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September 22, 2022

BY RESS AND EMAIL

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

Dear Nancy Marconi:

**Re: Enbridge Gas Inc. (“Enbridge Gas”)
Ontario Energy Board (“OEB”) File: EB-2022-0157
Panhandle Regional Expansion Project
Interrogatory Responses**

Consistent with Procedural Order No. 1, enclosed please find the redacted interrogatory responses for the Panhandle Regional Expansion Project.

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	Description of Document	Confidential Information Location	Brief Description	Basis for Confidentiality
Exhibit I.PP.5	Interrogatory response to I.PP.5	Page 2 of 3	Commercially Sensitive Information	The redactions relate to information that is commercially sensitive, considered to be Presumptively Confidential, and consists of financial and/or commercial material that Enbridge Gas has consistently treated as confidential. Disclosure of customer-specific demands could divulge investment plans, prejudice competitive positions and/or interfere with ongoing negotiations.

Exhibit	Description of Document	Confidential Information Location	Brief Description	Basis for Confidentiality
Exhibit I.PP.16, Attachment 1	Interrogatory response to I.PP.16, Attachment 1	Page 1 and Page 2	Commercially Sensitive Information	The redactions relate to information that is commercially sensitive, considered to be Presumptively Confidential, and consists of financial and/or commercial material that Enbridge Gas has consistently treated as confidential. Disclosure of this information could prejudice competitive positions and/or interfere with ongoing negotiations.
Exhibit I.PP.18, Attachment 1	Interrogatory response to I.PP.18, Attachment 1	Page 4 of 6	Commercially Sensitive Information	The redactions relate to information that is commercially sensitive and considered to be Presumptively Confidential. Enbridge Gas has consistently treated this type of information as confidential. Disclosure of this information could prejudice competitive positions and/or interfere with ongoing or future negotiations.

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

Also, please note an excel version of the following exhibits have been included with this submission.

- Exhibit I.ED.8, Attachment 1
- Exhibit I.ED.14, Attachment 1
- Exhibit I.ED.15, Attachment 2
- Exhibit I.ED.15, Attachment 4
- Exhibit I.FRPO.9, Attachment 1

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

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit B, Tab 2, Schedule 1, pages 1-2

Preamble:

The proposed Panhandle Regional Expansion Project (Project) consists of two distinct projects: Panhandle Loop and Leamington Interconnect. These two projects are part of the Panhandle System expansion but are geographically separated and the construction schedule and in-service dates are one year apart. The construction of the Panhandle Loop which includes NPS 36 pipeline and ancillary measurement, pressure regulation and station facilities are planned to commence in Q1 of 2023 and be placed into service by November 2023.

The construction of the Leamington Interconnect which includes NPS 16 pipeline and valve-site station (tie-in) facilities is planned to commence in Q2 of 2024 and be placed into service by November 2024.

Question:

- a) Please discuss the rationale for proposing the construction start and in-service date of the Leamington Interconnect, sequentially, approximately one year after the proposed construction start and in-service date for the Panhandle Loop.
- b) Please explain why the Panhandle Loop and Leamington Interconnect could not be constructed simultaneously to achieve a single in-service date for the Project with its full incremental capacity achieved in the Winter 2023/2024.

Response

- a) and b)
Enbridge Gas determined that constructing the Panhandle Loop in 2023 and the Leamington Interconnect in 2024 (i.e., staging the Project builds) was preferred compared to constructing both in 2023.

Staging construction in the manner proposed will allow Enbridge Gas to meet the Panhandle System design day demand in both Winter 2023/24 and Winter 2024/25 while ensuring that the deployment of capital is aligned with the timing of the system shortfall.

At this time it is not possible to construct the Leamington Interconnect for a November 1, 2023 in-service date as project development activities, specifically procurement of long-lead materials and lands, have been scheduled to support the proposed November 1, 2024 in-service date.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit B, Tab 1, Schedule 1, pages 8 and 9

Preamble:

Enbridge Gas stated that email notice of a follow-up Binding Reverse Open Season to all contract customers in the Area of Benefit was issued on September 29, 2021 and closed on October 15, 2021 (16-business days), that indicated it received no requests for turn-back of capacity. Further, Enbridge Gas stated that it did not receive any communications from customers requesting to reduce their existing firm or interruptible contract demands since the close of the Binding Reverse Open Season.

Enbridge Gas further stated that in addition to the Expression of Interest and Binding Reverse Open Season, customers can de-contract firm or interruptible capacity provided that they meet the notice requirements per the terms and conditions of their distribution contract.

Question:

- a) For Area of Benefit existing contract customers, please provide the total:
 - i. number of customers
 - ii. contract demand in 10³m³/day
 - iii. volume weighted average remaining contract term in years as of the projected in-service date of the Project

- b) For the Binding Reverse Open Season, please provide:
 - i. the number of customers notified and total contract demand in 10³m³/day in the Area of Benefit
 - ii. the number of customers and total contract demand in 10³m³/day that confirmed that they did not wish to turn-back capacity
 - iii. the number of customers and total associated contract demand in 10³m³/day that did not respond to the September 29, 2021 notice

Response

- a)
 - i. There were 129 existing distribution contract rate accounts, as well as 11 telemetered Large Volume rate M2 general service accounts in the PREP Area of benefit at the time the Expression of Interest process was launched.
 - ii. See table below.

Contract Demand	10³m³/day
Firm	9,379
Interruptible	2,398
Total Contract Demand	11,777

- iii. Distribution contracts do not expire. They are evergreen (i.e., automatically renew annually) unless a customer provides notice to Enbridge Gas that they wish to terminate the contract prior to the end of the “Initial Term” of the contract, or prior to the annual renewal date of the contract.

Enbridge Gas has no basis for which to assume that existing distribution contracts will not be renewed. In fact, the current Application provides evidence of continued growth in demand for natural gas in the Panhandle market area. This growth is supported by the results of the two reverse open seasons conducted for this Project, for which no bids to turnback capacity were received from existing contract customers in the Area of Benefit.

After the “Initial Term” of a distribution contract has passed, as defined in the contract terms and conditions, the contracts are renewed on a year-to-year basis unless written notice to terminate is provided at least 3 months prior to the end of the Initial Term of the contract, or before the annual renewal date.

Customers on distribution contracts that are currently renewed annually will be required to contract for another initial term for a minimum of 5 years up to a maximum of 20 years if they are expanding their operations and have requested incremental capacity that will be provided through this Project.

- b)
 - i. All contract customers noted in part a) i) above were contacted, representing all contract demand noted in part a) ii) above.

ii. and iii.

No bids to turnback capacity were received from either of the concurrent EOI/reverse open season, or the binding reverse open season.

- c) Enbridge Gas did not receive any bids to turnback capacity during the concurrent EOI/reverse open season process, which was open from February 17, 2021 to March 31, 2021 (47 days). Existing contract rate customers within the PREP Area of Benefit all have assigned Enbridge Gas account managers that directly communicate updates and serve their needs.

If Enbridge Gas had received any requests for turnback or to reduce contracted firm or interruptible capacity, and needed more time, Enbridge Gas would have worked with the customer either before or after the binding reverse open season.

As no requests for capacity turnback were received during the EOI/reverse open season process, and no requests were received between the time of the close of the EOI/reverse open season process and the binding reverse open season process, the 16-business day period for the binding reverse open season process was deemed to be appropriate.

Customers were not explicitly provided advance notice of the Binding Reverse Open Season. The binding reverse open season was sent out via email from the Enbridge Gas Large Volume Customer Communications mailbox and a notice was posted on the Enbridge Gas website.

- d) The term de-contract refers to a customer's ability to reduce the firm or interruptible parameters in their distribution contract.

Provided notice is given by the customers per the terms and conditions of their contract, customers can request to terminate their contract (will not take gas distribution service from Enbridge Gas after the annual renewal date), terminate their distribution contract and request to be moved to a non-contract general service rate (most commonly Rate M2 in the Union South Rate Zone) or reduce/de-contract their current levels of firm and/or interruptible service based on a reduction of peak gas demands.

- e) Please see the response to part a) iii. for context regarding contract terms. Additionally, the response to part a) ii. provides the total amount of contract demand currently under contract by existing contract customers in the Area of Benefit for the Project.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit B, Tab 2, Schedule 1, page 7, paragraph 20 and page 9, paragraph 26

Preamble:

The Project's incremental capacity is estimated to be 203 TJ/d. Approximately 98% of this capacity is expected to meet the demand of contract rate customers. Enbridge Gas asserted that, at the time of filing the application, 80% of the contract rate customer demand is subject to commitments by those customers. Binding commitments represent 159 TJ/d, including approximately 62 TJ/d of executed firm distribution contracts. Enbridge Gas noted that 100% of the 2023/2024 forecasted incremental demand on the Panhandle System is secured with binding customer commitments.

Question:

- a) Please clarify what the "binding commitments" that are not firm distribution contracts entail.
- b) Please provide any updates to the contract rate customers commitments or the executed contracts since filing the application.

Response

- a) A Commitment Letter ("CL") and/or a Letter of Indemnity ("LOI") are "binding commitments" that are not firm contracts, and can be utilized prior to the execution of a distribution contract. These binding commitments demonstrate a customer's commitment to the capacity they have expressed interest in or have formally requested from Enbridge Gas.

The use of CLs is a standard practice for Enbridge Gas and they have been used previously for the Chatham-Kent Rural Pipeline project (EB-

2018-0013). They are intended to provide further customer commitment to the requests for capacity received through an EOI process, prior to a customer executing an LOI or distribution contract.

There are no financial assurances required to execute a CL.

The use of LOIs is also standard practice for Enbridge Gas. They are commonly used prior to the execution of a distribution contract. Their usage allows Enbridge Gas to order long-lead time items and/or initiate project activities prior to the finalization of a distribution contract. Financial assurances are required for LOIs.

Refer to response to Exhibit I.PP.5 part b) for the LOI and CL templates.

- b) Table 1 below outlines the customer commitments to the Project as at the June 10, 2022 LTC application filing date, as well as the updated commitment numbers as at September 22, 2022, organized by commitment type.

Table 1

	TJ/d	
	As at Jun 10, 2022 (LTC filing)	As at Sep 22, 2022 (IR Responses)
PREP Capacity Commitments		
Executed Distribution Contracts	62	63
Executed Letters of Indemnity / Commitment Letters	97	104
Total PREP Capacity Commitments	159	167

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit B, Tab 1, Schedule 1, Attachment 1, page 5; Exhibit B, Tab 1, Schedule 1, page 11

Preamble:

Enbridge Gas stated that over 318 TJ/day of interest for incremental firm and interruptible demand over the 2023/2033 period from 44 customers was indicated through an Expression of Interest (EOI). Enbridge Gas provided a table showing its Panhandle Design Day demand forecast.

Question:

- a) Please provide the annual results of the Expression of Interest in each of the three categories:
 - i) new firm natural gas needs
 - ii) conversion from interruptible distribution service to firm distribution service
 - iii) new interruptible natural gas needs

- b) Please describe how the results of the Expression of Interest have been incorporated into Enbridge Gas's Panhandle Design Day demand forecast; e.g., are 100% of the volumes from the first two categories in the EOI included within the demand forecast?

Response

- a) Please see Table 1 below.

Table 1

PREP EOI Bid Summary - by year (m3/hour)

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
Incremental Firm	88,800	49,610	72,690	40,200	33,400	24,450	27,000	23,100	25,600	23,100	2,900	410,850
Interruptible to Firm Conversion	2,431	61,125	540	-	-	-	-	-	-	-	-	64,096
Firm or Interruptible Turnback	-	-	-	-	-	-	-	-	-	-	-	-
Total Incremental Firm	91,231	110,735	73,230	40,200	33,400	24,450	27,000	23,100	25,600	23,100	2,900	474,946
Incremental Interruptible	-	-	-	441	-	-	500	-	-	-	500	1,441
Total Incremental Firm + Interruptible	91,231	110,735	73,230	40,641	33,400	24,450	27,500	23,100	25,600	23,100	3,400	476,387

NOTES:

- The volumes received through the Expression of Interest process were in cubic metres of gas per hour (m³/hr).
- b) The Expression of Interest results were used to generate an informed demand forecast. All firm demands received through the Expression of Interest process have been incorporated into the long-term demand forecast.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff (“STAFF”)

INTERROGATORY

Reference:

Exhibit B, Tab 2, Schedule 1, Page 11, Table 3: Panhandle System Capacity, Design Day Demand, and Shortfall

Preamble:

Enbridge Gas stated that the proposed Project is needed to meet the forecasted firm customer demands by November 1, 2023 and beyond.

As part of its filed evidence, Enbridge Gas provided the following table detailing the forecast of the Panhandle System capacity, Design Day Demand, and shortfall. The existing Panhandle System capacity is 713 TJ/d. Without the Project, Enbridge Gas forecast that the Design Day Demand in the winter 2023/2024 will be 744 TJ/d resulting in the first system shortfall of an estimated 31 TJ/d.

Table 3: Panhandle System Capacity, Design Day Demand, and Shortfall

	Historical Actuals		FORECAST									
	Winter 19/20	Winter 20/21	Winter 21/22	Winter 22/23	Winter 23/24	Winter 24/25	Winter 25/26	Winter 26/27	Winter 27/28	Winter 28/29	Winter 29/30	Winter 30/31
Panhandle System Capacity (TJ/d)	725	725	713	713	713	713	713	713	713	713	713	713
Design Day Demand Forecast (TJ/d)	640	656	672	694	744	828	854	880	906	932	958	983
Surplus (shortfall is negative) (TJ/d)	84	89	41	20	(31)	(114)	(140)	(166)	(192)	(218)	(244)	(270)

Question:

- a) Please restate the table above assuming the Project is approved as planned with an in- service date of November 2023 for the NPS 36 pipeline and November 2024 for the NPS 16 pipeline.
- b) Please restate the table above showing the forecast of the Panhandle System capacity, Design Day Demand and shortfall in TJ/d with:

- i. The additional proposed NPS 36 pipeline only with in-service date of November 2023
 - ii. The additional proposed NPS 16 pipeline only with in service date of November 2024
- c) Please discuss Enbridge Gas's approach to managing the risk of capacity shortfall of the Panhandle System if:
 - i. The in-service date for the proposed NPS 36 pipeline is delayed
 - ii. The in-service date for the proposed NPS 16 pipeline is delayed
- d) Please discuss Enbridge Gas's approach to accommodate the proposed November 2023 in-service date for the proposed Panhandle Loop in the event that construction start is delayed.
- e) Please discuss the impact on construction start and the proposed in-service date of the Leamington Interconnect in the event that the proposed in-service date for the Panhandle Loop is delayed.

Response

a) Please see Table 1. All values shown in Table 1 are in TJ per day.

Table 1

	Historical Actuals		FORECAST									
	W19/20	W 20/21	W 21/22	W 22/23	W 23/24 Stage 1	W 24/25 Stage 2	W 25/26	W 26/27	W 27/28	W 28/29	W 29/30	W 30/31
Proposed System Capacity	725	725	713	713	833	916	916	916	916	916	916	916
Demand Base Forecast (TJ/d)	640	656	672	694	744	828	854	880	906	932	958	983
Surplus (shortfall is negative)	84	69	41	20	89	89	63	37	11	(15)	(41)	(67)

b)

i. Please see Table 2. All values shown in Table 2 are in TJ per day.

The incremental 120 TJ/d resulting from the installation of the NPS 36 Panhandle Loop is shown in Winter 2023/2024. The 5 TJ/d of surplus in Winter 2024/2025 is on the margin of design which is too close to a shortfall given the projection of growth expected in the following year. One large new customer or a change in timing of customer attachments could drive the system into a shortfall.

Table 2

	Historical Actuals		FORECAST									
	W19/20	W 20/21	W 21/22	W 22/23	W 23/24 Stage 1	W 24/25	W 25/26	W 26/27	W 27/28	W 28/29	W 29/30	W 30/31
Proposed System Capacity	725	725	713	713	833	833	833	833	833	833	833	833
Demand Base Forecast (TJ/d)	640	656	672	694	744	828	854	880	906	932	958	983
Surplus (shortfall is negative)	84	69	41	19	89	5	(21)	(47)	(73)	(99)	(125)	(150)

ii. Please see Table 3. It is not possible to serve the forecast demand by only installing the NPS 16 Leamington Interconnect for Winter 2024/2025. The NPS 16 Leamington Interconnect capacity reduces to ~44 TJ/d without the benefit of the NPS 36 Panhandle loop being in service.

Table 3

	Historical Actuals		FORECAST									
	W19/20	W 20/21	W 21/22	W 22/23	W23/24	W 24/25 Stage 2	W 25/26	W 26/27	W 27/28	W 28/29	W 29/30	W 30/31
Proposed System Capacity	725	725	713	713	713	757	757	757	757	757	757	757
Demand Base Forecast (TJ/d)	640	656	672	694	744	828	854	880	906	932	958	983
Surplus (shortfall is negative)	84	69	41	19	(31)	(71)	(97)	(123)	(149)	(175)	(201)	(227)

c) and d)

In the event of a delayed in-service date of either the Panhandle Loop or the Leamington Interconnect, Enbridge Gas would evaluate short-term alternatives to increase Panhandle System capacity. The most likely action would be to contract firm deliveries at Ojibway through an exchange service for Winter 2023/24 to serve as many customer requests as possible.

Contracting Firm Exchange service was evaluated by the Company. Based on results from the RFP for a Firm Exchange between Dawn and Ojibway, the estimated capacity on PEPL system with delivery to Ojibway is only 21 TJ/d (whereas a minimum of 42 TJ/d of incremental deliveries at Ojibway is required to delay the in-service date of the proposed Project by one year).¹ Therefore, the required capacity to meet all Winter 2023/24 firm demands is not commercially available, resulting in design day demand exceeding system capacity for Winter 2023/24.

The executed Firm distribution contracts underpinning the need for the Project include a condition that the Board grants a leave to construct for the proposed Project. In the event Enbridge Gas does not have sufficient capacity through the proposed Project, the Company would provide formal notice of cancellation for firm service.

As of September 22, 2022, Enbridge Gas has executed 4 firm contracts and 2 Letters of Indemnity with customers that would need to be canceled. Once these contracts are canceled, Enbridge Gas would then need to begin the process of re-contracting with these customers for the delayed in-service date.

Additionally, there are 30 Commitment Letters which have been executed by customers that have expressed intent to execute a distribution contract or LOI for new or incremental natural gas capacity that would be created by the Project. These Commitment Letters would have to be cancelled and the customers would also need to be informed that their requested in-service date would be delayed, and that their requirements could not be met.

Greenhouse operations can be built and become operational in a short period of time – as little as six months. With a delay of in-service date and the corresponding lack of certainty of natural gas supply, there is a risk that greenhouse operators will change or cancel their expansion plans for the Leamington-Kingsville area, and potentially move their operations outside of the

¹ Exhibit C, Tab 1, Schedule 1, Pages 14 to 19.

province. Other customer types may also be required to change their business plans, which are dependent on firm natural gas distribution service.

- e) In the event the Panhandle Loop in-service date is delayed, all else constant, the Leamington Interconnect construction schedule and in-service date of November 1, 2024 would not be impacted. However, the delay of the Panhandle Loop would result in a shortfall of capacity for customer demand for Winter 2023/2024.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit B, Tab 1, Schedule 1, pages 18-19, paragraphs 55 and 56

Preamble:

Enbridge Gas stated that the capacity provided by the Project is intended to ensure the growing Panhandle Market has sufficient capacity until Winter 2028/2029.

In discussion of Project timing and growth plans, Enbridge Gas identified the potential need for a second phase of transmission expansion to meet the demands that are forecasted over the next 20 years. Enbridge Gas stated that it is forecasting the need for this second phase of transmission expansion to take place by Winter 2028/2029.

Question:

- a) Please explain the rationale for the assertion that the Panhandle System with the proposed incremental capacity provided by the Panhandle Regional Expansion Project, subject to this application, will not be sufficient to provide the needed capacity to the Panhandle Market beyond Winter 2028/2029?

Response

- a) Please refer to the response at Exhibit I.STAFF.5 a). Assuming the Project is approved, the Panhandle System Capacity of approximately 916 TJ/d compared to the forecast demands of approximately 932 TJ/d by Winter 2028/2029 would result in an estimated shortfall of 15 TJ/d (rounding). The forecasted demand is based on customer responses to the EOI process conducted in 2021 (Exhibit B, Tab 1, Schedule 1, Pages 2-11) and at Winter 2028/2029 would be greater than system capacity.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff (“STAFF”)

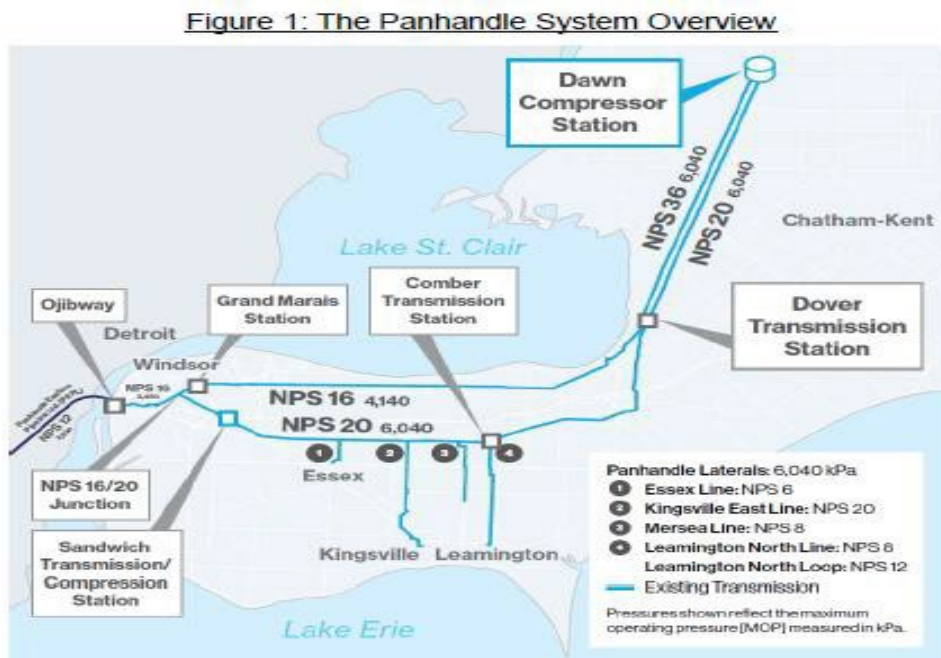
INTERROGATORY

Reference:

Exhibit B, Tab 2, Schedule 1, Page 2, Figure 1: Panhandle System Overview;
Exhibit C, Tab 1, Schedule 1, pages 1-25, Project Alternatives; Exhibit C, Tab 1,
Schedule 1, page 9, Table 1: Summary of Current Panhandle System Pressure
Bottleneck and Proposed Facility Solution

Preamble:

Enbridge Gas provided a diagram of the Panhandle System overview:



Enbridge Gas identified two Panhandle System’s pressure bottlenecks that need to be eliminated to provide the system capacity to meet the forecast demand growth:

1. The loss of pressure on NPS 20 Panhandle Line between Dover TS and Comber TS (Dover to Comber bottleneck)

2. The loss of pressure between NPS 20 Panhandle Line and Leamington-Kingsville market (Leamington-Kingsville market bottleneck)

The Project has been selected as a preferred alternative after assessment of:

1. Facility alternatives
 1. Panhandle Loop, to address the Dover to Comber bottleneck, construction of NPS 36 to loop (i.e. parallel to) the existing NPS 20 Panhandle Line west of Dover Transmission Station (TS).
Leamington Interconnect, to address Leamington-Kingsville market bottleneck, construction of lateral NPS 16 connecting Kingsville East Line, Mersea Line, Leamington North Line and Leamington North Loop.
The Panhandle Loop and Leamington Interconnect were selected as the best combined alternatives to meet the need determined by Enbridge Gas.
 2. Upsize of the existing NPS 16 Panhandle Line or NPS 20 Panhandle Line west of Dover TS
 3. Liquefied Natural Gas (LNG) Plant
2. Integrated Resource Planning Alternatives (IRPA)
 1. Firm 3rd party exchange between Dawn and Ojibway
 2. Demand side management alternative: Enhanced Targeted Energy Efficiency (ETEE)
 3. Trucked Compressed Natural Gas (CNG)
3. Hybrid or combination of facility with IRPA alternative
 1. Firm exchange between Dawn and Ojibway combined with the looping of the existing NPS 20 Panhandle Line west of Dover TS and installing a Leamington Interconnect lateral NPS 16

Enbridge Gas stated that it employed the following criteria to assess and select the preferred alternative:

1. Economic criteria as a quantitative measure of cost-effectiveness and used the following metrics:
 1. Total cost
 2. Cost per unit of capacity
 3. Net Present Value (NPV)
2. Timing to meet the Panhandle System forecast demand within five years
3. Safety and reliability to provide reliable and safe delivery of firm volumes on the coldest winter day on the Panhandle System
4. Risk management defined as price risk increase once the alternative

- has been deployed
5. Environmental and socio-economic impact which is defined by Enbridge Gas as qualitative impacts on Indigenous peoples, municipalities, landowners and the environment

Question:

- a) Using the Panhandle System overview diagram please delineate the pipeline facilities alternatives discussed in the evidence. Please use a separate overview diagram for each of pipeline facilities alternatives considered to address the two system bottlenecks.
- b) Please provide a table comparing all the alternatives assessed (facilities, IRPA and Hybrid) including the proposed Project. For each alternative provide values (quantitative or qualitative) of the five assessment criteria noted in the evidence. In a separate column explain the rationale for the outcome of the assessment for each of the alternatives.

Response

- a) Please see Figures 1-8 below for diagrams of each of the Facility, IRPA and Hybrid alternatives discussed.

Facility Alternative Maps

Figure 1

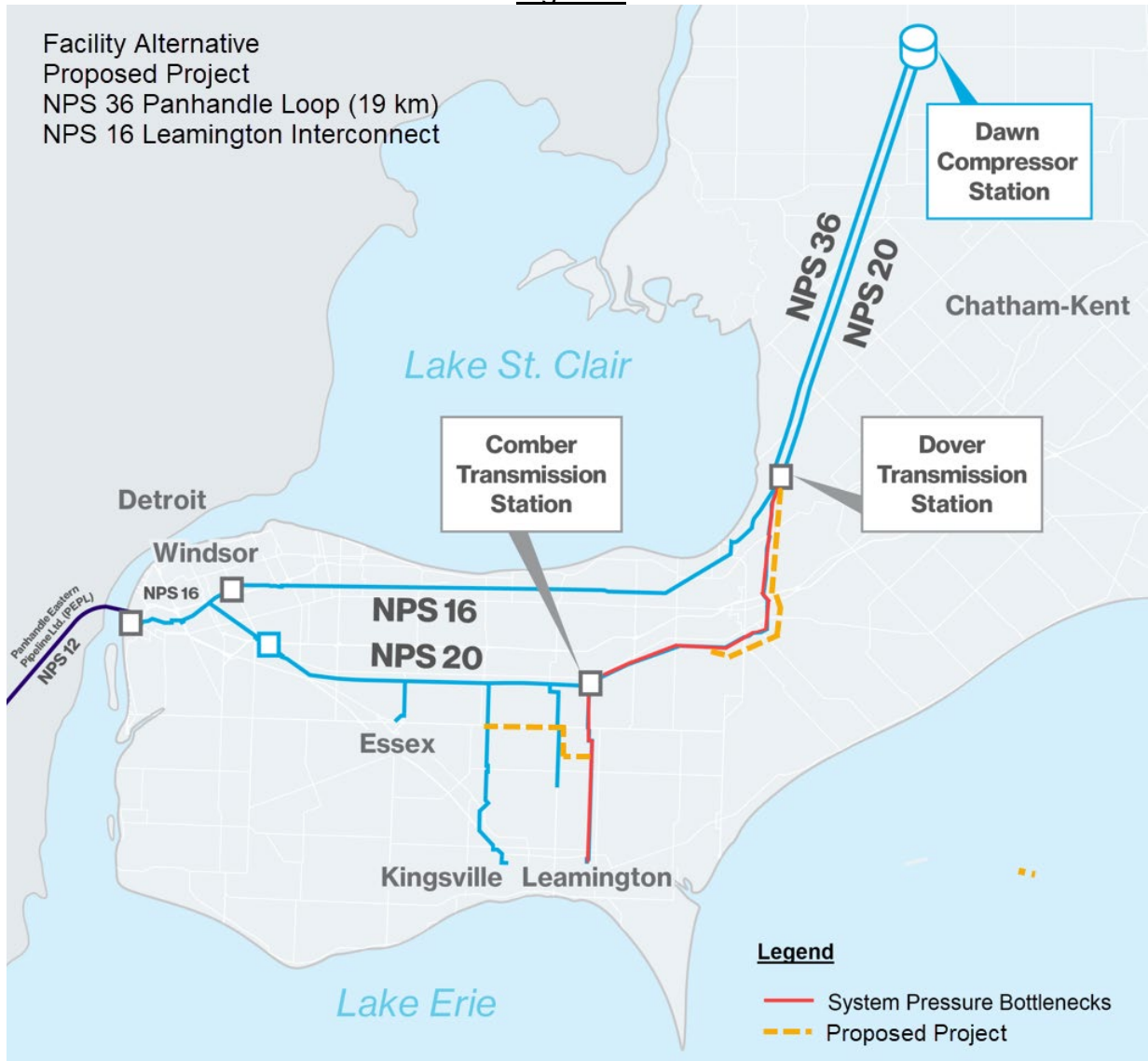


Figure 2

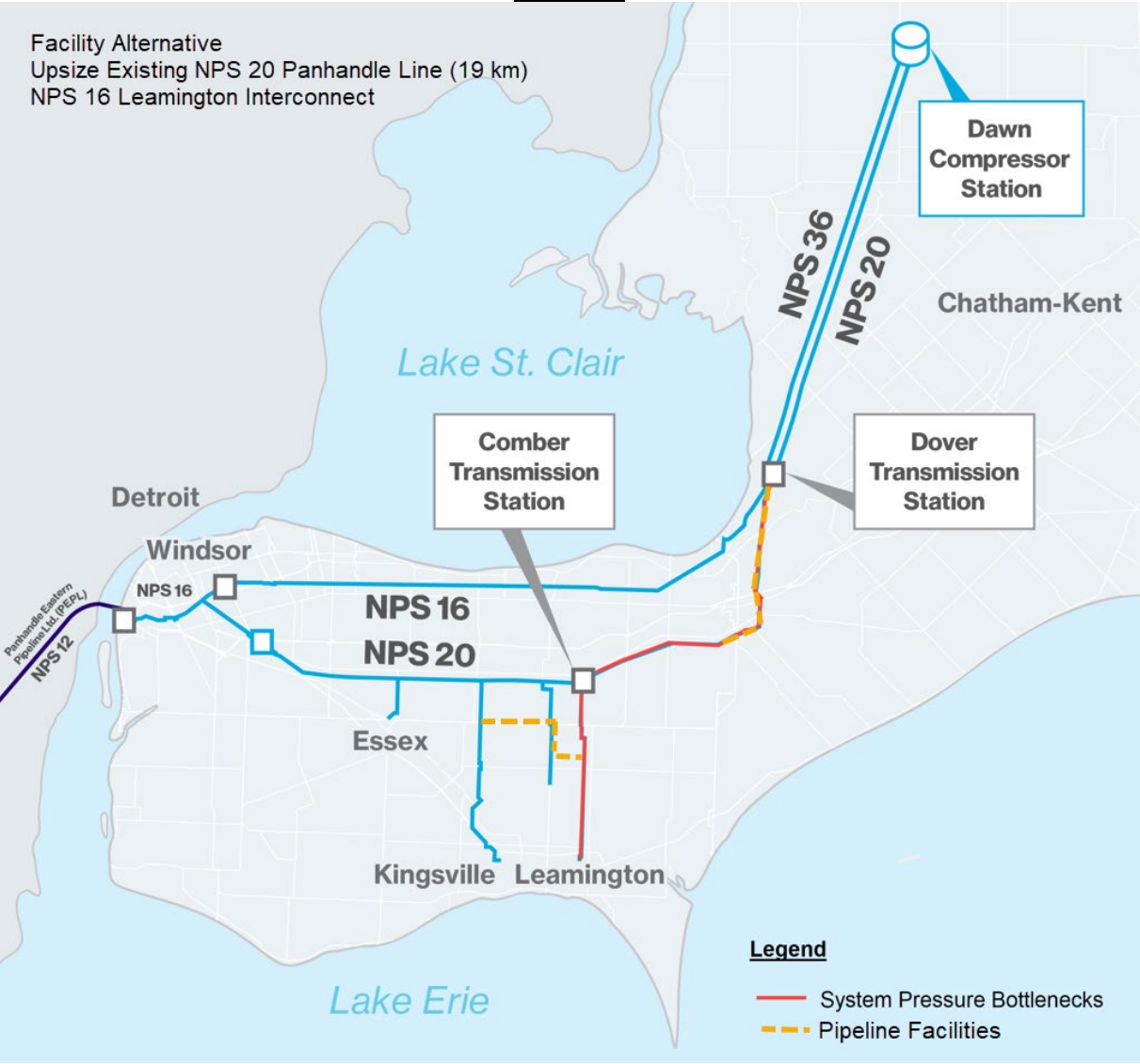


Figure 3

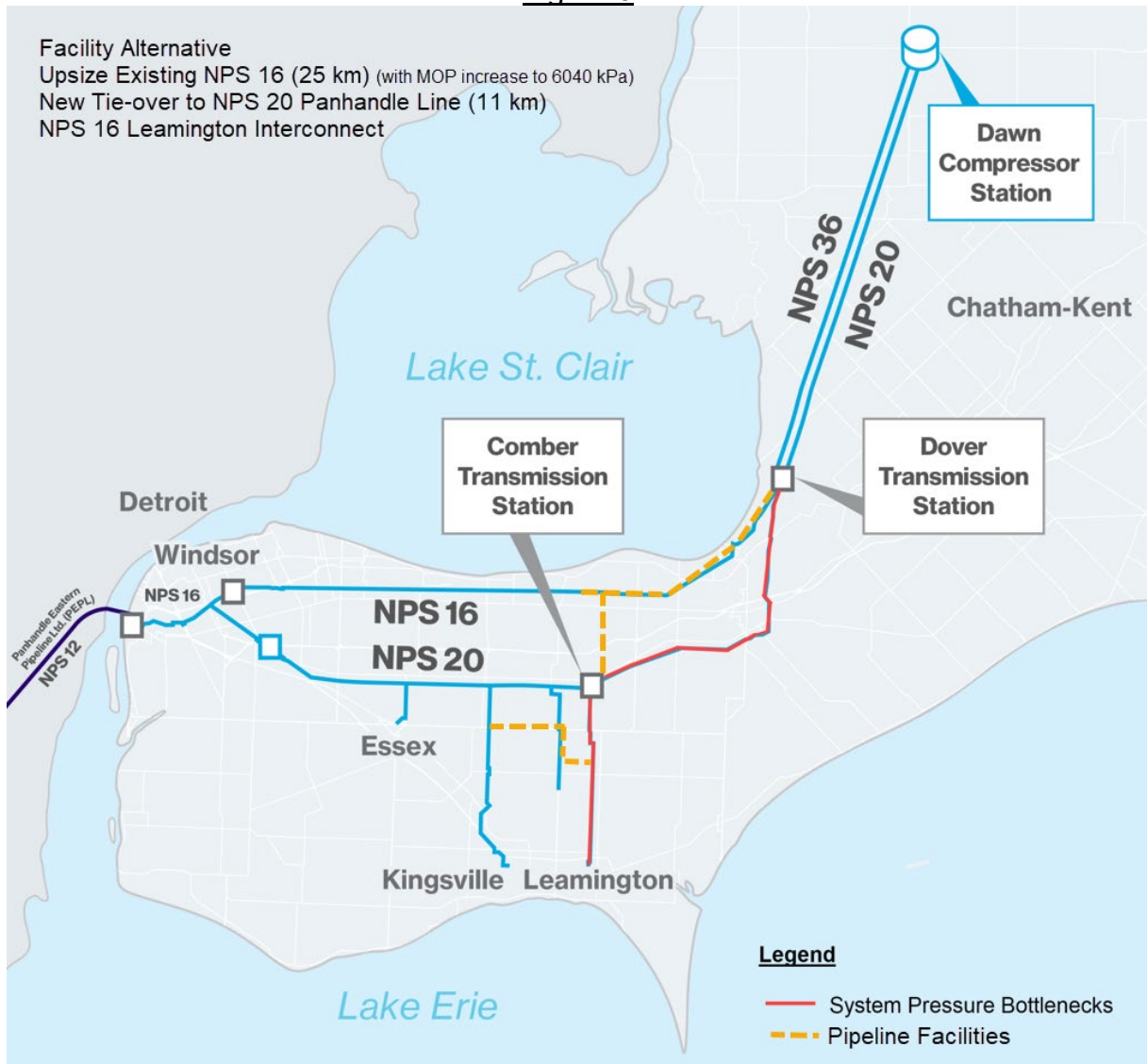
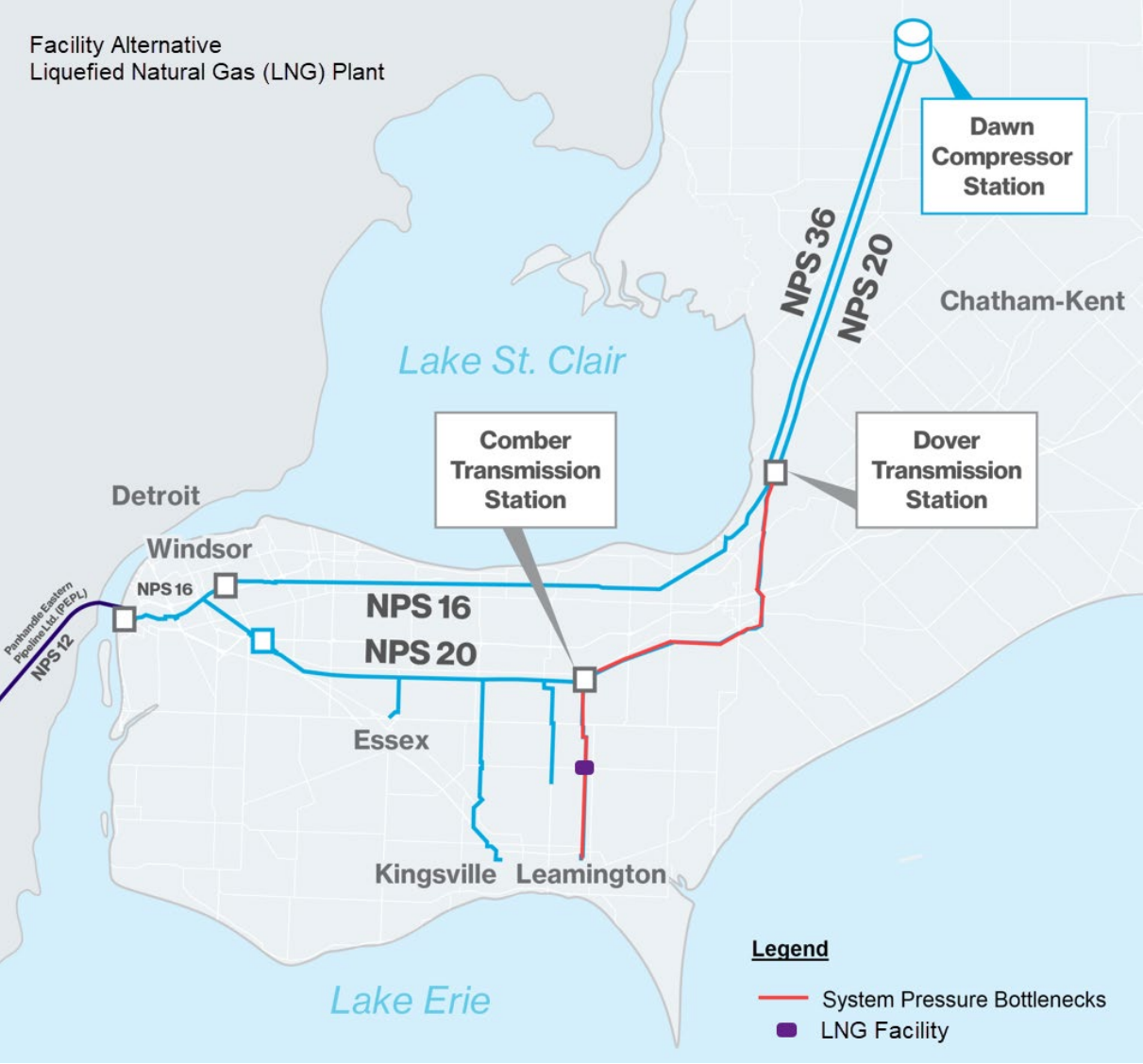


Figure 4



Integrated Resource Planning Alternatives

Figure 5

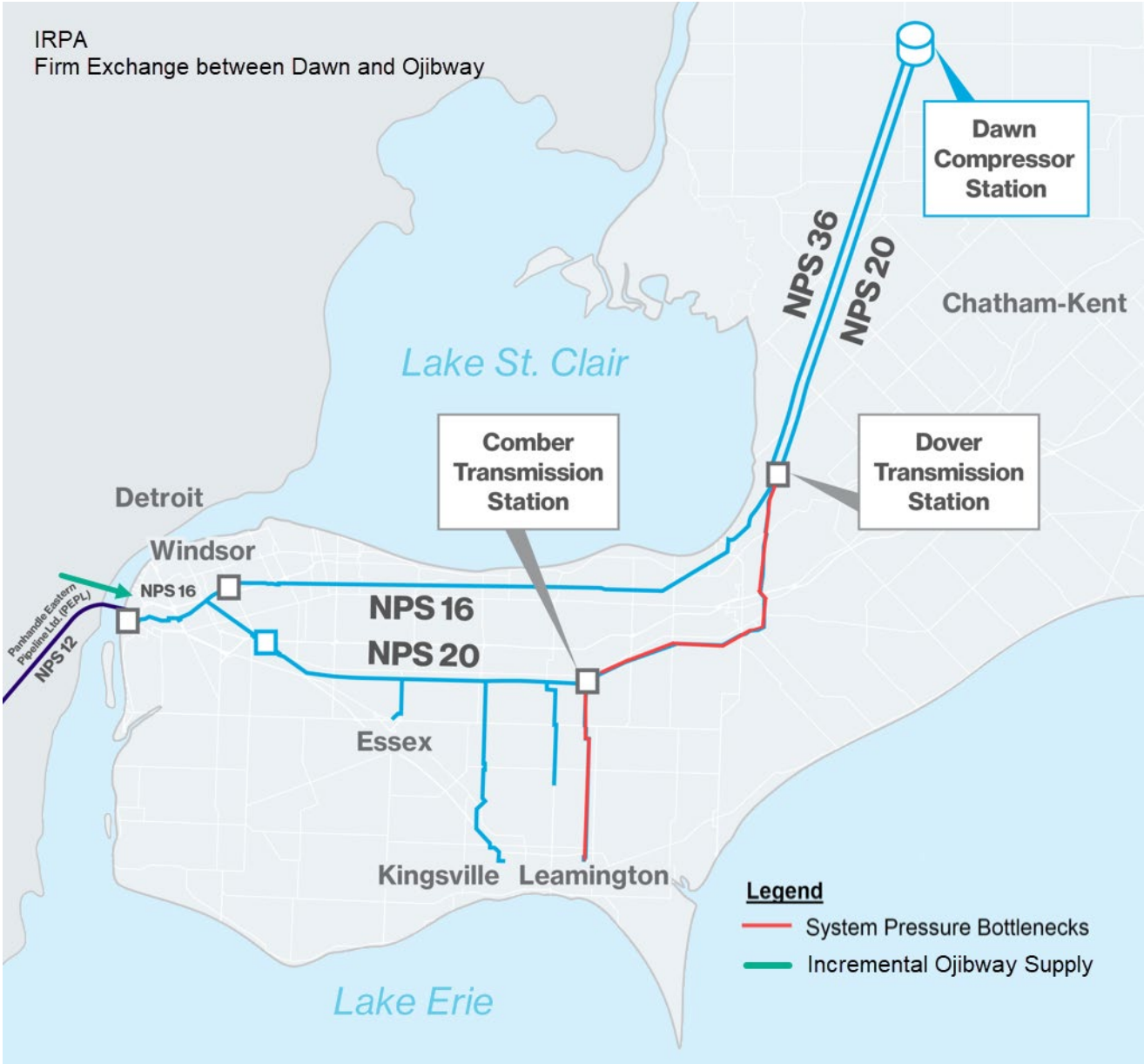


Figure 6

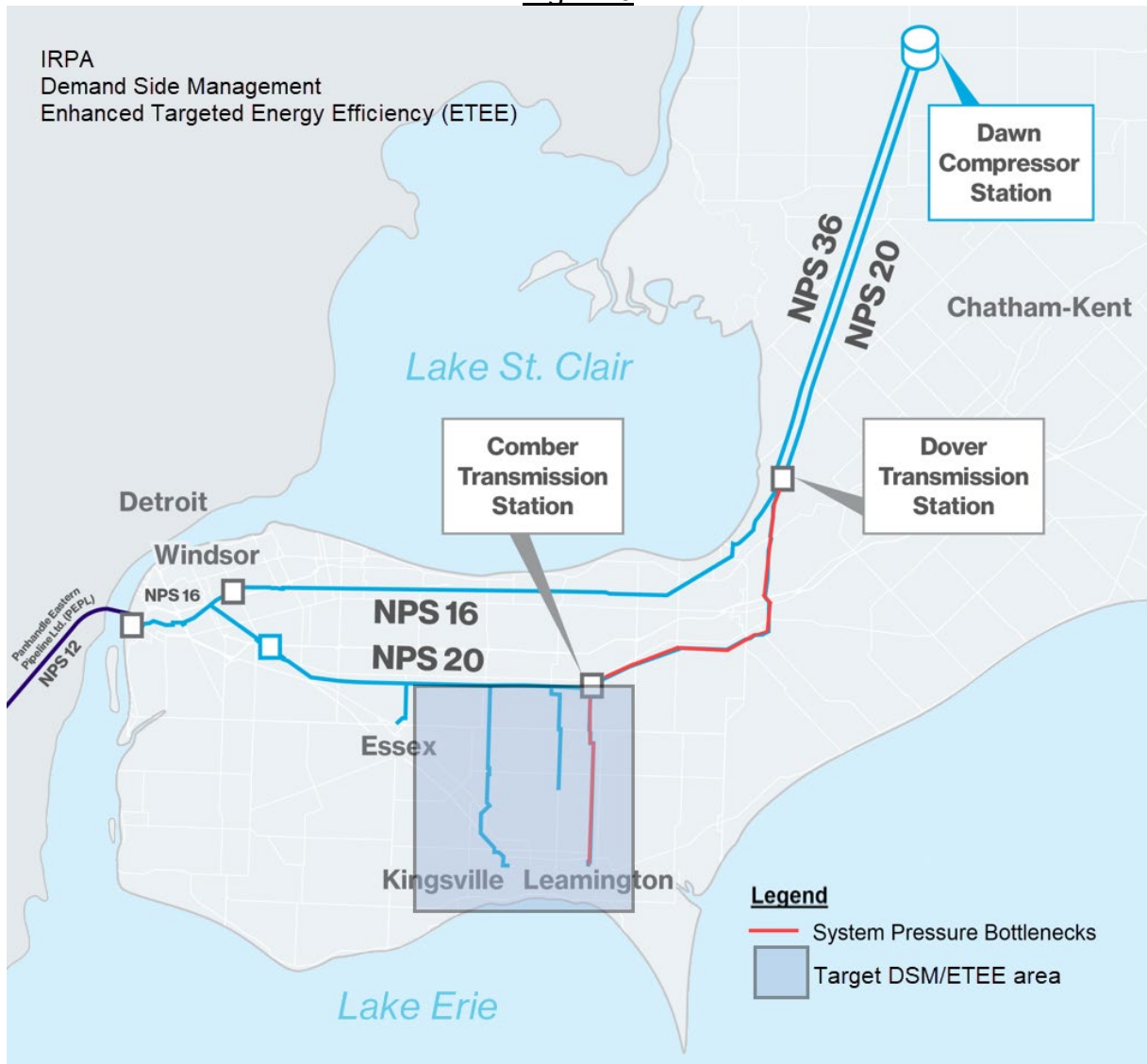
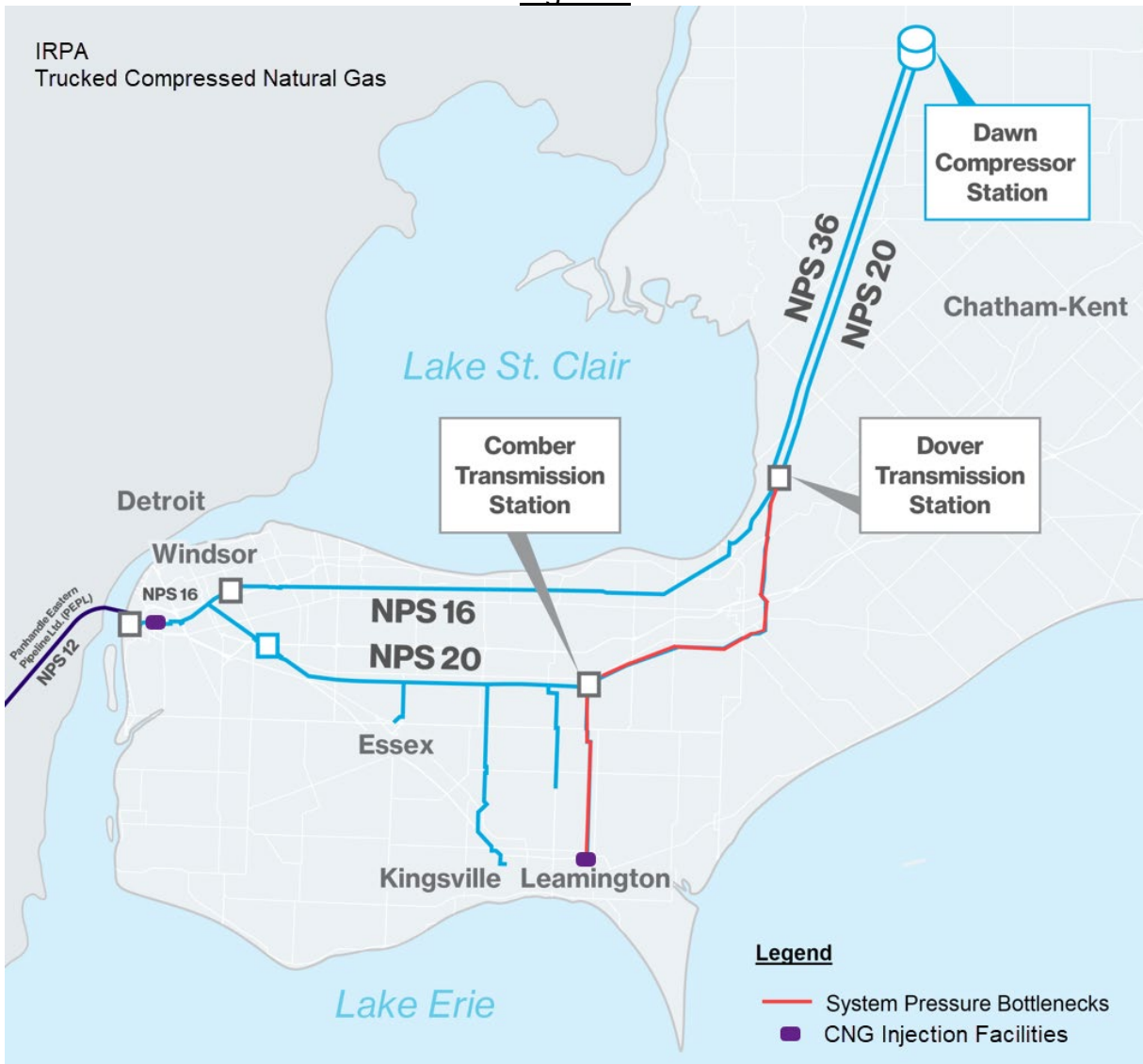
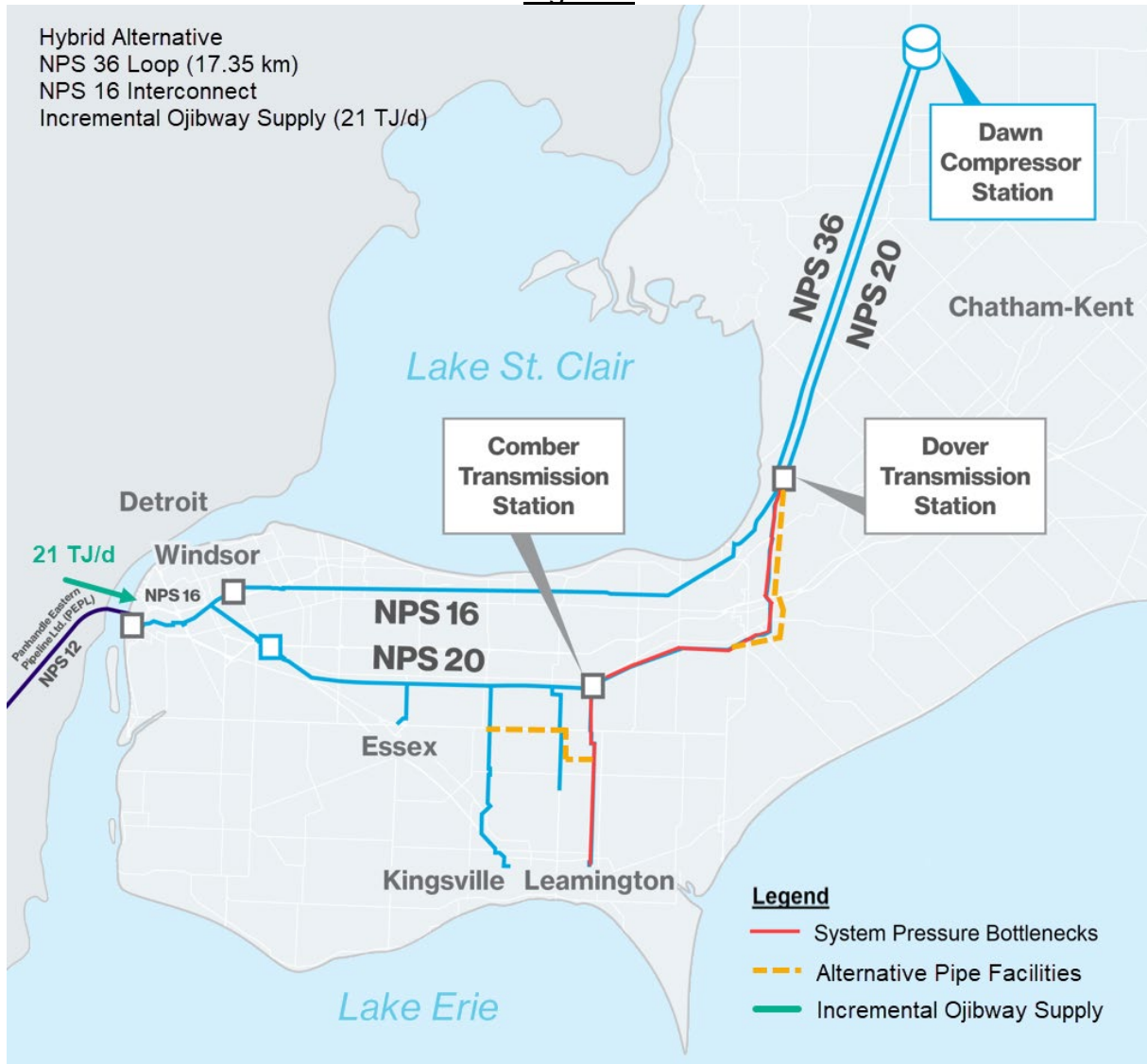


Figure 7



Hybrid Alternative

Figure 8



- b) For a summary of viable alternatives (i.e., alternatives that meet all Assessment Criteria), please see Attachment 1 to this response. For a summary of non-viable alternatives (i.e., alternatives that do not meet all Assessment Criteria) please see Attachment 2 to this response. The Assessment Criteria applied to all alternatives is discussed at Exhibit C, Tab 1, Schedule 1, Pages 3-4.

Viable Alternative Description	Type	Capacity Created (TJ/d)	Cost Effectiveness			Timing	Safety & Reliability	Risk Management	Environmental & Socio-economic	Rationale
			Total Cost (\$ million)	\$/TJ	NPV					
Proposed Project 19 km NPS 36 Panhandle Loop NPS 16 Leamington Interconnect	Facility	203	\$314.4	\$1.55	\$(66.9)	✓	✓	✓	✓	Most cost-effective alternative with best cost per unit of capacity. The proposed Project includes a larger capacity, with a lower cost per unit of capacity, to more effectively meet the growing customer demands. Please also see the response at Exhibit I.EP.8 for discussion of long-term benefits of this alternative.
17.35 km NPS 36 Panhandle Loop NPS 16 Leamington Interconnect 21 TJ/d Firm Exchange between Dawn and Ojibway	Hybrid #1	203	\$376.4	\$1.85	\$(129.7)	✓	✓	✓	✓	More costly than the preferred alternative based on cost per unit of capacity (\$1.85 vs. \$1.55 for the proposed Project) and NPV [\$(129.7) vs. \$(66.9) for the proposed Project] due to the need for both facilities and incremental annual O&M costs for a firm exchange service. There is future price risk with respect to exchange services. The service contains price variability compared to facility alternatives which have a fixed cost once installed.
19 km NPS 30 Panhandle Loop NPS 16 Leamington Interconnect	Facility	195	\$304.5	\$1.57	\$(56.2)	✓	✓	✓	✓	Provides a slightly higher NPV compared to the proposed Project, but creates less capacity (195 TJ vs 203 TJ for the proposed Project) and therefore is less cost effective based on cost per unit of capacity (\$1.57 vs \$1.55 for the proposed Project). Limits ability to serve anticipated future system demand.
19 km NPS 30 Panhandle Loop NPS 20 Leamington Interconnect	Facility	203	\$342.3	\$1.61	\$(85.7)	✓	✓	✓	✓	More costly than the proposed Project based on cost per unit of capacity and NPV (\$1.61 vs. \$1.55 for the proposed Project) and NPV [\$(85.7) vs \$(66.9) for the proposed project].
19 km NPS 36 Panhandle Loop NPS 20 Leamington Interconnect	Facility	212	\$332.4	\$1.64	\$(74.9)	✓	✓	✓	✓	More costly than the proposed Project based on cost per unit of capacity and NPV (\$1.64 vs. \$1.55 for the proposed project) and NPV [\$(74.9) vs \$(66.9) for the proposed project].

Viable Alternative Description	Provides market assurance in meeting the growing firm demands along the Panhandle System for the next five years.	Increases Ontario customers' access to diverse supply, storage, and price transparency of the Dawn Hub.	Provides load balancing between existing laterals to reduce the pressure drop between the NPS 20 Panhandle Line and the Leamington-Kingsville market, which also allows for incremental growth throughout the entire Panhandle Market.	Scalable with system growth.	Directly feeds area of growth.
Proposed Project 19 km NPS 36 Panhandle Loop NPS 16 Leamington Interconnect	✓	✓	✓	✓	✓
17.35 km NPS 36 Panhandle Loop NPS 16 Leamington Interconnect 21 TJ/d Firm Exchange between Dawn and Ojibway	✓	✓	✓	✓	✓
19 km NPS 30 Panhandle Loop NPS 16 Leamington Interconnect	✓	✓	✓	✓	✓
19 km NPS 30 Panhandle Loop NPS 20 Leamington Interconnect	✓	✓	✓	✓	✓
19 km NPS 36 Panhandle Loop NPS 20 Leamington Interconnect	✓	✓	✓	✓	✓

Non-Viable Alternative Description	Type	System Capacity Created (TJ/d)	Cost Effectiveness	Timing	Safety & Reliability	Risk Management	Environmental & Socio-economic	Rationale
Upsize of existing NPS 16 Panhandle Line west of Dover Transmission	Facility	N/A	N/A	X	X	✓	X	<p>This Alternative is not viable as it cannot be constructed for November 1, 2023 and maintain reliable service to Panhandle System customers. This alternative would require moving as many as nine downstream system connections from the NPS 16 Panhandle Line to the NPS 20 Panhandle Line and constructing a new interconnecting pipeline between the NPS 16 Panhandle Line and the NPS 20 Panhandle Line.</p> <p>Additionally, this alternative would require acquisition and development of new greenfield pipeline easements on previously undisturbed land resulting in increased environmental and landowner impacts compared to the proposed Project.</p>
Upsize of existing NPS 20 Panhandle Line west of Dover Transmission	Facility	N/A	N/A	X	X	✓	X	<p>The NPS 20 Panhandle Line is required to serve customers at all times of the year because the NPS 16 Panhandle Line cannot serve system demands on its own, even during periods of low demand in the summer. As result, reliable service to customers could not be maintained during the construction period while the NPS 20 Panhandle Line would be out of service. Therefore, a lift and lay of the NPS 20 Panhandle Line west of Dover Transmission is not a viable alternative.</p>
Liquefied Natural Gas (LNG) Plant	Facility	~192 TJ/d	<p>Costs: \$580 million in today's dollars</p> <p>O&M: \$5 million annually</p>	X	✓	✓	X	<p>This alternative cannot be constructed for Winter 2023/24 and does not meeting timing criteria. Additionally, this alternative is not financially feasible therefore Enbridge Gas did not assess it further.</p>
Firm 3rd party exchange between Dawn and Ojibway (+21 TJ/d, maximum available)	IRPa	Please Refer to Exhibit I.ED.6a(i)	<p>IRPA Costs: \$4.2 million Annually, \$73.1 over a 40-year term</p> <p>\$/Capacity: \$3.48</p>	X	✓	✓	✓	<p>A firm exchange service between Dawn and Ojibway was rejected as there are no stand-alone commercial services that can be contracted with a pipeline company or secondary market that would deliver gas via the Panhandle System into the distribution networks that would eliminate the need for additional facilities. It is not possible to address the 5-year system shortfall of 192 TJ/d with Ojibway deliveries alone because the volume required would greatly exceed the physical import capability at Ojibway.</p> <p>Based on the Winter 2023/24 Panhandle System design forecast, a minimum of 42 TJ/d of incremental deliveries at Ojibway would be required to delay the in-service date of the proposed Project by one year (over double the capacity which is operationally available to deliver to into Ojibway). This is not commercially available, as the estimated available capacity on the Panhandle Eastern Pipeline system with delivery to Ojibway is 21 TJ/d based on results from RFP.</p>

Demand side management alternative: Enhanced Targeted Energy Efficiency (ETEE)	IRPA	5.43 TJ/d	Costs: ~\$50 million \$/Capacity: \$9.21	X	✓	✓	✓	<p>As noted in the Posterity report included at Attachment 2 to Exhibit C-1-1, a maximum peak hour reduction potential of 6,900 m³/hour (5.43 TJ/d) from general service could be obtained by 2029/2030 compared to 203 TJ/d from the proposed project.</p> <p>There is insufficient peak demand reduction potential from the general service customer base downstream of the Leamington lateral interconnect to eliminate or reduce the scope of facility requirements to meet the identified system need.</p>
Trucked Compressed Natural Gas (CNG)	IRPA	N/A	N/A	X	X	X	X	<p>Approximately 550 truck loads of CNG per day would be required to meet the shortfall capacity of 192 TJ/d. This is not practical and poses issues both in terms of logistics and security of supply. For these reasons Enbridge Gas determined that this alternative is not a viable solution early in its assessment of alternatives and did not pursue further.</p>

Non-Viable Alternative Description	Provides market assurance in meeting the growing firm demands along the Panhandle System for the next five years.	Increases Ontario customers' access to diverse supply, storage, and price transparency of the Dawn Hub.	Provides load balancing between existing laterals to reduce the pressure drop between the NPS 20 Panhandle Line and the Leamington-Kingsville market, which also allows for incremental growth throughout the entire Panhandle Market.	Scalable with system growth.	Directly feeds area of growth.
Upsize of existing NPS 16 Panhandle Line west of Dover Transmission	✓	✓	✓	X	X
Upsize of existing NPS 20 Panhandle Line west of Dover Transmission	✓	✓	✓	✓	✓
Liquefied Natural Gas (LNG) Plant	✓	✓	X	✓	✓
Firm 3rd party exchange between Dawn and Ojibway (+21 TJ/d, maximum available)	X	X	X	X	✓
Demand side management alternative: Enhanced Targeted Energy Efficiency (ETEE)	X	X	X	✓	✓
Trucked Compressed Natural Gas (CNG)	✓	✓	X	✓	✓

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit A, Tab 2, Sched 2, page 2; Exhibit B, Tab 1, Sched 1, page 18

Preamble:

Enbridge Gas noted that the capacity provided by the Project is intended to ensure the growing Panhandle Market has sufficient capacity until Winter 2028/2029. Enbridge Gas indicated that it has also identified the potential need for a second phase of transmission expansion to meet the demands that are forecasted over the next 20 years, with a forecasted 2029 in-service date.

Question:

- a) Please clarify why Enbridge Gas proposed sizing the Project specifically to provide incremental capacity to address a five-year forecasted shortfall (i.e. as opposed to a smaller or larger project that would address the shortfall for a shorter or longer time horizon, respectively).
- b) Did Enbridge consider a project alternative (e.g. increasing the pipeline sizes of the Project) that would avoid the need for a second phase of expansion? If so, please describe why Enbridge Gas rejected this option, with reference to factors (e.g., cost per unit capacity/NPV, demand forecast uncertainty, etc.) that contributed to Enbridge Gas's decision.

Response

- a) As discussed at Exhibit C, Tab 1, Schedule 1, the proposed Project is the most cost-effective alternative on a cost per unit of capacity basis, and is capable of serving forecasted demand until Winter 2028/2029. Other Project benefits are discussed in the response at Exhibit I.EP.8.

Enbridge Gas designed the proposed Project to address the five-year forecast shortfall, while providing a balance between cost efficiencies in the planning, development, construction of the Project, and the forecast uncertainty in the later years of the forecast. The proposed Project provides market assurance in meeting the growing firm demands along the Panhandle System for the next five years.

- b) Yes. Enbridge Gas considered alternatives including increased pipeline diameter. The NPS 42 Panhandle looping of the NPS 20 Panhandle Line option was not selected as the preferred alternative for several reasons:
- It only provides 4 TJ/d of additional capacity compared to the NPS 36, because the NPS 20 Panhandle Line bottleneck beyond the proposed Project end point to Comber Transmission station is not alleviated;
 - It is not consistent with the upstream NPS 36 pipeline between Dawn and Dover Transmission station;
 - There are increased costs due to the additional launcher and receiver facilities required for the integrity program; and,
 - It requires two separate integrity programs, introducing additional risk, cost, and gas handling complexity into the operation and maintenance of the Panhandle System.

For a summary of all viable pipeline facility alternatives, please see Attachment 1 at Exhibit I.STAFF.7.

In order to mitigate the capacity shortfall beyond Winter 2028/2029, the various pipeline facilities considered would need to be extended towards Comber Transmission station to increase system capacity and reduce or eliminate the NPS 20 Panhandle pressure bottleneck downstream of the proposed Project.

It is not possible to avoid the need for future facilities beyond Winter 2028/2029 by increasing the diameter of any of the viable pipeline alternatives.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit B, Tab 1, Schedule 1, pages 8-9; IRP Decision and Order (EB- 2020-0091), page 94

Preamble:

Enbridge Gas noted that it has not received any interest from customers in turning back firm or interruptible capacity or converting existing firm capacity to interruptible capacity.

Question:

- a) Please provide a status update on the scope and timing of Enbridge Gas's efforts in response to the OEB's direction in the IRP Decision and Order to study how interruptible rates might be modified to increase customer adoption in order to help reduce peak demand.
- b) Is Enbridge Gas giving consideration to demand response Integrated Resource Planning Alternatives (IRPAs) for customers (contract or general service) on firm distribution service, either as:
 - i. an alternative to the proposed Project. Please describe any such alternative assessed.
 - ii. to avoid or defer the potential second phase of transmission expansion beyond 2028/2029 in this region? If so, please describe. If not, why not?

Response

- a) Enbridge Gas is currently working to complete a study regarding how interruptible rates might be modified to increase customer adoption. The study will be filed with Enbridge Gas's 2024 Rate Rebasing application.

b)

i) Yes, Enbridge Gas did consider demand response as an IRP alternative to the Project. However, Enbridge Gas did not pursue this alternative for two reasons:

- First, as noted at Exhibit B, Tab 1, Schedule 1, Pages 8 to 9, Enbridge Gas conducted two Reverse Open Seasons providing contract customers the opportunity to turn back firm capacity or request to shift their firm contracts to interruptible contracts. Enbridge Gas did not receive any requests for firm capacity turnback or to transition to an interruptible service in either of those Reverse Open Seasons.
- Second, most of the large customers in the Project area cannot shift their natural gas demands to off peak times or have their firm natural gas demands interrupted. Many of the customers in the Project area operate greenhouses and cannot shift their natural gas demands to off peak times, as this would result in no heat in the greenhouse during peak periods, which could damage their crops. Aside from natural gas, the main alternate fuels used for heating in the greenhouse sector are oil, diesel and propane. Not only are these fuels typically more expensive than natural gas, but they would also prevent a greenhouse from using the CO₂ emissions within the greenhouse because other elements in the exhaust of those alternate fuels would harm the crops. Without the availability of natural gas, a more expensive and higher carbon intensive energy source would need to be procured for heat, and an alternative source of CO₂ would also be required to maintain production levels. Backup alternate fuel systems are also not intended or designed to be used for extended periods of time. The availability of alternate fuels is another concern. In general, switching fuel sources is disruptive for greenhouse operations. There are also commercial, industrial, and power generation customers within the Project area for which demand response is not a viable option, as a reduction in natural demand consumption would cause a disruption to operations, creating economic and productivity loss, uncertainty, as well as potential safety concerns for processes that cannot be easily/safely shut down and restarted at great frequency.

ii) Please see the response at Exhibit I.STAFF.10 b).

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit C, Tab 1, Schedule 1, pages 23-24; Exhibit C, Tab 1, Schedule 1, Attachment 2; [Greenhouse Energy Profile Study](#) (IESO website).

Preamble:

Enbridge Gas indicated that an Enhanced Targeted Energy Efficiency IRPA (ETEE) for general service customers was assessed and rejected due to insufficient demand reduction potential.

Question:

- a) Why was the scope of the analysis for this energy efficiency IRPA limited to general service customers, as opposed to the contract customers who are driving incremental demand growth?
- b) Has Enbridge Gas considered energy efficiency IRPAs for contract customers to avoid or defer the potential second phase of transmission expansion in this region?
- c) Given that all but one of the responses to the Expression of Interest for additional natural gas capacity came from greenhouses, what is Enbridge Gas doing (through its DSM programs), to mitigate the growth in natural gas demand from the greenhouse sector? Has Enbridge adjusted its DSM program mix or outreach strategy to focus more on this sector?
- d) Please describe how Enbridge Gas has made use of the analysis in the 2019 "Greenhouse Energy Profile Study" that Enbridge Gas supported.

Response

- a) The Enhanced Targeted Energy Efficiency IRP alternative focused on the general service customers in the Project area because the potential for incremental energy efficiency programming-related reductions for contract customers (who are already active participants in Enbridge Gas's DSM programming and sophisticated energy consumers) are limited and would not provide enough capacity to reduce, defer or avoid the Project. In addition, the energy efficiencies gained through such conservation activities typically reduce annual consumption but may have limited impact on peak hour needs.
- b) Enbridge Gas will consider all IRP alternatives to reduce, avoid or defer the potential second phase of transmission expansion in this region as part of its annual review and assessment of identified system needs/constraints and projects in the Asset Management Plan.
- c) Enbridge Gas continuously evolves and adjusts its DSM program design and implementation approaches in response to customer and market needs. Some of the adjustments Enbridge Gas has made in recent years in response to growth in the greenhouse sector includes:
- Increased the number of utility Energy Solutions Advisors focused on the greenhouse sector, from four to six; and
 - Introduced new limited-time incentive offers of 20-50% more incentive per greenhouse project.

Enbridge Gas Energy Solutions Advisors provide greenhouse customers with project assistance and are continuously exploring and identifying new ways that greenhouse customers/operators can implement energy efficient process improvements.

- d) As discussed in part a) above, the Enhanced Targeted Energy Efficiency IRP alternative assessed focused on general service customers only, served by the Panhandle system. Therefore, the 2019 "Greenhouse Energy Profile Study" was not relevant to the assessment.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit C, Tab 1, Schedule 1, pages 14-22

Preamble:

Enbridge Gas provides details on two IRPAs:

- i. Exchanges (nominal) between Dawn and Ojibway
- ii. Hybrid Alternative consisting of firm exchange between Dawn and Ojibway in combination with looping of the NPS 20 Panhandle Line west of Dover Transmission and installing a Leamington Lateral interconnect

Enbridge Gas noted that it has considered and rejected these alternatives to the Project.

Question:

- a) Please discuss the parameters used in the assessment of each IRP alternative and a Hybrid Alternative noted in the preamble.
- b) Please explain the grounds for rejecting exchanges between Dawn and Ojibway alternative and for rejecting the Hybrid Alternative.

Response

a) and b)

Both alternatives were evaluated based on the parameters of the Assessment Criteria described at Exhibit C, Tab 1, Schedule 1, Pages 3-4. Through their evaluation, they were rejected because they did not meet all necessary criteria.

For a summary of the assessment of viable alternatives and the rationale for their selection or rejection, please see the response at Exhibit I.STAFF.7 Attachment 1.

For a summary of the assessment of non-viable alternatives and the rationale for their rejection, please see the response at Exhibit I.STAFF.7 Attachment 2.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff (“STAFF”)

INTERROGATORY

Reference:

Exhibit E, Tab 1, Schedule 1, pages 2-3, Table 1: Project Cost Comparison – Panhandle Loop, Table 2: Project Cost Comparison- Leamington Interconnect

Preamble:

Enbridge Gas provided the following tables outlining Project cost comparisons for the Panhandle Loop and Leamington Interconnect segments, separately. Each segment has been compared to a recent expansion project on the Panhandle System.

Table 1: Project Cost Comparison – Panhandle Loop

Item No.	Description	(a) Current Project Panhandle Loop	(b) Comparison Forecast 2017 PRP (EB-2016-0186)	(c) Comparison Actual 2017 PRP (EB-2016-0186)	(d) = (a) – (c) Variance to Actual
	<i>Pipeline Diameter</i>	<i>NPS 36</i>	<i>NPS 36</i>	<i>NPS 36</i>	
	<i>Length (km)</i>	<i>19 km</i>	<i>40 km</i>	<i>40 km</i>	
	<i>Pipeline Material</i>	<i>Steel</i>	<i>Steel</i>	<i>Steel</i>	
1	Materials	56,600,000	23,800,000	24,480,000	32,120,000 (1)
2	Labour, External Permitting and Land, Outside Services	124,100,000	203,754,000	202,374,000	(78,274,000) (2)
3	Contingency	19,200,000	34,133,000	-	19,200,000
4	IDC	3,500,000	2,781,000	1,837,000	1,663,000
5	Total Direct Capital Cost	203,400,000	264,468,000	228,691,000	(25,291,000)
6	Indirect Overheads	43,200,000	-	-	43,000,000 (3)
7	Total Project Cost	246,600,000	264,468,000	228,691,000	17,709,000
8	Total Cost per km	12,978,947/km	6,611,700/km	5,717,275/km	7,261,672/km

Table 2: Project Cost Comparison – Leamington Interconnect

Item No.	Cost Description	(a) Current Project PREP: Leamington Lateral	(b) Comparison Forecast KTRP (EB-2018-0013)	(c) Comparison Actual KTRP (EB-2018-0013)	(d) = (a) – (c) Variance to Actual
	<i>Pipeline Diameter</i>	<i>NPS 16</i>	<i>NPS 20</i>	<i>NPS 20</i>	
	<i>Length (km)</i>	<i>12 km</i>	<i>19 km</i>	<i>19 km</i>	
	<i>Pipeline Material</i>	<i>Steel</i>	<i>Steel</i>	<i>Steel</i>	
1	Materials	13,200,000	7,724,000	8,932,428	4,267,572 (1)
2	Labour, External Permitting and Land, Outside Services	37,300,000	82,931,000	67,912,817	(30,612,817) (2)
3	Contingency	5,200,000	13,599,000	-	5,200,000
4	IDC	1,100,000	1,462,000	691,496	408,504
5	Total Direct Capital Cost	56,800,000	105,716,000	77,536,741	(20,736,741)
6	Indirect Overheads	11,000,000	-	-	11,000,000
7	Total Project Cost	67,800,000	105,716,000	77,536,741	(9,736,741)
8	Total Cost per km	5,650,000/km	5,564,000/km	4,080,881/km	1,569,119/km

Enbridge Gas stated that it is not aware of any other recent and comparable project approved by the OEB. Enbridge Gas noted that costs for these projects are not directly comparable with the cost estimates for the Projects because of differences in the characteristics and timing.

Question:

- a) For Table 1 and Table 2 above, please add rows that show the “material cost per km” and “labour, external permitting and land, and outside services per km.” Please explain the reasons for any variances in both material and labour costs per km as between the Project and the actual costs of the comparison projects.
- b) Please advise whether indirect overheads for the Panhandle Reinforcement Project have ever been identified.
- c) Please explain why there are indirect overheads forecast for the Project and not for the comparison projects in Tables 1 and 2.
- d) Please provide tables, using the same itemized cost description as in Tables 1 and 2 (including the additional rows requested by OEB staff in part (a)), separately comparing the costs for the Panhandle Loop and the Leamington Interconnect to more recent OEB approved projects that are not on the

Panhandle System with a similar pipeline size and length and/or based on customer demand growth. For context, OEB staff would like to see more recent projects to allow for a comparison of material and labour costs in current market conditions.

- e) Please provide any other information to support the reasonableness of the cost estimates for each Panhandle Loop and Leamington Interconnect in the context of the significantly higher costs per km for the Project relative to the actual costs of the comparable projects.

Response

- a) For the Panhandle Loop, please see Table 1. For the Leamington Interconnect, please see Table 2.

Table 1: Project Cost Comparison – Panhandle Loop with Cost per KM

Item No.	Description	(a) Current Project Panhandle Loop	(b) Comparison Forecast (2017 PRP (EB-2016-0186))	(c) Comparison Actual 2017 PRP (EB-2016-0186)	(d) = (a) - (c) Variance to Actual
	<i>Pipeline Diameter</i>	<i>NPS 36</i>	<i>NPS 36</i>	<i>NPS 36</i>	
	<i>Length (km)</i>	<i>19 km</i>	<i>40 km</i>	<i>40 km</i>	
	<i>Pipeline Material</i>	<i>Steel</i>	<i>Steel</i>	<i>Steel</i>	
1	Materials	56,600,000	23,800,000	24,480,000	32,120,000
2	Labour	124,100,000	203,754,000	202,374,000	(78,274,000)
3	Contingency	19,200,000	34,133,000	-	19,200,000
4	Interest During Construction	3,500,000	2,781,000	1,837,000	1,663,000
5	Total Direct Capital Cost	203,400,000	264,468,000	228,691,000	(25,291,000)
6	Indirect Overheads	43,200,000	-	-	43,200,000
7	Total Project Cost	246,600,000	264,468,000	228,691,000	17,909,000
8	Total Cost per km	12,979,000	6,612,000	5,717,000	7,262,000
9	Material Cost per km	2,979,000	595,000	612,000	2,367,000
10	Labour, External permitting and land, and Outside Services per km	6,532,000	5,094,000	5,059,000	1,473,000

Table 2: Project Cost Comparison – Leamington Interconnect with Cost per KM

Item No.	Description	(a) Current Project PREP: Leamington Lateral	(b) Comparison Forecast KTRP (EB-2018-0013)	(c) Comparison Actual KTRP (EB-2018-0013)	(d) = (a) - (c) Variance to Actual
	<i>Pipeline Diameter</i>	<i>NPS 16</i>	<i>NPS 20</i>	<i>NPS 20</i>	
	<i>Length (km)</i>	<i>12 km</i>	<i>19 km</i>	<i>19 km</i>	
	<i>Pipeline Material</i>	<i>Steel</i>	<i>Steel</i>	<i>Steel</i>	
1	Materials	13,200,000	7,724,000	8,932,428	4,267,572
2	Labour	37,300,000	82,931,000	67,912,817	(30,612,817)
3	Contingency	5,200,000	13,599,000	-	5,200,000
4	Interest During Construction	1,100,000	1,462,000	691,496	408,504
5	Total Direct Capital Cost	56,800,000	105,716,000	77,536,741	(20,736,741)
6	Indirect Overheads	11,000,000	-	-	11,000,000
7	Total Project Cost	67,800,000	105,716,000	77,536,741	(9,736,741)
8	Total Cost per km	5,650,000	5,564,000	4,081,000	1,569,000
9	Material Cost per km	1,100,000	407,000	470,000	630,000
10	Labour, External permitting and land, and Outside Services per km	3,108,000	4,365,000	3,574,000	(466,000)

The variance in material cost per km between the proposed Project (Panhandle Loop and Leamington Interconnect) and the comparison project actuals (2017 PRP and KTRP) is driven mainly by supply chain challenges in recent years, including:

- Global supply chain issues: Recent global conflicts and the COVID-19 pandemic have negatively impacted supply chain dynamics, causing an increase in costs for a wide range of products.
- Limited capacity at production facilities: Production facilities are experiencing capacity and labour challenges, resulting in fewer quantities of products being available, and therefore increasing their costs. More specifically, one valve supplier has recently filed for insolvency, further limiting supply options, and therefore increasing costs.

The variance in labour cost per km between the proposed Panhandle Loop and the comparison project actual (2017 PRP) reflects approximately a 4% annual increase, which is within the expected range of annual labour cost increases from recent years.

The variance in labour cost per km between the proposed Leamington Interconnect and the comparison project actual (KTRP) is primarily due to the abnormally wet weather experienced during the construction of the KTRP project. These weather delays resulted in higher than typical contractor/construction costs, which are not expected to re-occur during the construction of the proposed Project.

- b) Indirect overheads for the Panhandle Reinforcement Project have not been specifically identified due to the process to allocate overheads at the time. Please see the response to c) below.
- c) Enbridge Gas adopted the practice of including indirect overheads for reference purposes with Leave to Construct (“LTC”) applications effective in 2019. This change in presentation was made to facilitate the comparison of costs presented in the Incremental Capital Module (“ICM”) applications as part of the annual rates filings and the LTCs for the projects. Tables 1 and 2 represent a comparison of costs as per the LTCs filed for the KTRP (EB-2018-0013) and the 2017 Panhandle Reinforcement Project (EB-2016-0186). The LTCs for these projects were filed prior to the decision to include indirect overheads as part of LTC applications.

The OEB’s own Natural Gas Facilities Handbook (updated March 31, 2022), also explicitly considers indirect overheads to be included as part of Total Project Costs at pages 34 and 35.¹

- d) Upon review of recent projects, Enbridge Gas could not find directly comparable projects to the proposed Project, in terms of the variables listed by OEB Staff (pipeline size and length, in current market conditions).²
- e) Please see response to a) above. Enbridge Gas undertook the following efforts during development of cost estimates, to capture current market pricing for materials and labour costs:
- Requested and received external budgetary vendor quotes for major equipment and materials, including large-bore valves and line pipe.
 - Requested and received external non-binding construction contractor quotes from 8 independent construction contractors that execute comparable projects within Canada.

¹ <https://www.oeb.ca/sites/default/files/uploads/documents/regulatorycodes/2022-03/OEB-Natural-Gas-Facilities-Handbook-20220331.pdf>

² Enbridge Gas is interpreting “current market conditions” as the most recent 12 months, as many of the supply chain challenges described in part a) have evolved during that timeframe.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit E, Tab 1, Schedule 1, page 1, paragraphs 1 and 2

Preamble:

The total estimated cost of the Project is \$314.4 million. Excluding indirect overheads, the total estimated cost is \$260.2 million. The contingency rate of 11% is applied to all direct capital costs based on the risk profile of the Project. Enbridge Gas cost estimates are based on "...a class 3 estimate prepared in Q1 2022 as per American Association of Cost Engineers."

Question:

Please respond to the following questions referring to the entire Panhandle Regional Expansion Project cost estimate and to each of the Panhandle Loop and Leamington Interconnect cost estimates.

- a) Please provide an overview of the American Association of Cost Engineers standards and classes of cost estimates as applied to the Project.
- b) Please identify the factors of the Project's costs risk profile and Enbridge Gas's strategies to manage these risks in order to reduce use of the contingency budget.
- c) Does Enbridge Gas anticipate changes in the 11% contingency for the Project and if so please discuss.
- d) Given the maturity of the Project design, please discuss the criteria applied to assign the Project a class 3 cost estimate set by the American Association of Cost Engineers.

Response

a) Please see Table 1 below for the 5 estimate classes as outlined in American Association of Cost Engineers (“AACE”) Recommended Practice (RP) No. 18R-97.

Table 1 – Estimate Classification

ESTIMATE CLASS	Primary Characteristic	Secondary Characteristic			
	LEVEL OF PROJECT DEFINITION Expressed as % of complete definition	END USAGE Typical purpose of estimate	METHODOLOGY Typical estimating method	EXPECTED ACCURACY RANGE Typical variation in low and high ranges [a]	PREPARATION EFFORT Typical degree of effort relative to least cost index of 1 [b]
Class 5	0% to 2%	Concept Screening	Capacity Factored, Parametric Models, Judgment, or Analogy	L: -20% to -50% H: +30% to +100%	1
Class 4	1% to 15%	Study or Feasibility	Equipment Factored or Parametric Models	L: -15% to -30% H: +20% to +50%	2 to 4
Class 3	10% to 40%	Budget, Authorization, or Control	Semi-Detailed Unit Costs with Assembly Level Line Items	L: -10% to -20% H: +10% to +30%	3 to 10
Class 2	30% to 70%	Control or Bid/Tender	Detailed Unit Cost with Forced Detailed Take-Off	L: -5% to -15% H: +5% to +20%	4 to 20
Class 1	50% to 100%	Check Estimate or Bid/Tender	Detailed Unit Cost with Detailed Take-Off	L: -3% to -10% H: +3% to +15%	5 to 100

Notes: [a] The state of process technology and availability of applicable reference cost data affect the range markedly. The +/- value represents typical percentage variation of actual costs from the cost estimate after application of contingency (typically at a 50% level of confidence) for given scope.
 [b] If the range index value of “1” represents 0.005% of project costs, then an index value of 100 represents 0.5%. Estimate preparation effort is highly dependent upon the size of the project and the quality of estimating data and tools.

b) The potential for cost escalation of material and labour costs represents the most significant cost risk(s) for the project. Enbridge Gas has used recent external market data to estimate these costs and has advanced procurement of long lead time items and general materials to mitigate the effect of changing market conditions.

c) There is no plan to reassess or change the contingency for the project.

- d) Enbridge Gas adheres to AACE definitions for Class 3 based on RP 18R-97. The following activities were completed in support of achieving a Class 3 classification:
- 30% engineering design was completed by external consultants:
 - i. 30% engineering design deliverables including alignment sheets, PFD's, P&ID's, plot plans, and 3D models were completed and validated with Enbridge Gas internal subject matter experts.
 - ii. A detailed equipment list was produced and used to determine material costs.
 - Requested and received external budgetary vendor quotes for major equipment and materials including large-bore valves and line pipe.
 - Requested and received external non-binding construction contractor quotes from 8 independent construction contractors that execute comparable projects within Canada.
 - Contingency was estimated using a proprietary and time-tested contingency model that aligns with best practices espoused by the AACE and Construction Industry Institute.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit A, Tab 3, Schedule 1, page 5, paragraph 13; Enbridge Gas's 2023 Rates (Phase 1) Application (EB-2022-0133), Exhibit A, Tab 2, Schedule 1, page 2, paragraph 4

Preamble:

Enbridge Gas stated that if the Project meets the criteria for rate recovery through the ICM mechanism, then an ICM request for the costs of the Project may form part of its 2023 Rates (Phase 2) application. Enbridge Gas also stated that upon rebasing, it expects the capital costs associated with the Project will be included in rate base.

In Enbridge Gas's 2023 Rates¹ (Phase 1) application currently before the OEB, Enbridge Gas stated that it will not be proposing an ICM request for 2023 rates "...and as such, there will not be a Phase 2 of the 2023 Rates application".

Question:

- a) Regarding Enbridge Gas's recovery of costs associated with the Project, please confirm that Enbridge Gas will not file an ICM request for the Project.
- b) Please advise whether Enbridge Gas intends to include the capital costs associated with the Project in rate base upon rebasing. If so, please confirm whether Enbridge Gas expects to include the costs of the Project in rate base as part of Enbridge Gas's upcoming 2024 rebasing application. Otherwise, please explain Enbridge Gas's plan for the recovery of costs associated with the Project.
- c) Considering that the Panhandle Expansion Project consists of two projects with in- service dates on November 1, 2023 and November 1, 2024 respectively, please advise whether it is Enbridge Gas's plan to include the capital cost of the

¹ EB-2022-0133

entire Project in the rate base in the upcoming rebasing application for rates effective January 1, 2024

Response

- a) Confirmed.
- b) Confirmed.
- c) The capital cost of the Project will form part of 2024 rate base for the 2024 rebasing application based on the in-service date of each phase of the project.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit E, Tab 1, Schedule 1, pages 4-10; Exhibit E, Tab 1, Schedules 3-7.

Preamble:

Enbridge Gas noted that E.B.O. 134 is the appropriate economic test to apply to the Project, as the Project consists entirely of transmission pipeline infrastructure to which distribution customers do not directly connect.

Enbridge Gas noted that the Stage 1 Discounted Cash Flow (DCF) analysis for the Project shows that the Project has a Net Present Value (NPV) of negative \$95 million and a Profitability Index (PI) of 0.63. Enbridge Gas further noted that after the Stages 2 and 3 DCF analyses are applied, the NPV for the Project is between \$342 million and \$463 million, and the Project is economically feasible.

Question:

- a) Please explain why indirect overhead is not included as part of the cash outflows in the DCF analysis. As part of the response, please provide a reference to the E.B.O. 134 Report of the Board.
- b) Please discuss the contract demand for contract rate customers and volumes for general service customers used in the calculation of the transmission margin at Exhibit E, Tab 1, Schedule 4. Please explain how these contract demand and volume figures were derived. Further, please explain how these figures align with the statement that 98% of the incremental capacity created by the Project will meet contract rate customer demand.
- c) Please provide a detailed calculation supporting the Stage 2 DCF analysis at Exhibit E, Tab 1, Schedule 6.
 - i. Please explain the annual energy demand figure used in the Stage 2 DCF

- analysis. Specifically, please discuss this energy demand figure in the context that it appears that only 2% of the incremental capacity created by the Project is for general service customers.
- ii. Please explain how the fuel mix used in the Stage 2 DCF analysis was estimated.
 - iii. Please explain the \$0.14/m³ price for natural gas used in the Stage 2 DCF analysis.
 - iv. Please confirm that the natural gas price used in the Stage 2 DCF analysis includes the cost of carbon.
- d) Please confirm that only the direct economic benefits associated with the Project are included in the Stage 3 DCF analysis at Exhibit E, Tab 1, Schedule 7.
- e) Please explain the GDP Factor and the Jobs Factor used in the Stage 3 DCF analysis.
- f) Please confirm that the economic benefits (e.g. GDP impact, taxes, etc.) listed in the Stage 3 DCF analysis are the same as used in previous E.B.O. 134 tests for OEB approved Panhandle projects. If there are any changes relative to previous applications for Panhandle projects, please explain those changes and provide rationale supporting the changes.

Response

- a) E.B.O. 134 Report of the Board states “The Board finds that incremental costs should be used in evaluating the feasibility of system expansion.”¹ Indirect overhead is not an incremental cost and has therefore not been included in the DCF analysis.
- b) The contract demand for contract rate customers was derived by dividing the Contract Firm (Total Incremental Demand) forecast, as seen at Exhibit B, Tab 1, Schedule 1, Page 11, Table 1, by a heat value content of 0.03932 GJ per m³.

¹ Ontario Energy Board, E.B.O. 134 Report of the Board, June 1, 1987, paragraph 6.70

The volumes for general service customers were derived using Enbridge Gas's customer attachment forecast. The customer attachments are converted into an annual volumetric forecast based on a forecast normalized average consumption.

Enbridge Gas's pipeline systems are designed to serve the peak design day demands of natural gas consumers. The schedule referred to by OEB Staff (Exhibit E, Tab 1, Schedule 4) is the Calculation of Revenue for the Project, which is calculated based on annual volumes/demand. There is no direct correlation between annual demand (m^3) and peak day demand (TJ/d) as each are highly dependent on temperature and individual customer demand profiles. In other words, the revenue forecast for the Project provided at Exhibit E, Tab 1, Schedule 4 cannot be compared to the statement that 98% of Project capacity is designed for contract rate customer demand at Exhibit B, Tab 1, Schedule 1, Paragraph 20, as the annual demand that underpins the Calculation of Revenue for the Project is not related to the peak design day demand.

- c) Please see Attachment 1 for a detailed Stage 2 calculation. Please refer to Exhibit I.ED.14 Attachment 1 for a live Excel version of the calculation.
- i. The statement that 2% of the incremental capacity created by the Project is for general service customers is based on the Design Day Demand forecast as shown at Exhibit B, Tab 1, Schedule 1, Page 11, Table 1 (TJ/d). The Stage 2 energy demand figure is based upon the forecast annual energy provided to general service customers by the Project. Please also see the response to part b) above.
 - ii. The fuel mix used in the Stage 2 analysis is based upon the Statistics Canada report Households and the Environment: Energy Use.² The fuel mix was calculated assuming the exclusion of natural gas and wood from the Stats Canada data.
 - iii. The natural gas price of $\$0.14/m^3$ is the 2021 average effective price determined using the posted effective price from the Ontario Energy Board website.³ See Table 1 below.

² Statistics Canada Catalogue no. 11-526-S, Households and the Environment: Energy Use - 2011, Page 19, Table 2

³ <https://www.oeb.ca/consumer-information-and-protection/natural-gas-rates/historical-natural-gas-rates>

Table 1: 2021 Average Effective Price of Natural Gas

Date	Effective Price (¢/m³)
Jan 2021	13.4224
Apr 2021	13.7086
Jul 2021	13.2272
Oct 2021	17.1480
Average	14.3766

- iv. The natural gas price of \$0.14/m³ is a before cost of carbon price, however the cost of carbon has been included separately in the results of the Stage 2 analysis.
- d) Confirmed. Only economic benefits associated with the Project are included in the Stage 3 analysis.
- e) The GDP Factor and Jobs Factor quantifies the impact that infrastructure spending has on gross domestic product (“GDP”) and on the generation of jobs. The GDP factor of 0.91 indicates that GDP rises by \$0.91 per dollar of spending. The Jobs factor of 4.7 indicates that 4.7 jobs are generated per million dollars spent.
- f) Confirmed. The approach to economic benefits in the Stage 3 analysis are the same as used in previous OEB-approved Panhandle projects. The assumption figures for GDP and Jobs Factors have been updated in this analysis to reflect more current information (see footnote at Exhibit E, Tab 1, Schedule 7 for source).

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit D, Tab 1, Schedule 1: Environmental Matters, page 13, paragraph 21

Preamble:

Enbridge Gas filed an application with the Technical Standards and Safety Authority (TSSA). Enbridge Gas stated that it has not received any concerns from the TSSA to date and expects to receive a letter indicating that they have completed their review of the design for the Project in the coming months.

Question:

Please provide an update on the status of the TSSA's review of the Project.

Response

The TSSA completed their review of the design for the Project and provided its final review letter on July 26, 2022 (see Attachment 1). Within the letter, the TSSA confirmed that "all outstanding items have been addressed by EGI".



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July 26, 2022
Final review letter

Re: Panhandle Regional Expansion project- TSSA file WO# 8096252 - OEB file number: EB-2022-0157

The applicable regulation that applies to Panhandle Regional Expansion project is [Ontario Regulation 210/01: Oil and Gas Pipeline Systems](#). The applicable standard for this project is CSA Z662-19 which TSSA adopted under [Oil and Gas Pipeline Code Adoption Document \(CAD\)](#). The mentioned Code Adoption Documents (CAD) specifies the standards that are adopted by TSSA and any changes or addition to the requirements of CSA Z662-19.

TSSA audits all Pipeline operating companies that are licensed to transmit or distribute “gas” in the province of Ontario. TSSA also reviews and audits all new pipeline projects that are submitted to OEB for leave to construct. The review of the new pipeline projects submitted to OEB consists of reviewing the technical aspect of the project and focusing on compliance with the adopted standards and O.Reg.210/01. TSSA has the authority to issue an order to the operator for any non-compliances to the regulation and/or adopted standards.

This project so far has been reviewed on the technical aspects of the project including design, material specification, wall thickness calculation and stress on the pipe wall thickness on the maximum operating pressure. All outstanding items have been addressed by EGI.

TSSA may audit and inspect the EGI to ensure compliance with applicable technical and safety standards for the construction and operation of this project.

Should you have any questions, please contact me at 416.734.3539 or by e-mail at kmanouchehri@tssa.org. When contacting TSSA regarding this file, please refer to the Service Request number provided above.

Yours truly,

A handwritten signature in black ink, appearing to read "Kourosh Manouchehri".

Kourosh Manouchehri, P.Eng.,
Fuels Safety Engineer
Tel.: (416) 734-3539
Fax: (416) 231-7525

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit F, Tab 1, Schedule 1: Environmental Matters, page 2, paragraphs 7 and 8

Preamble:

As part of the public consultation, Enbridge Gas held two virtual public information sessions:

- November 17, 2021 to December 3, 2021
- February 14, 2022 to February 28, 2022

Enbridge Gas stated that notification of these virtual information sessions were completed by newspaper publications, letters, social media and radio.

Question:

- a) Please describe the content and timing of the newspaper publications, letters, social media and radio notifications for the sessions
- b) Please provide the attendance of these virtual sessions.
- c) Please discuss the comments or concerns received in the virtual information sessions and any follow ups Enbridge Gas has undertaken to respond.

Response

- a) A description of the content and timing of the newspaper publications, letters, social media and radio notifications for Virtual Information Session #1 can be found at Section 3.4.1, Page 17, of the Environmental Report (Exhibit F, Tab 1, Schedule 1, Attachment 1).

A description of the content and timing of the newspaper publications, letters, social media and radio notifications for Virtual Information Session #2 can be found at Section 3.4.2, Page 17, of the Environmental Report (Exhibit F, Tab 1, Schedule 1, Attachment 1).

- b) Virtual Information Session #1 had 419 participants. Virtual Information Session #2 had 459 participants.¹
- c) As noted in Section 3.6.1 of the Environmental Report, during the two virtual information sessions seven comment forms were received from the public.

The main areas of concern included:

- The location of the Preliminary Preferred Wheatley Interconnect/Preliminary Preferred and Preferred Routes of the Wheatley Lateral Reinforcement and the environmental and agricultural effects it could cause; and
- Construction logistics (type of equipment used, accessing gas from the Panhandle Loop segment, and construction area width).

It should also be noted that four additional comments were received from the public via the interactive mapping tool noting concerns over a species sighting (Western Chorus Frog [*Pseudacris triseriata*]), an unmarked grave, swimming pool infrastructure, and a planned condo development near the Panhandle Loop, while one comment was received regarding a septic tank near the Leamington Interconnect.

In addition, Boralex Richardson Windfarm provided comments on the interactive mapping tool during the first virtual information session noting concerns about access to their wind infrastructure, excavations near the foundational base of some of their wind infrastructure, and damage to buried power cables in proximity to the Panhandle Loop. It should be noted that representatives from Enbridge Gas spoke to a representative from Boralex on December 16, 2021 and provided further project information.

Voltage Power reached out to AECOM requesting mapping for the Panhandle Loop and existing 16' and 20' pipelines in order to evaluate their proposed transmission line. At the time of writing this ER, it was agreed that the mapping would be sent to Voltage Power for their use.

¹ Environmental Report, Section 3.5.2, Page 18 (Exhibit F, Tab 1, Schedule 1, Attachment 1)

Enbridge Gas responded to and considered, where relevant, all comments received during the virtual information sessions.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit F, Tab 1, Schedule 1: Environmental Matters, page 4, paragraph 13 and Environmental Report, Appendix E: Stage 1 Archeological Assessment Report

Preamble:

An archeological assessment for the Project is required by the Ontario Heritage Act and Standards and Guidelines for Consultant Archaeologist (2011). Enbridge Gas stated that it would conduct the archeological assessments required by the for the Project during "...the Spring, Summer and Fall 2022". As part of the Environmental Report, Enbridge Gas included the Stage 1 Archeological Assessment Report for the Project. The Stage 1 Archaeological Assessment report recommends that a Stage 2 Archaeological Assessment be conducted for all potentially undisturbed sites within the Project's study area.

Question:

- a) What is the status and projected completion of the surveys and studies required to conduct the Stage 2 Archeological Assessment?
- b) What is the anticipated date for filing the Stage 2 Archaeological Assessment Report with the Ministry of Tourism, Culture and Sport (MTCS) for a review?

Response

- a) The surveys and studies required to conduct the Stage 2 Archaeological Assessment for the Panhandle Loop are approximately 90% complete, and are projected to be fully complete in October 2022.

The surveys and studies required to conduct the Stage 2 Archaeological Assessment for the Leamington Interconnect will commence in Fall 2022, and are anticipated to be completed in Spring 2023.

- b) The anticipated date for filing the Stage 2 Archaeological Assessment Report with the MTCS for review is October 31, 2022, for the Panhandle Loop, and Spring 2023 for the Leamington Interconnect.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit F, Tab 1, Schedule 1: Environmental Matters, page 4, paragraph 14 and Environmental Report, Appendix F: Cultural Heritage Assessment Report: Existing Conditions and Preliminary Impact Assessment

Preamble:

As part of the environmental assessment process for the Project, in accordance with the *Ontario Heritage Act*, Enbridge Gas is required to complete a *Cultural Heritage Assessment Report* (CHAR) prior to construction and submit it to the MTCS for review and comment. Enbridge Gas included in the Environmental Report, *A Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment* (Preliminary CHAR). The Preliminary CHAR concluded that there are no municipally, provincially and/or federally recognized Built Heritage Resources (BHR) and Cultural Heritage Landscapes (CHL) directly (physically) impacted by the Project. Enbridge Gas has committed to the recommendations in the Preliminary CHAR which is attached to the Environmental Report.

Question:

- a) Please comment if Enbridge Gas has submitted the Preliminary CHAR to the MTCS for review and if any comments were received. If applicable, please describe the comment received and Enbridge Gas's response.
- b) Please discuss if there are other MTCS reporting requirements regarding the final CHAR for the Project. If so, what is the anticipated timeline for addressing these requirements?

Response

- a) A Cultural Heritage Assessment Report was completed, and a copy was provided in the ER when submitted to the MTCS as part of the OPCC review. As part of the

report, the MTCS confirmed on December 31, 2021, that no properties designated by the Minister or other provincial heritage properties were located within, or adjacent to, the project study area.

- b) No further reporting requirements are required.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit G, Tab 1, Schedule 1, pages 1-2

Preamble:

The proposed pipelines for the Project total approximately 31 km in length. The Project will require approximately 59.5 hectares (147 acres) of permanent easement. Enbridge Gas will also require approximately 83 hectares (205 acres) of temporary easement for construction and topsoil storage purposes.

Enbridge Gas has initiated meetings with the landowners where temporary or permanent land rights are required and will continue to meet with them to obtain all required land rights.

Question:

- a) Please quantify the total required permanent and temporary easements for the Panhandle Loop and Leamington Interconnect separately.
- b) Please identify the permanent and temporary easement agreements that have been obtained since the filing of this application.
- c) Please provide an update on the status and prospect of remaining land negotiations where permanent and temporary easements are required. Please include any concerns raised by landowners and Enbridge Gas's responses.
- d) Please discuss any expected delays with respect to obtaining the required land rights for the Project and its impact to the construction start and in-service date for the Panhandle Loop and Leamington Interconnect.

Response

a) Please see Table 1 below:

Table 1

Panhandle Loop	Acres	Hectares
TOTAL Proposed Permanent Easement	100.35	40.62
TOTAL Proposed Temporary Land Use (TLU)	153.26	62.03
Leamington Interconnect		
TOTAL Proposed Permanent Easement	46.63	18.88
TOTAL Proposed Temporary Land Use (TLU)	51.70	20.93

- b) No agreements for permanent easement or temporary land use have been entered-into since the filing of the current Application.
- c) The land acquisition process commenced on August 29, 2022. Meetings with landowners will continue and are subject to stakeholder availability.

One landowner expressed a concern regarding the proposed location of an above-ground station, pipeline easement and temporary easement within the Project area. Enbridge Gas continues to evaluate all options and taking the landowners comments into consideration.

- d) Enbridge Gas expects to have acquired all necessary land rights in advance of commencing project construction, and does not anticipate any delay to planned Project in-service date at this time.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit G, Tab 1, Schedule 1, pages 4-5, Table 1: Potential Permits/Authorizations for the Project

Preamble:

Enbridge Gas identified the potential permits and authorizations required for the Project and listed them in Table 1 at the reference above.

Enbridge Gas also stated that other authorizations, notifications, permits and/or approvals may be required in addition to those identified in Table 1.

Question:

- a) For each of the potential permits/authorizations listed in Table 1, please confirm if it has been identified as a potential permit/authorization for the Panhandle Loop, Leamington Interconnect, or both.
- b) For each of the potential permits/authorizations listed in Table 1, please confirm if it is required for the Project.
- c) For each permit/authorization listed in Table 1 that Enbridge Gas requires, please provide an update on the status of the permit/authorization including when Enbridge Gas expects to acquire each required permit/authorization. Please also discuss any anticipated potential delays in acquiring each required permit/authorization.
- d) Has Enbridge Gas identified to date any other required permits/authorizations, in addition to those listed Table 1? If so, please describe the required permit(s)/authorization(s), the status and expected date for acquisition of the permit(s)/authorization(s), and whether the permit(s)/authorization(s) are required for the Panhandle Loop, Leamington Interconnect, or both.

Response

a) to d)

Please see Table 1 below for status update of required permits.

Enbridge Gas continues making applications for all necessary permits and authorizations into the Fall of 2022 and anticipates having all permits and authorizations in place prior to the start of construction (by March 31, 2023) for the Panhandle Loop. Permit applications and authorizations for the Leamington Interconnect will commence in 2023 and are expected to be in place prior to the start of construction (by March 31, 2024).

Enbridge Gas continues to actively engage all required permitting agencies and has received positive feedback regarding the project to date. Therefore, the Company does not anticipate any permitting delays.

One additional permit has been identified and added to the table below; Plains Midstream Canada ULC.

Table 1: Potential Permits/Authorizations for the Project

<u>AUTHORITY</u>	<u>PURPOSE</u>	<u>PIPELINE SEGMENT</u>
Provincial		
Ontario Energy Board	Pursuant to section 90(1) of the Act, an Order granting leave to construct the Project. Pursuant to section 97 of the Act, an Order approving the form of pipeline easement agreement found at Exhibit G, Tab 1, Schedule 1, Attachment 3, and the form of temporary land use agreement found at Exhibit G, Tab 1, Schedule 1, Attachment 4.	Both
Ministry of Transportation	Encroachment permit to cross Hwy 401.	Panhandle Loop
Ministry of Heritage, Sport, Tourism and Culture Industries	Archaeological clearance under the <i>Ontario Heritage Act</i> (OHA).	Both
Plains Midstream Canada ULC	Encroachment Agreement to cross Plains Midstream pipelines.	Panhandle Loop

Ministry of Environment, Conservation and Parks	Permitting or registration under the <i>Endangered Species Act</i> (ESA) (2007). Permit to Take Water (PTTW) or Environmental Activity and Sector Registry (EASR) (surface and groundwater) under the <i>Ontario Water Resources Act</i> (1990).	Both
Ministry of Energy	Provision of a letter confirming the procedural aspects of consultation with potentially impacted Indigenous communities undertaken by Enbridge Gas for the Project is satisfactory.	Both
Municipal		
County of Essex	Municipal Consent of proposed alignment, including road occupancy permits for crossings and access off municipal roads.	Both
Municipality of Chatham-Kent		Panhandle Loop
Municipality of Lakeshore		Both
Lambton County		Both
Municipality of Leamington		Leamington Interconnect
Town of Kingsville		Leamington Interconnect
Other		
Canadian Pacific Railway	Crossing Agreement to cross under railway corridor.	Panhandle Loop
Via Rail Canada Inc.	Crossing Agreement to cross under railway corridor.	Panhandle Loop
Landowner agreements for easements, temporary working space and/or storage sites	Obtain required Easement agreements. Obtain required TLU Agreements.	Both
Lower Thames Valley Conservation Authority	Development Permits under Ontario Regulation 152/06 (Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses), as per the <i>Conservation Authorities Act</i> (1990)	Panhandle Loop

Essex Region Conservation Authority	Development Permits under Ontario Regulation 158/06 (Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses), as per the <i>Conservation Authorities Act</i> (1990)	Both
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ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Exhibit H, Tab 1, Schedule 1, Attachment 6 and Attachment 7

Preamble:

In accordance with the OEB's Environmental Guidelines, Enbridge Gas contacted the Ministry of Energy (MOE) on June 29, 2021 with respect to the Crown's duty to consult related to the Project. The MOE by way of a letter, delegated the procedural aspects of the Crown's Duty to Consult for the Project to Enbridge Gas on August 6, 2021 (Delegation Letter).

In the Delegation Letter, the MOE identified six Indigenous communities that Enbridge Gas should consult in relation to the Project. In a follow-up email on August 6, 2021, the MOE asked that Delaware Nation be included in the engagement and consultation on the Project based on a "best practice based on proximity". On June 10, 2022, Enbridge Gas provided to the MOE the Indigenous Consultation Report (ICR) for the Project. Enbridge Gas filed the ICR and supporting documents with the application's evidence (Attachment 7). Upon its review of the ICR and monitoring the consultation related to the Project the MOE would issue to Enbridge Gas a letter indicating if in its opinion the procedural aspects of consultation undertaken by Enbridge Gas are satisfactory (Letter of Opinion). In accordance with the Indigenous consultation documentation protocol set in the OEB's Environmental Guidelines, Enbridge Gas would file the Letter of Opinion with the OEB.

As part of the evidence, Enbridge Gas filed a summary of the Indigenous consultation activities (Attachment 6). The information Enbridge Gas filed at Attachments 6 and 7 describes the Indigenous consultation up to June 7, 2022.

Question:

- a) Please update the logs on Indigenous consultation activities and engagement since June 7, 2022. Please summarize any issues and

concerns that each of the engaged Indigenous communities raised to date.

- b) For each of the Indigenous communities consulted, please outline Enbridge Gas's plans, actions and commitments to continue to engage and, as appropriate:
- i) address any concerns
 - ii) resolve any outstanding issues or otherwise provide accommodation
 - iii) offer capacity funding
- c) Please update the evidence with a summary description and copies of any documentation on communication between the MOE and Enbridge Gas after June 7, 2022 regarding the MOE's review of Enbridge Gas's Indigenous consultation activities.
- d) Please obtain an update from the MOE on the status and anticipated timeline of receiving a Letter of Opinion for the Project.

Response

- a) Please see Attachment 1 to this response for Enbridge Gas's updated Indigenous Engagement Log since the submission of Exhibit H, Tab 1, Schedule 1, Attachment 7, updated as of September 9, 2022.

During a meeting on July 19, 2022, CKSPFN/TFG asked a number of questions regarding the Project. These questions and Enbridge Gas's responses are set out in Attachment 2 to this response.

At various times since filing the current Application with the OEB, AFN, CKSPFN and WIFN expressed concerns during their respective reviews of the ER related to fugitive emissions, cumulative effects and mitigation measures. Please see Attachment 3 to this response for the First Nation's comments on the ER and how Enbridge Gas has addressed or plans to address their respective concerns.

- b) Aamjiwnaang First Nation
- Enbridge Gas has received comments from AFN regarding the ER and provided responses back for AFN's review. Enbridge Gas has offered to meet again to review the responses provided and address any issues or concerns AFN might have. As of September 9, 2022, Enbridge Gas is not aware of any outstanding concerns or issues.

- Enbridge Gas will continue to provide updates and engage with AFN on the Project.
- Capacity funding has been provided to AFN for their engagement in this Project.

Caldwell First Nation

- Enbridge Gas has requested a meeting to discuss the Project with CFN and engage on their Consultation Protocol. As of September 9, 2022, CFN has not advised Enbridge Gas that there are any outstanding concerns or issues. When CFN would like to meet, Enbridge Gas would be happy to discuss the Project with them. As CFN is engaged in the OEB proceeding for the Project, questions are also being addressed through the Interrogatory process.
- Enbridge Gas will continue to provide updates and engage with CFN on the Project.
- Enbridge Gas has offered capacity funding to CFN on multiple occasions.

Chippewa of Kettle and Stony Point First Nations

- Enbridge Gas has received comments from CKSPFN regarding the Environmental Report and provided responses back for CKSPFN's review. Enbridge Gas has offered to meet again to review the responses and address any issues or concerns CKSPFN might have. As CKSPFN is engaged in the OEB proceeding for the Project, questions are also being addressed through the Interrogatory process.
- Enbridge Gas will continue to provide updates and engage with CKSPFN on the Project.
- Capacity funding has been provided to CKSPFN for their engagement on this Project.

Chippewas of the Thames First Nation

- Enbridge Gas has received comments from COTTFN regarding the Environmental Report and is in the process of providing responses back for COTTFN's review. Enbridge Gas will offer to meet to review the responses and address any issues or concerns COTTFN might have.
- Enbridge Gas will continue to provide updates and engage with COTTFN on the Project.
- Capacity funding has been provided to COTTFN for their engagement in this Project.

Walpole Island First Nation

- Enbridge Gas has received comments from WIFN regarding the Environmental Report and provided responses back for WIFN's review. Enbridge Gas has offered to meet again to review the responses and address any issues or concerns WIFN might have. As of September 9, 2022, Enbridge Gas is not aware of any outstanding concerns or issues.

- c) On June 10, 2022, an Enbridge Gas representative emailed the MOE advisor to advise of the filing of the Application with the OEB. On June 13, 2022, the MOE acknowledged the email (please see Attachment 4 for this correspondence).

On September 6, 2022, an Enbridge Gas representative emailed the MOE advisor to request an update from the MOE on the status and anticipated timeline of receiving a Letter of Opinion for the Project, as per the request at part d) below. The MOE advisor responded on the same day to provide details on their interactions to date with Indigenous Nations (please see Attachment 5 for this correspondence).

- d) Please see Attachment 5 to this response for the update provided by the MOE as requested. As per the MOE email dated September 6, 2022:

ENERGY is in the process of discussing with communities their experiences with Enbridge's consultation to-date on the Panhandle project. ENERGY continues to monitor the OEB process and is reviewing Three Fires Group's interests and concerns. ENERGY's intent is to provide the Letter of Opinion by the end of the record closing.

Enbridge Gas Inc. Indigenous Engagement Log

Log updated as of September 9, 2022

Aamjiwnaang First Nation (AFN)					
Line Item	Date	Method	Summary of Enbridge Gas Inc. ("Enbridge Gas") Engagement Activity	Summary of Community's Engagement Activity	Outstanding Issues or Concerns
1.15	June 9, 2022	Email	The Enbridge Gas representative sent an email to the AFN representative to provide a monthly update of Enbridge Gas's proposed projects. The update provided information regarding the Project status, Outstanding Engagement Request and proposed OEB Project Application filing date. The Enbridge Gas representative advised that capacity funding was available to support engagement on Enbridge Gas projects.		
1.16	June 13, 2022	Email		The AFN representative emailed the Enbridge Gas representative inquiring about the due date for feedback on the Environmental Report.	
			The Enbridge Gas representative advised the Project application had been submitted to the OEB on June 10, 2022 but noted they could update the OEB and MOE on any additional comments received. The Enbridge Gas representative advised they could discuss AFN's comments during their June 28, 2022 meeting with the environmental committee.		
1.17	June 27, 2022	Email		The AFN representative emailed their comments on the environmental report to the Enbridge Gas representative. Capacity funding was provided to AFN and accepted on May 16, 2022.	
1.18	June 28, 2022	Virtual Meeting	Enbridge Gas and the AFN environmental committee met to discuss Enbridge Gas projects. Enbridge Gas reviewed the scope, route and species at risk for the Project. An Enbridge Gas representative advised that field surveys were being completed and Indigenous monitors representing AFN would be attending.		
				An AFN representative asked who was monitoring and who received the results of the fieldwork.	
			The Enbridge Gas representative responded that Tri-Tribal Monitoring service has been in the field on behalf		

			of AFN for the Project and that the results of the findings would be included in the Stage 2 report, which would be forwarded to AFN upon completion.		
				An AFN representative provided an update to the Environmental committee members that the Project environmental report underwent a technical review by Vertex, a third party environment firm representing AFN, and their comments were sent to Enbridge Gas on June 27. She advised the committee that Enbridge Gas would respond to the comments.	
1.19	August 12, 2022	Email	The Enbridge Gas representative sent an email to the AFN representative to provide a monthly update of Enbridge Gas's proposed projects. The update provided information regarding the Project status, Outstanding Engagement Request and proposed OEB Project Application filing date. The Enbridge Gas representative advised that capacity funding was available to support engagement on Enbridge Gas projects.		
1.20	September 8, 2022	Email	The Enbridge Gas representative emailed the AFN representative the responses to their comments on the environmental report (Exhibit I.STAFF.22, Attachment 3). The Enbridge Gas representative also provided a copy of the field study memo provided by the environmental consultant and generic sediment control plans for Dam & Pump, HDD, and Temporary Vehicle Crossings. The Enbridge Gas representative requested a meeting with AFN following their review of the comments.		
Caldwell First Nation (CFN)					
Line Item	Date	Method	Summary of Engagement Activity	Response from Community/Outstanding Issues	Outstanding Issues or Concerns
2.17	June 9, 2022	Email	The Enbridge Gas representative sent an email to the CFN representative to provide a monthly update of Enbridge Gas's proposed projects. The update provided information regarding the Project status, Outstanding Engagement Request and proposed OEB Project Application filing date. The Enbridge Gas representative advised that capacity funding was available to support engagement on Enbridge Gas projects.		
2.18	July 5, 2022	Telephone call	An Enbridge Gas representative called the CFN representative to follow up		

			on emails and left a voice mail message with a return phone number.		
2.19	July 11, 2022	In Person discussion	An Enbridge Gas representative met with a CFN representative who confirmed that Enbridge Gas was reaching out to the appropriate contact within the community.		
2.20	July 19, 2022	Email	The Enbridge Gas representative emailed the CFN representative, regarding the Fieldwork Participation Agreement (FPA). The Enbridge Gas representative advised that they would like to use the same FPA agreement for all Nations to ensure consistency and transparency. Enbridge Gas advised they would provide an FPA for the Project and noted capacity funding was available for CFN to obtain a legal review of the FPA.		
2.21	July 25, 2022	Email		The CFN representative emailed the Enbridge Gas representative advising CFN preferred to draft their own contracts, noting a pan-Indigenous approach to the contract was not satisfactory.	
2.22	August 5, 2022	Email	The Enbridge Gas representative emailed the CFN representative clarifying they did not use a pan-Indigenous approach to contracts, noting they preferred to standardize agreements for legal and contract management purposes. The Enbridge Gas representative advised they made accommodations to the best of their ability, and provided a draft agreement with suggested revisions. The Enbridge Gas representative provided an overview of rates, advising capacity funding was available for training or personal protection equipment.		
2.23	August 12, 2022	Email	The Enbridge Gas representative sent an email to the AFN representative to provide a monthly update of Enbridge Gas's proposed projects. The update provided information regarding the Project status, Outstanding Engagement Request and proposed OEB Project Application filing date. The Enbridge Gas representative advised that capacity funding was available to support engagement on Enbridge Gas projects.		
				The CFN representative emailed the Enbridge Gas representative advising they would provide comments once the CFN leadership had completed their	

				review of projects in their traditional territory.	
2.24	August 22, 2022	Email		The CFN representative emailed the Enbridge Gas representative advising the rates suggested by Enbridge Gas were acceptable, noting capacity funding would be negotiated from project to project. The CFN representative advised they accepted the recommended revisions to the CFN fieldwork participation agreement and the agreement for execution. The CFN representative requested the agreement be modified for future projects.	
			On August 24, 2022, the Enbridge Gas representative emailed the CFN representative providing the fieldwork participation agreement for execution. The Enbridge Gas representative requested a meeting to discuss the project and capacity funding.		
2.25	August 26, 2022	Email		The CFN representative emailed the Enbridge Gas representative the signed copy of the FPA for the Project. The CFN representative advised they would be interested in meeting to identify gaps in capacity in regard to the Project. The CFN representative advised it would be best to meet with CFN and the Three Fires Group (TFG) as the parties are working together.	
2.26	September 9, 2022	Email	The Enbridge Gas representative emailed the CFN representative to request some dates for a meeting with CFN and TFG and to also provide clarity on the partnership or arrangement between the two parties with respect to consultation on the Project.		
Chippewas of Kettle and Stony Point First Nation (CKSPFN)					
Line Item	Date	Method	Summary of Engagement Activity	Response from Community/Outstanding Issues	Outstanding Issues or Concerns
3.20	June 8, 2022	Email		A representative from the Three First Group, acting on behalf of CKSPFN, (TFG) sent an email to the Enbridge Gas representative to advise they required an extension of June 28, 2022 to review and comment on the environmental report for the Project. The TFG representative asked when the Project application was being filed with the OEB.	
			On June 9, 2022, the Enbridge Gas representative replied to the CKSPFN representative advising that the		

			Project application was anticipated to be filed on June 10, 2022. The Enbridge Gas representative requested a meeting after June 28, 2022 following CKSPFN's review of the environmental Report.		
3.21	June 28, 2022	Email		The CKSPFN representative emailed the Enbridge Gas representative advising they would provide their comments on the Environmental Report by July 5, 2022 and requested Enbridge Gas's availability for a meeting the week of July 18, 2022.	
				The Enbridge Gas representative emailed the CKSPFN representative providing their availability for a meeting on July 18 and 19, 2022.	
				The parties agreed to meet on July 19, 2022.	
3.22	July 5, 2022	Email		The CKSPFN representative emailed the Enbridge Gas representative providing their comments on the Project Environmental Report.	
				On the same day, the Enbridge Gas representative acknowledged receipt of the email.	
3.23	July 11, 2022	In person Meeting		The Enbridge Gas and CKSFPN/Three Fires Group (TFG) representatives met in person to discuss opportunities for business partnerships on Enbridge Gas work.	
				The TFG requested information regarding the general contractors for the Project.	
3.24	July 14, 2022	In Person Meeting	An Enbridge representative met in person with a representative from TFG to discuss opportunities for supply chain inclusion, bid timing of the RFP and construction timelines for the Project.		

3.25	July 19	Virtual meeting	<p>The Enbridge Gas representative had a conference call with CKSPFN regarding the Project. Topics of discussion included the purpose of the Project, water crossings, emissions, and the Environmental Report.</p>		
				<p>For the questions asked by TFG and the responses to these questions, please see Exhibit I.STAFF.22, Attachment 2</p>	
			<p>The Enbridge Gas representative advised they would provide responses to the questions not answered in the meeting in a follow up email.</p>		
3.26	July 19, 2022	Email	<p>The Enbridge Gas representative emailed the CKSPFN representative to confirm the contracting authority (Three Fires Group or CKSPFN) for the Fieldwork Participation Agreement.</p>		
				<p>On July 20, 2022, the CKSPFN representative replied and advised they would confirm the appropriate contracting authority for CKSPFN.</p> <p>The CKSPFN representative requested that Enbridge Gas email all consultants to ensure that the consultation email address was being used for all monitoring invitations.</p>	
			<p>The Enbridge Gas representative emailed the environmental consultant for the Project and included the CKSPFN representative to confirm that all emails should be sent to the consultation email address provided.</p>		
3.27	July 25, 2022	Email	<p>The Enbridge Gas representative emailed the CKSPFN representative providing the shape files for the Project.</p>		
3.28	July 27, 2022	Email	<p>The Enbridge Gas representative emailed the CKSPFN representative to provide updates on outstanding items. The Enbridge Gas representative advised that the response to CKSPFN's comments on the environmental report were delayed and an update would be provided the following week. The Enbridge Gas representative also advised that the shape files had been sent.</p>		
3.29	July 29, 2022	Email		<p>The TFG representative emailed the Enbridge Gas representative requesting Project details on the General Contractor bid list, timing</p>	

				of RFP and timelines for construction work.	
			On August 10, 2022, the Enbridge Gas representative replied to the TFG representative to provide the details requested.		
3.30	August 2, 2022	Email	<p>The Enbridge Gas representative emailed the CKSPFN representative providing a comment tracker and generic sediment control plans for Dam & Pump, HDD, and Temporary Vehicle Crossings in response of the July 19, 2022 meeting. The Enbridge Gas representative noted some responses to the inquiries raised would be responded to within the environmental report responses and indicated they could be available later that week.</p> <p>Please see Exhibit I.STAFF.22, Attachment 2 for responses to the questions posed at the July 19, 2022 meeting.</p>		
3.31	August 11, 2022	Email	<p>The Enbridge Gas representative emailed the CKSPFN representative with an update email to advise on the status of responding to the comments received from CKSPFN regarding the environmental report . Enbridge Gas advised that their responses to the environmental would be ready for review the week of August 15, 2022, which would allow CKSPFN to review them prior to the OEB Intervenor comments due in early September. The Enbridge Gas also inquired as to any items CKSPFN has requested that remains outstanding.</p>		
3.32	August 12, 2022	Email	<p>The Enbridge Gas representative sent an email to the CKSPFN representative to provide a monthly update of Enbridge Gas’s proposed projects. The update provided information regarding the Project status, Outstanding Engagement Request and proposed OEB Project Application filing date. The Enbridge Gas representative advised that capacity funding was available to support engagement on Enbridge Gas projects.</p>		
3.33	August 18, 2022	Email	<p>The Enbridge Gas representative emailed the CKSFPN representative to provide its responses to CKSFPN’s comments on the environmental report (Exhibit I.STAFF.22, Attachment 3). The Enbridge Gas representative requested a meeting with CKSFPN to discuss the responses once CKSFPN</p>		

			<p>has had an opportunity to review them.</p> <p>Please see (Exhibit I.STAFF.22, Attachment 3) for responses to the CKSFPN environmental report.</p>		
3.34	August 24, 2022	Email	<p>The Enbridge Gas representative emailed the CKSFPN representative following up on an email sent on July 19 regarding the fieldwork participation agreement. The Enbridge Gas representative provided a copy of the standard fieldwork participation agreement for their review and requested clarity on which authority should be listed on these agreements (CKSFPN or TFG).</p>		
3.35	September 7, 2022	Email	<p>The Enbridge Gas representative emailed the CKSFPN representative a copy of the field study memo provided by the environmental consultant.</p>		
Chippewas of the Thames First Nation (COTTFN)					
Line Item	Date	Method	Summary of Engagement Activity	Response from Community/Outstanding Issues	Outstanding Issues or Concerns
4.17	June 10, 2022	Email	<p>The Enbridge Gas representative emailed the COTTFN representative providing a June 2022 Project update. The Enbridge Gas representative advised comments received on the Environmental Report could be incorporated at any time. The Enbridge Gas representative requested a meeting in July 2022 to review COTTFN's comments on the environmental report.</p>		
4.18	July 25, 2022	Email		<p>The COTTFN representative emailed the Enbridge Gas representative advising they would provide their comments on the Environmental Report later that week. The COTTFN representative provided their availability for a community information session on current Enbridge Gas projects.</p>	
4.19	July 28, 2022			<p>The COTTFN representative emailed the Enbridge Gas representative providing their comments on the Project Environmental Report, and an invoice.</p> <p>COTTN addressed concerns in the environmental report regarding mitigation measures, cumulative effects, and other issues.</p>	

				The letter requested a community engagement session in the fall 2022.	
4.20	Aug 2, 2022		The Enbridge Gas representative emailed the COTTFFN representative advising the Project team was working on responses to their comments on the Environmental Report. The Enbridge Gas representative noted they would schedule a community information session on current Enbridge projects for the fall 2022.		
4.21	Aug 12, 2022	Email	The Enbridge Gas representative sent an email to the COTTFFN representative to provide a monthly update of Enbridge Gas's proposed projects. The update provided information regarding the Project status, Outstanding Engagement Request and proposed OEB Project Application filing date. The Enbridge Gas representative advised that capacity funding was available to support engagement on Enbridge Gas projects.		
Oneida Nation of the Thames (Oneida Nation)					
Line Item	Date	Method	Summary of Engagement Activity	Response from Community/Outstanding Issues	Outstanding Issues or Concerns
5.11	June 10, 2022	Email	The Enbridge Gas representative was supposed to meet with the Oneida Nation representation on June 10, 2022 to discuss the Project, but the Oneida Nation representative was no longer available. The Enbridge Gas representative established a meeting for June 29, 2022. In addition to this, the Enbridge Gas representative advised comments received on the Environmental Report could be incorporated at any time. The Enbridge Gas representative requested a meeting in July 2022 to review the Oneida Nation's comments on the environmental report.		
5.12	June 29, 2022	In Person Meeting	The Enbridge Gas representative met with the Oneida Nation representative in Oneida First Nation. The Enbridge Gas representative provided a Project update. The Oneida Nation representative had no concerns with respect to the Project status.		
5.13	August 12, 2022	Email	The Enbridge Gas representative sent an email to the Oneida Nation representative to provide a monthly update of Enbridge Gas's proposed projects. The update provided information regarding the Project status, Outstanding Engagement Request and proposed OEB Project		

			Application filing date. The Enbridge Gas representative advised that capacity funding was available to support engagement on Enbridge Gas projects.		
Walpole Island First Nation (WIFN)					
Line Item	Date	Method	Summary of Engagement Activity	Response from Community/Outstanding Issues	Outstanding Issues or Concerns
6.19	June 9	Email	The Enbridge Gas representative emailed the WIFN representatives providing an update on the Project and requested a meeting to discuss the Project.		
6.20	June 20, 2022	Email		The WIFN representative emailed the Enbridge Gas representative providing their comments on the environmental report for the Project. Capacity funding was provided to WIFN and accepted on May 16, 2022.	
6.21	July 13, 2022	In person meeting	The Enbridge Gas representative and the WIFN representative met to discuss the Project. Supply chain management was discussed, and information was provided on how WIFN businesses could participate in the supply chain management aspect of Enbridge Gas projects.		
6.22	August 12, 2022	Email	The Enbridge Gas representative sent an email to the WIFN representative to provide a monthly update of Enbridge Gas's proposed projects. The update provided information regarding the Project status, Outstanding Engagement Request and proposed OEB Project Application filing date. The Enbridge Gas representative advised that capacity funding was available to support engagement on Enbridge Gas projects.		
6.23	September 8, 2022	Email	The Enbridge Gas representative emailed the WIFN representative the responses to their comments on the environmental report. The Enbridge Gas representative also provided a copy of the field study memo provided by the environmental consultant and generic sediment control plans for Dam & Pump, HDD, and Temporary Vehicle Crossings. The Enbridge Gas representative requested a meeting with WIFN following their review of Enbridge Gas's responses to their comments.		

			Please see Exhibit I.STAFF.22, Attachment 3 for responses to the WIFN's environmental report.		
				On September 9, 2022, the WIFN representative acknowledged receipt of the email.	

Three Fires Group and Enbridge Gas meeting – July 19, 2022			
	TFG Question/Comment	Enbridge Gas Response/Comment	Follow up items from meeting
1.	Three Fires Group (TFG) asked to be informed if Enbridge Gas proceeds with originally proposed distribution lines for the Panhandle project, as they would like to be consulted on them as early as possible in the process.	Enbridge Gas agreed to meet early to discuss the proposed distribution lines for the Panhandle project if these proceed.	
2.	TFG asked when they would be receiving the ER comments for Panhandle that were sent to EGI on July 5, 2022	Enbridge Gas advised that they were working on the responses and should have drafts this week from the environmental consultants. Enbridge Gas committed to providing the Panhandle responses by July 29; however, due to vacations, this might not be feasible and Enbridge Gas would provide an update next week.	Enbridge Gas provided an update on Wednesday, July 27 that the responses would be provided the following week.
3.	TFG asked what the need was for the Project? Was it driven by large development such as the battery plant or Greenhouses?	Enbridge Gas advised that the need for the Panhandle Project stemmed from an increased need for gas supply in the general region. Greenhouses were a factor driving the need for gas supply. Enbridge	In the OEB application for the Project, Exhibit B Tab 1 Schedule 1, the need is described as follows: 11. Enbridge Gas launched an Expression of Interest (“EOI”) process in February 2021 to formally gauge interest for incremental growth on the Panhandle system. 15. Of the 44 bid forms received, 43 of the requests for additional capacity were from customers in the greenhouse

		Gas advised they would take the question away and confirm.	sector and one request was from a large power generator (Brighton Beach Power L.P. (doing business as Atura Power ("Atura"))). 18. After the close of the EOI process, Enbridge Gas was approached by a large industrial customer from the automotive industry (Stellantis N.V. ("Stellantis")) which requested incremental natural gas service to their planned large scale electric vehicle ("EV") battery manufacturing facility in Windsor, Ontario.
4.	TFG asked if the need for the Project was power generation specific	The Enbridge Gas representative advised they were not aware of any power generation that was needing additional gas supply from this Project but would confirm.	Please see the response above.
5.	TFG asked for the shape files for both the Dawn Corunna and Panhandle Project	The Enbridge Gas representative advised they would supply the shape files.	The shape files for the Panhandle Project were provided on Monday, July 25. The shape files for Dawn Corunna were provided on July 28.
6.	TFG advised that all Enbridge Gas correspondence with CKSPFN go through the consultation inbox	The Enbridge Gas representative confirmed they would send correspondence through the requested inbox.	
7.	The TFG representative asked about the cumulative effects assessment and why it is only limited to the construction phase of the project and not the operations phase.	The Enbridge Gas representative advised that he would follow up with a response.	This question will be addressed in the ER response table.
8.	The TFG representative asked about figure 1 (Panhandle Loop: Route Alternative Study	The Enbridge Gas representative advised	The Route Alternative Study Area is defined and explained in Section 2.2.1 of the ER.

	Area) and figure 2 (Panhandle preliminary). Why were the study boundaries used?	they would go back to Aecom to get a response.	
9.	The TFG representative advised that GHG and fugitive emissions within the CKSPFN traditional territory were a concern. The TFG asked about the anticipated fugitive emissions from the Project.	The Enbridge Gas representative advised they would seek out and provide a response.	Enbridge Gas has estimated that the incremental fugitive and vented (including integrity digs) emissions due to this project are approximately 238 tCO ₂ e/yr. This considers emissions due to operations only.
10.	The TFG representative asked if we were transporting anything other than natural gas within the pipeline?	The Enbridge Gas representative advised that the line was for Natural Gas. The Enbridge Gas representative advised that they would also provide a response to this question within the response to the ER.	<p>It is important to clarify that the compatibility of steel transmission pipelines with blended or pure hydrogen remains under active investigation. While Enbridge Gas is evaluating the general compatibility of materials and systems up to 100% hydrogen, the upper limit has not yet been determined. These efforts underscore Enbridge Gas's proactive steps in working to ensure the gas grid of the future is able to deliver a lower carbon fuel to its customers.</p> <p>Partial or full conversion to hydrogen will necessitate enhanced integrity management programs and operational changes to ensure continued safety and reliability. Enbridge Gas is actively engaged with governments, research agencies and partners across the globe to accelerate the transition towards net-zero while keeping safety, affordability and reliability top of mind.</p>
11.	TFG asked about the mitigations for water crossings and requested review of water crossing specific mitigations based on the CKSPFN water assertion. When would these documents be available for review?	The Enbridge Gas representative advised that the draft EPP is not yet complete and will be updated as permits, like the water crossing permits, are obtained and permit conditions are known. The Enbridge Gas representative advised that we could send them	Enbridge Gas provided the Generic Sediment Control Plans for Dam & Pump crossings, HDD crossings, and temporary vehicle crossings (culverts and bridges), which were requested by CKSPFN when providing the minutes back on August 2, 2022.

		the Generic Sediment Control Plans that will be adhered to at this time.	
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Response to Aamjiwnaang First Nation (AFN) comments received June 27, 2022 re: Environmental Report on the Panhandle Regional Expansion Project (“Project”)				
No.	Section	Comment	Recommendation	Enbridge Gas Response
1.	4.33, 5.3.2.4 (Wildlife and Wildlife Habitat)	<p>In the context of wildlife and wildlife habitat, the AFN may want to consider the following:</p> <ul style="list-style-type: none"> • Request details surrounding preliminary field investigations, involvement in any 2022 field studies, and a summary of specific sites that may have wildlife and/or wildlife habitat concerns where site-specific mitigation or monitoring may be required. • An apparent lack of any assessment of potential effects to wildlife corridors and habitat fragmentation. 		<p>To assess the potential effects of the project on the identified Species at Risk (SAR) species, ecological land classification, botanical inventories, and bat acoustic monitoring surveys were conducted in 2022.</p> <p>Field surveys were undertaken in 2022 in order to further understand the project challenges and opportunities towards wildlife and wildlife habitat and to further refine mitigation and preventative measures. Prior to the investigations, AFN was invited to participate in the 2022 field program. At this time, there are no additional wildlife and wildlife habitat investigations proposed. However, AFN will be provided with a report summarizing the field survey findings and recommendations.</p> <p>As stated in Section 4.3.3.1 of the Environmental Report (ER), the majority of the study area is composed of agricultural fields with natural areas largely limited to hedgerows or narrow strips of woodlots and riparian areas of agricultural drains. Additionally, both pipelines parallel or follow existing infrastructure (roads, existing pipeline easements), limiting new effects to undisturbed lands. Mitigation measures, including a tree planting program, as summarized in ER Appendix G, will be employed to limit effects to SAR and Significant Wildlife Habitat (SWH). Through these measures no significant project impacts, including habitat fragmentation, are anticipated.</p>
2.	4.3.3.2, 5.3.2.5, Appendix D (Species and Risk)	<p>In the context of SAR, the AFN may want to consider the following:</p> <ul style="list-style-type: none"> • Request details surrounding preliminary field investigations, involvement in any 2022 field studies, and a summary of specific sites that may have SAR 		<p>To assess the potential effects of the project on the identified SAR species, ecological land classification, botanical inventories, and bat acoustic monitoring surveys were conducted in 2022.</p>

		concerns where site-specific mitigation or monitoring may be required		Enbridge Gas has offered AFN the opportunity to participate in the field program and has committed to providing AFN a report summarizing the SAR field survey findings.
3.	5.3.3.1 (Indigenous Interests)	The ER does not explain how indigenous concerns were considered during the effect assessment.		<p>Consultation, including Indigenous Engagement, is detailed in Section 3 and Appendix B of the ER.</p> <p>Potential project effects from construction and operation on Indigenous interests were considered and addressed, through proposed mitigation measures, by Enbridge Gas in Section 5.3.3.1</p> <p>Additionally, through this ER review process Enbridge Gas will address any specific Indigenous concerns.</p>
4.	6 (Cumulative Effects Assessment)	<ul style="list-style-type: none"> • Aquatics (groundwater, surface water, fish and fish habitat) do not appear to have been considered in the cumulative effects assessment. • Socio-economic effects do not appear to have been considered in the cumulative effects assessment. • Cumulative effects are predicted to be not significant or not expected for soil, vegetation, wildlife and wildlife habitat, and air quality and noise. The primary rationale provided to support this conclusion is that mitigation measures will avoid or minimize any potential effects to these receptors. However, it is not clear how the successful implementation of the proposed mitigation measures will be monitored or assessed during and after Project construction as no specific monitoring or contingency plans are provided in the ER 		<p>The cumulative effects assessment was completed in accordance with the Ontario Energy Board (OEB) Environmental Guidelines. Enbridge Gas reviewed publicly available information on current and planned projects in the area, then considered the effects that are additive or interact with the effects that have already been identified as resulting from the pipeline construction. The cumulative effects assessment identified potential additive effects on soil, vegetation, wildlife and wildlife habitat, air quality and the acoustic environment. Enbridge Gas determined that, provided the mitigation and protective measures outlined in the ER are implemented and that concurrent projects implement similar mitigation and protective measures, potential cumulative effects are not anticipated to occur, or if they do occur, they are not anticipated to be significant.</p> <p>A full-time Environmental Inspector will be on-site for the duration of the project to assess the effectiveness of mitigation measures and implement adaptive management should mitigation measures be limited in effectiveness. The</p>

				pipeline corridor will be monitored following construction to ensure the effectiveness of mitigation measures.
5.	7 (Environmental Monitoring and Contingency Plans)	<p>The AFN may want to consider the following:</p> <ul style="list-style-type: none"> • Request to be informed or involved in any 2022 field studies in determining sensitive environmental locations or features that may require monitoring. • Request to be involved in the development of the Project EPP. • Request regular updates of any environmental inspections during and after construction. • Request to be immediately informed of any undocumented archaeological or heritage resource discoveries. 		<p>Enbridge Gas has committed to 2022 field studies and AFN has been participating in these studies. Enbridge Gas has also committed to providing AFN with a report summarizing field study findings.</p> <p>Enbridge Gas is open to continue working with AFN moving forward.</p>
6.		<p>While the Projects Indigenous Engagement Log Demonstrates active engagement between the proponent and the Nation during the Project information phase, the ER does not demonstrate how Indigenous concerns were considered, or how treaty rights were considered during the effects assessment. Mitigations for effects to traditional Indigenous territories, communities and practices are not proposed in the effects assessment.</p>		<p>Section 5.3.3.1 of the ER considers potential impacts and mitigation measures for Indigenous interests. Additionally, through this ER review process Enbridge Gas will address any specific Indigenous concerns.</p> <p>A summary of feedback from the First Nations is provided with the Project application for OEB approval. These can be found in H1-1 Attachment 6 and 7 of the OEB filing.</p>
7.		<p>Vegetation clearing and disruption of traditionally significant species is of concern to the Nation. As such, limiting vegetation removal to the extent possible and implementing invasive species management is important. We recommend that the Nation be involved in the planning and procurement of native species where opportunities exist for seeding and restoration of cleared vegetations. Also, consideration should</p>	<p>Enbridge must be providing specific details about what actions they plan to undertake to offset forest/woodland habitat loss and forest/woodland fragmentation associated with this project.</p>	<p>Section 2 of the ER notes the route selection process that was followed for the Project. The route selection process examined route alternatives and chose the most preferred route based on avoidance of socio-economic and environmental features. Based on this process, the majority of the preferred route resides in agricultural land with minimal disturbance to vegetation and woodland.</p>

		<p>be given to promote the Nation’s greenhouse for vegetation restoration initiatives.</p>	<p>Enbridge must commit to consulting with AFN on the offsetting measurers. AFN expects that these measurers will include:</p> <ul style="list-style-type: none"> • Offsetting the fragmentation and loss of forests/woodlots by creating more forest habitat within the local landscape at a minimum of a 3:1 ratio; • Prioritizing forest habitat offsetting measurers to expand existing forests/woodlands and to maintain or build habitat connectivity within the local landscape; • Prioritize planting native plant species and consulting with AFN to ensure that plant species of importance are included in the plantings; • Undertake follow-up monitoring for a minimum of 5 years 	<p>In addition, Enbridge Gas is committed to implementing a tree replacement program that replants 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) in response to the Indigenous consultation process.</p> <p>Directly impacted landowners are given first right of refusal for the tree planting under this program. 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.</p>
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			<p>and re-plant if necessary to ensure the survival of plantings and successful establishment of the compensation forest habitat; and</p> <p>Provide opportunities for AFN community members to be involved in these activities</p>	
8.		<p>Measures and standards to avoid and mitigate impacts to fish and fish habitat including impacts to aquatic species at risk must include always having a qualified environmental professional on site during any works or activities below the high-water mark to verify that measures and standards to avoid and mitigate impacts to fish and fish habitat are effective. The authorized project footprint must be monitored for pools of standing water and stranded or trapped fish within those pools. This monitoring must be conducted anytime that there is a potential for pools of standing water, including times when work activities are not taking place. Using appropriate gear, timing, and salvage techniques, a qualified environmental professional shall capture and relocate fish and invertebrates salvaged</p>		<p>The referenced Best Management Practices (BMPs) will be implemented.</p>
9.		<p>A spill prevention and emergency response plan must be developed to minimize potential for environmental incidents and to provide guidance for responding to situations that pose imminent</p>		<p>Mitigation measures identified in Tables 5-3, 5-5, 5-7 and Section 7.2.2 of the ER will be implemented during the duration of the project. These mitigation measures,</p>

		<p>threat to the environment. The measures contained in the plan will minimize adverse effects to terrestrial and aquatic environments and improve the safety of the workers and public. Contamination of land and/or water from spills can result in pollution of soil and groundwater, which could be lethal to aquatic and terrestrial wildlife. Given the importance of surface water to the Nation, we recommend that the Nation be involved in the development of the plan and their endorsement be sought before finalizing the plan. If these measures are implemented in addition to Enbridge's recommended mitigation measures, impact to surface water will be reduced to non-significant.</p>		<p>including the Spill Prevention plan, will be part of the Environmental Protection Plan for construction.</p> <p>Construction will complete an Emergency Response plan for all areas of execution in coordination with the Contractors completing works across the Project prior to start of any activities.</p>
10.		<p>Surface and groundwater are important to the Nation. As such, we recommend that the Nation be given the opportunity to review and comment on all in-water work plans, erosion and sediment control plan, and emergency spill prevention and response plan before construction.</p>		<p>Generic Sediment Control Plans for Dam & Pump, HDD, and Temporary Vehicle Crossings will be provided for review.</p> <p>Regarding emergency spill prevention and response plan, please see comment #9.</p>
11.		<p>The Nation should be consulted on timing and completion of the Stage 2 archaeological assessment for artifacts. There is concern that anything found of archaeological significance has not been provided to the Nation as it was collected by Six Nations and not provided specifically to the Aamjiwnaang First Nation.</p>		<p>Enbridge Gas offered AFN the opportunity to participate in the 2022 field program and will consult with AFN on the details of the stage 2 archeological assessment. Enbridge Gas provides capacity funding for participation in archaeological assessments as well as having monitors participate in the Stage 2 Archaeology Assessment work.</p> <p>No items have been provided to any First Nations.</p>
12.		<p>The Nation should seek or request opportunities for local business and community members to participate in the Project where practicable.</p>		<p>The Enbridge Gas representative for Supply Chain Management- Indigenous Engagement has met with AFN to discuss opportunities on the Project and for local business</p>

		Trainings and workshops could be made available to the Nation so they can qualify for higher paying technical positions.		participation in Enbridge Gas projects in general. Enbridge Gas is in the process of working through training workshops that could be offered and will be able to provide AFN with more information in the future.
13.		Territorial lands have not been as well studied as Reserve lands with respect to Traditional Land Use or Traditional Knowledge. The capacity of the Nation to extend beyond the boundaries of the reserve to assess potential Project impacts to their territorial lands is required.		Enbridge Gas would be happy to discuss the completion of an Indigenous Knowledge, Land Use study, extending beyond the boundaries of the reserve, with AFN.
14.		The Nation should be involved in future field study investigations that may have wildlife and/or wildlife habitat concerns where site-specific migration or monitoring may be required. Also, if there are existing preliminary field investigation studies of wildlife and wildlife habitat within the proposed project area, they should be available to the Nation.		Ecological field surveys were undertaken in 2022 to enhance the understanding of Project impacts on significant wildlife habitat. AFN has been involved in the field programs to date. Additionally, please see response to comment #1.
15.		The Nation should be involved in future preliminary field investigations and any existing recent field survey studies that may have SAR concerns where site-specific mitigation or monitoring may be required be made available to them. Certain species at risk (e.g., Butler’s Garter Snake) have been downgraded from endangered to threatened, which has removed engagement opportunities for the Nation.		While Butler’s Garter Snake is a SAR (as defined as an ESA species listed as Threatened, Endangered or Extirpated), it was not identified during the ER SAR records review for SAR within the vicinity of the study area or during the 2022 field program. Ecological field surveys were undertaken in 2022. AFN has been involved in the field programs to date. Additionally, please see response to comment #1 and #2
16.		Details on the assessment of potential effects to wildlife corridors and habitat fragmentation should be included in the ER.		As stated in ER Section 4.3.3.1, the majority of the Project Site Areas are composed of agricultural fields with natural areas largely limited to hedgerows or narrow strips of woodlots and riparian areas of agricultural drains.

				<p>Additionally, both pipelines parallel or follow existing infrastructure (roads, existing pipeline easements), limiting new effects to undisturbed lands.</p> <p>Potential effects of the project on wildlife and their habitat have been identified in Section 5.3.2.4.</p>
17.	5.3.7 Designated Natural Areas and Vegetation	<p>Vertex recommends that Enbridge develop a Vegetation Management Plan to identify potential impacts to vegetation that may result from the Project, and outline mitigation measures to prevent adverse environmental effects to terrestrial ecosystems over both the short and long term. The Vegetation Management Plan should aim to ensure that no adverse impacts to at-risk plant species (e.g., American Chestnut, Ogden’s Pondweed, Gillman’s Goldenrod, Colicroot and Black Ash) and to other ecosystems outside the Project footprint.</p>		<p>Section 5.3.2.3 (Table 5-8) of the ER lists potential impacts to vegetation as well as recommended mitigation & preventative measures to be followed during construction in order to limit impacts to vegetation. Some of these mitigation & preventative measures include, limiting vegetation removal, obtaining permitting requirements/approval from government regulatory agencies, revegetating cleared areas with native seeds and vegetation species, and the replanting of trees as part of Enbridge’s tree replacement program. Contract provisions will also require the Contractor to minimize impacts to vegetation communities during construction and implement mitigation and preventative measures.</p> <p>In addition to the mitigation measures outlined in the ER and contract package, Enbridge Gas will also provide a Plant Species of Concern Contingency Plan to the winning construction contractor that outlines protocols and measures to follow if an at-risk plant species is found during construction.</p>
18.	5.3.8 Wildlife and Wildlife Habitat	<p>Vertex recommends that the Nation be involved in future field study investigations that may have wildlife and/or wildlife habitat concerns where site-specific migration or monitoring may be required. Also, if there are existing preliminary field investigation studies of wildlife and wildlife habitat within the proposed project area, they should be available to the Nation.</p>		<p>Please see response to comment #1.</p>

19.	5.3.9 Species at Risk	We recommend that the Nation be involved in future preliminary field investigations and any existing recent field survey studies that may have SAR concerns where site-specific mitigation or monitoring may be required be made available to them.		Please see response to comment #2.
20.	5.3.12 Landfills and Contaminated Sites	A Waste Management Plan for the collection, storage, labeling, and disposal of waste material should be developed prior to the execution of the Project. The waste management plan should also cover disposal of excess soil and management of contaminated soil.		Enbridge Gas will develop a Waste Management Plan prior to construction
21.	5.5 Environmental Monitoring and Contingency Plans	We recommend that the Nation be involved in the development of the Construction Environmental Management Plan and that their comments and input are considered. The Nation should also be involved in future field studies in determining sensitive environmental locations or features that may require ongoing monitoring.		<p>Enbridge Gas has committed to 2022 field studies and AFN has been participating in these studies. Enbridge Gas has also committed to providing AFN with a report summarizing field study findings.</p> <p>Enbridge Gas is open to continue working with AFN moving forward.</p>
22.	Other Recommendations	While the Projects Indigenous Engagement Log demonstrates active engagement between the proponent and the Nation during the Project information phase, the ER does not demonstrate how Indigenous concerns were considered, or how treaty rights were considered during the effects assessment. Mitigations for effects to traditional Indigenous territories, communities and practices are not proposed in the effects assessment.		Please see response to comment #6.

Enbridge Gas Inc.'s ("Enbridge Gas") Response to Chippewas of Kettle & Stoney Point First Nation's Comments received July 5, 2022 re: Environmental Report on the Panhandle Regional Expansion Project ("Project")			
Table 1. Comments on the Panhandle Regional Expansion Project – Environmental Report ("ER")			
Reference	Text from ER	Comments	Enbridge Gas Response
Section 1.2	19 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 [...] Chatham-Kent.	<ul style="list-style-type: none"> - There is an opportunity to design this pipeline such that it can transport alternative fuels like hydrogen and/or blends of natural gas in the near-term, rather than needing to retrofit the line to make this feasible. Given the profoundly serious impacts of climate change on all aspects of the environment, this is a consideration that should be outlined in the present report. - Enbridge should comment on measures that will be taken to ensure pipeline integrity during alternative fuel transport and blending. 	<p>The compatibility of steel transmission pipelines with blended or pure hydrogen remains under active investigation. While Enbridge Gas is evaluating the general compatibility of materials and systems up to 100% hydrogen, the upper limit has not yet been determined. These efforts underscore Enbridge Gas's proactive steps in working to ensure the gas grid of the future is able to deliver a lower carbon fuel to its customers.</p> <p>Partial or full conversion to hydrogen will necessitate enhanced integrity management programs and operational changes to ensure continued safety and reliability. Enbridge Inc., including Enbridge Gas, is actively engaged with governments, research agencies and partners across the globe to accelerate the transition towards net-zero while keeping safety, affordability, and reliability top of mind.</p>
Section 3.6.1	It should also be noted that four additional comments were received from the public via the interactive mapping tool noting concerns over a species sighting (Western Chorus Frog [<i>Pseudacris triseriata</i>], [...]) near the Leamington Interconnect.	<ul style="list-style-type: none"> - Enbridge should comment on (1) western chorus frog wildlife and habitat surveys, and (2) measures that will be taken to ensure the protection of the western chorus frog's habitat. - The Great Lakes/St. Lawrence population of western chorus frog is threatened in Canada, and as such has a Recovery Strategy under the Species at Risk Act. Main threats to the species are listed as habitat loss and degradation through urban development, climate change, and the expansion and maintenance of linear infrastructure, all of which are features of the proposed 	<p>The ecology team has made note of the sighting of Western Chorus Frog, reported through the interactive mapping tool.</p> <p>Ecological field surveys have been completed in 2022 to investigate species presence and significant wildlife habitat (SWH) in the vicinity of the Project Study Areas (PSAs).</p> <p>As stated in Section 4.3.3.1 of the Environmental Report (ER) the Western Chorus Frog is not a provincial Species at Risk (SAR) in the geography where it was noted to occur. However, the species is considered a SAR federally when projects occur on federal lands. Although these [non-SAR] species are not afforded protection under the provincial Endangered Species Act, effects to these species need to be considered as their habitat may be designated as significant, such as amphibian breeding habitat.</p>

		<p>project (Environment Canada, 2015). The habitat of this species is also protected in Ontario by the Provincial Policy Statement (PPS) under the Planning Act.</p>	<p>The anticipated effects on these [non-SAR] species are likely limited as the majority of the Project area is composed of agricultural fields with natural areas largely limited to hedgerows or narrow strips of woodlots and riparian areas of agricultural drains. Additionally, both pipelines parallel or follow existing infrastructure (roads, existing pipeline easements), limiting new effects to undisturbed lands. Ecological land classification surveys, and targeted surveys for SAR such as habitat assessments have further refined areas of suitable significant wildlife habitat (SWH). Mitigation measures noted in Table 5-9 of the ER will be employed to limit effects to these candidate features. Some of these mitigation measures include Installing and maintaining sediment and erosion controls such as silt fence barriers, rock flow check dams, compost filter socks or approved alternative along the edge of the construction footprint area if within 30 m of a wetland or waterbody where appropriate, obeying site speed limits identified in plans for traffic management and adhering to applicable timing windows (e.g., bat roosting window of April 1 to October 1).</p>
<p>Section 4.2.3</p>	<p>A segment north of Jeannettes Creek, approximately 5km in length, and the north end of the Panhandle Route lies within a Significant Groundwater Recharge Area and a Highly Vulnerable Aquifer (MECP, 2022).</p>	<ul style="list-style-type: none"> - Enbridge should include comment(s) as well as mitigation measure(s) in Section '5.3.1.2 Groundwater Resources' that will be taken to ensure and maintain the integrity of groundwater recharge zones and significant groundwater resources. - Enbridge should seek approval from local residents, Indigenous communities, municipal and provincial governments, and conservation authorities prior to building a pipeline nearby and/or above a highly vulnerable aquifer/source of drinking water. 	<p>Potential effects and mitigation measures to groundwater resources are summarized in ER Table 5-1. Through the implementation of mitigation measures, no significant adverse residual effects on groundwater are anticipated. This includes the Significant Groundwater Recharge Area and Highly Vulnerable Aquifer identified in ER Section 4.2.3.</p> <p>Impacts are not anticipated beyond the Project footprint based on the mitigation measures recommended in section 5.3.1.2 and potential impacts on aquatic resources will be addressed through the permitting process. Enbridge Gas is seeking leave to construct from the Ontario Energy Board in accordance with applicable legislation and will obtain any legally required permits to undertake the Project. Enbridge Gas offers capacity funding to Indigenous communities we are engaged with to support in meaningful consultation on projects.</p>

<p>Section 4.3.1.1</p>	<p>There are twenty-nine watercourses that are crossed by the Panhandle Loop based on a desktop review of relevant aerial imagery and watercourse mapping. They include 11 named drains, 15 unnamed drains, Jeannettes Creek, Baptiste Creek, and the Thames River. Ultimately, these watercourses drain to the Thames River or Lake St. Clair.</p>	<ul style="list-style-type: none"> - As stated in the ER, the watercourses crossed by the pipeline will ultimately drain into the Thames River or Lake St. Clair, both of which are of great importance to CKSPFN. Many of the watercourses that drain into Lake St. Clair are already significantly impacted by industrial and agricultural operations in the area, and are in need of protection. - Enbridge should clearly outline how these 29 watercourses will be crossed by the PPR, as well as how any direct impacts to the watercourses will be mitigated. - We have appended CKSPFN’s water rights assertion (Band Council Resolution #2851), which declares ownership and jurisdiction of the lakebeds and waterways within the study area. Further information regarding plans for crossing these watercourses should be provided to CKSPFN so that we can more accurately assess any risks to our lands and waters. 	<p>At this point it is 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, etc.) will be installed using trenchless methods (i.e., HDD or direct pipe).</p> <p>Table 5-5 summarizes mitigation measures for surface waters, including watercourse crossings. With the implementation of mitigation measures, no significant adverse residual effects on surface water are anticipated during construction or operation of the project.</p> <p>Watercourse crossings will adhere to the sediment control plans for Dam & Pump and Horizontal Direction Drill. Culverts and bridges will be installed in adherence to the sediment control plan for temporary vehicle crossings.</p> <p>The sediment control plans for Dam & Pump and Horizontal Direction Drill were sent to TFG on August 2, 2022.</p> <p>Enbridge Gas would be pleased to hold additional meetings with CKSPFN representatives to further explain and discuss planned Project watercourse crossings and work in the area of watercourses as well as to answer any questions regarding the above-referenced sediment control plans and mitigation measures.</p>
<p>Section 4.3.1.3</p>	<p>Jack’s Creek Drain 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. The drain was categorized in 2019 as containing Lake Chubsucker (<i>Erimyzon sucetta</i> – Endangered (END) under SARA, Threatened (THR) under Endangered</p>	<ul style="list-style-type: none"> - CKSPFN asks to be provided with all records and protection plans for sensitive or SAR fish and mussel species within Jack’s Creek Drain, as well as all other watercourses crossed by the PPR. Suitable habitat for coolwater fish species is somewhat limited in the area 	<p>Ecological field surveys have been completed in 2022 to enhance the understanding of watercourse crossings and their potential for fish and mussel SAR and SAR habitat. Enbridge Gas will provide CKSPFN with a report summarizing the SAR field survey findings. Enbridge Gas will consult with CKSPFN as part of relevant Department of Fisheries and Oceans Canada (DFO) and the Ministry of the Environment, Conservation and Parks (MECP)</p>

	<p>Species Act (ESA)) and the recently downlisted Special Concern Mapleleaf mussel (<i>Quadrula quadrula</i> – Special Concern (SC) under SARA and ESA). The drain flows North-West for 2.5 km from the crossing before it meets another drain, merges, and then flows into Lake St. Clair. The following fish community is known as Jacks Creek from the LIO dataset (MNDMNR, 2022). Jacks Creek provides habitat to an assemblage of 28 warmwater and coolwater fish species (Table 4-2) several species of mussels and is characterized overall as having a warmwater thermal regime.</p>	<p>and impacts should be avoided as much as possible.</p>	<p>applications should these permits be required e.g., Species at Risk Act (SARA), and Endangered Species Act (ESA).</p> <p>As stated in ER Section 4.3.1.3, all the Threatened and Endangered species within the study area receive protection under both the provincial ESA and federal SARA.</p> <p>Additional correspondence with regulators/permitting agencies will be required for any additional aquatic SAR identified or if a watercourse containing provincially or federally listed SAR will be affected by the Project.</p>
Section 4.3.2.1	<p>The PPS, implemented under the Planning Act (1990), protects Provincially Significant Wetlands (PSWs) from development and site alteration while regulations under the Conservation Authorities Act (1990) prohibit certain activities within wetlands (MNR, 2010). The PPS further specifies that a wetland is considered provincially significant if evaluated as such through the OWES (MNR, 2014). Until categorized by NDMNR, wetlands are classified as “unevaluated”.</p>	<ul style="list-style-type: none"> - It should be noted that unevaluated wetlands are often the result of research gaps, and do not always indicate a lack of importance or ecological value. - Enbridge should look to survey and mitigate effects on both Provincially Significant Wetlands, classified through the OWES, as well as unevaluated wetlands. 	<p>Agree. Section 4.3.2, Designated Natural Areas and Vegetation of the Environmental Report provides an overview of the various types of wetlands, and whether they are traversed by the Project. The Environmental Report assesses the impacts of the Project on all wetland types, and the mitigation for wetlands as provided in Tables 5.1, 5.3, 5.8, and 5.9 applies to all wetland types.</p>
4.3.2.2.2	<p>One woodlot on County Road 8 will be crossed by the pipeline, which may result in some tree clearing.</p>	<ul style="list-style-type: none"> - Enbridge should elaborate on its Tree Replacement Program in the ER to ensure appropriate measures are in place to replace the loss of trees, particularly within the woodlot along the Leamington Interconnect. - As per OEB Environmental Guidelines (2016), Enbridge should disclose additive 	<p>Where feasible, in consultation with directly impacted landowners, Enbridge Gas will restore the lands to pre-existing conditions with the exception of woodlands and trees within the permanent easement. Enbridge Gas committed to implementing a tree replacement program that replants 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</p>

		<p>effects, specifically forest/woodlot cover losses due to tree clearing for pipeline construction as well as operation and maintenance.</p>	<p>3:1 (trees to be replaced on a 3:1 area basis at 1000 tree seedlings per acre).</p> <p>Directly impacted landowners are given first right of refusal for the tree planting under this program. 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.</p>
<p>Table 5-4 Potential spread of Soybean Cyst Nematode (SCN)</p>	<p>If the pipeline route or an adjacent farm field is identified as having SCN all equipment and boots should be properly cleaned before moving to an area that has not shown to be impacted by SCN. This may involve thorough washing before moving equipment from an impacted field to nonimpacted field.</p>	<ul style="list-style-type: none"> - Enbridge should disclose an approximate location for where said “thorough washing” would occur in the ER to mitigate the downstream effects of washing potentially contaminated equipment (including boots) with SCN. If a location cannot be provided, Enbridge should ensure this information is included in its best practice protocol and approved by landowners of agricultural fields. 	<p>Enbridge Gas will commit to establishing best practice protocol for controlling Soybean Cyst Nematode (SCN) spread and sharing this protocol with landowners of agricultural fields.</p>
<p>Table 5-5 Changes in surface water quality and quantity</p>	<p>N/A</p>	<ul style="list-style-type: none"> - Enbridge should disclose proposed dewatering mitigation measures, as it relates to changes in surface water quantity since none were present in Table 5-5. - What mitigation measures will be taken – before, during, and after construction – to ensure the biophysical features remain intact whilst dewatering occurs? If damaged, how will fish and invertebrate habitat be restored post-dewatering? 	<p>The potential impacts from dewatering and surface water takings will be evaluated once the detailed design of the Project is complete.</p> <p>Enbridge Gas will obtain a permit from the MECP for the water taking (Environmental Activity and Sector Registry [EASR] or Permit to Take Water [PTTW]) and complete detailed modelling and mitigation plans in support of that permit and in accordance with MECP requirements when construction details become available.</p> <p>For these reasons, the proposed pipeline construction at the Panhandle Regional Expansion Site is considered to have a low potential for impacts to hydrogeological features.</p>

			CKSPFN will be consulted as part of relevant DFO and MECF applications should these permits be required e.g., SARA, ESA or PTTW.
Table 5-5 Changes in surface water quality and quantity (cont.)	Restrict construction equipment to designated controlled vehicle access routes to minimize the potential contamination.	<ul style="list-style-type: none"> - CKSPFN requests access to all documents for vehicle routes for construction sites along bodies of water (rivers, streams, wetlands, etc.). A clear, visual map – with coordinates – should be provided to the CKSPFN Consultation Team. 	Enbridge Gas will commit to establishing vehicle routes for construction sites to minimize the potential for watercourse contamination and will share this information with CKSPFN.
Table 5-5 Changes in surface water quality and quantity (cont.)	Control quantity and quality of stormwater discharge using best management practices.	<ul style="list-style-type: none"> - Enbridge should disclose said best management practices in its ER. For instance, an Appendix can outline the best management practices that will be used to mitigate potential impacts of stormwater discharges. 	Best management practices include the use of filtration tubs, sediment bags, discharge being setback a minimum of 30 metres from a waterbody, and oversight from a full-time environmental inspector. This information will be included in the Environmental Protection Plan.
Section 5.3.2.2	A field investigation of each watercourse crossing will be conducted to determine if fish and/or fish habitat is present.	<ul style="list-style-type: none"> - Enbridge should disclose the upstream and downstream distances that will be considered to evaluate and determine the presence of fish and/or fish habitat. 	<p>The established right-of-way, plus 25 m upstream and downstream of the right-of-way limits, was assessed for the presence of fish and/or fish habitat.</p> <p>Qualified Environmental Practitioners (QEP) have completed ecological field investigations to determine if fish and/or fish habitat are present, to ensure that the field assessments are scientifically defensible and adhere to established procedures and regulatory requirements.</p>
Table 5-11 Effects to traditional Indigenous territories, communities, and practices	Indigenous communities should be consulted with for any permits where a duty to consult applies.	<ul style="list-style-type: none"> - Limiting opportunities to consult Indigenous communities only when the “duty to consult applies” does not recognize the immediate need to respect and promote the rights of Indigenous Peoples affirmed in treaties and the United Nations Declaration on 	<p>Enbridge Gas is committed to engaging meaningfully with Indigenous Nations on an ongoing basis throughout the lifecycle of the Project including the operational phase.</p> <p>As articulated in Enbridge Inc.’s Indigenous Peoples Policy, Enbridge Gas respects the unique rights of Indigenous Peoples, Treaties and UNDRIP. Enbridge Gas is committed to meaningful</p>

		<p>the Rights of Indigenous Peoples (UNDRIP). As such, the Chippewas of Kettle and Stony Point First Nation (CKSPFN) call upon Enbridge to commit to taking effective measures – including administrative, consultation, and cooperation with Indigenous Peoples, and promoting mutual respect and understanding as well as good relations – with CKSPFN and all other treaty Nations throughout the proposed Panhandle project and during future projects.</p>	<p>engagement on proposed and future projects with Indigenous communities.</p> <p>We look forward to continuing to engage with TFG, CKSPFN and other Nations on the proposed Project, including its operations phase, and during future Enbridge Gas projects. If there are specific measures that CKSFPN would like to see initiated, we would be happy to discuss further.</p> <p>Enbridge Gas commenced consultation with CKSPFN on the Project October 15, 2021 and is engaged in ongoing discussions and information exchange. Enbridge Gas welcomes specific feedback that CKSPFN and other Nations may have, on the Project to avoid or mitigate any impacts the Project may have on aboriginal rights and interests.</p>
<p>Section 5.3.3.4</p>	<p>Potential effects on community services and infrastructure during construction and operation.</p>	<ul style="list-style-type: none"> - Beyond the potential effects listed in Section 5.3.3.4 – Community Services and Infrastructure, the ER does not address the possible increase in violence, sexual assault, and harassment towards status and non-status Indigenous women and girls as well as 2SLGBTQIA+ individuals. - Does Enbridge have a Code of Conduct for temporary workers (including third party contractors) working in non-local project areas? - MMIWG Calls to Justice for Extractive and Development Industries: <i>13.1 We call upon all resource-extraction and development industries to consider the safety and security of Indigenous women, girls, and 2SLGBTQIA people, as well as their equitable benefit from development, at all stages of project planning, assessment,</i> 	<p>There would be no anticipated residual effects due to the Project's scope, anticipated existing local tradesperson workforce, and short duration of active construction timeline of approximately six months coupled with the requirements of Enbridge Gas' Supplier Code of Conduct.</p> <p>Enbridge Gas' general contractors are required to follow Enbridge policies including the Supplier Code of Conduct, which states "Enbridge believes that each individual with whom we come in contact deserves to be treated fairly, honestly, and with dignity. We do not condone any form of harassment, discrimination, or inappropriate actions or language of any kind." Drug and Alcohol Programs, Respectful Workplace Training and Indigenous Peoples Awareness Training are specific to the Construction Contractor(s) that will construct the projects, which haven't been selected yet.</p>

		<p><i>implementation, management, and monitoring.</i></p>	<p>Enbridge Gas would welcome an elder or a cultural representative from CKSPFN to share their knowledge specific to the region with the Project team.</p> <p>Should CKSPFN have further suggestions based on local and regional experiences and best practices, Enbridge encourages information sharing in this regard.</p>
<p>Table 5-12</p>	<p>Given the available capacity of the local community services and infrastructure, along with the implementation of the mitigation measures, no significant adverse residual effects on community services and infrastructure are anticipated.</p>	<ul style="list-style-type: none"> - Although no significant adverse residual effects on community services and infrastructure have been documented in the ER, we call upon Enbridge to provide social capacity for Indigenous communities, if demand limits a community's ability to seek the services they require. - MMIWG Calls to Justice for Extractive and Development Industries: <i>13.2 We call upon resource-extraction and development industries and all governments and service providers to anticipate and recognize increased demand on social infrastructure because of development projects and resource extraction, and for mitigation measures to be identified as part of the planning and approval process. Social infrastructure must be expanded and service capacity built to meet the anticipated needs of the host communities in advance of the start of projects. This includes but is not limited to ensuring that policing, social services, and health services are adequately staffed and resourced</i> 	<p>While no significant adverse residual effects on community services and infrastructure are anticipated, in the event that such effects materialized, Enbridge Gas would work in consultation with the Indigenous community to mitigate those impacts.</p> <p>Indigenous communities are able to apply for funding through Enbridge Inc.'s corporate citizenship program. Enbridge Gas would be happy to discuss this program with CKSPFN and has provided the link to the application for funding. https://www.enbridge.com/About-Us/Our-Values/Corporate-citizenship/Apply-For-Funding.aspx</p> <p>In addition, through its lifecycle engagement program, Enbridge Gas enters into long term relationship agreements designed to support operational engagement, provide capacity funding as needed, and offers Project-related agreements when appropriate.</p> <p>Should CKSPFN have further suggestions based on local and regional experiences and best practices, Enbridge Gas encourages information sharing in this regard.</p>

<p>Table 5-13 Restricted land access</p>	<p>Any municipal approvals required for land restrictions and haul routes</p>	<ul style="list-style-type: none"> - Enbridge should notify CKSPFN – well in advance – about any land restrictions throughout the development, construction, operation, and maintenance of the proposed Panhandle project. 	<p>Enbridge Gas is currently seeking all municipalities approvals for road crossings and drain crossings. Meetings have been held with municipalities to review alignments and proposed haul routes, and the municipalities have no concerns at this time. Enbridge Gas continues to meet with municipalities regarding open cut vs. trenchless methods and depths.</p>
<p>Section 6.2</p>	<p>Since the project is not predicted to have net effects during operations, only the construction, operation and/or decommissioning of future developments occurring before the completion of construction were considered in the assessment of cumulative effects.</p>	<ul style="list-style-type: none"> - Given that fugitive emissions (i.e., the unintentional and undesirable emissions, leakage, or discharge of gases or vapors from storage tanks, pipelines, wells, or other pieces of infrastructure) as well as “integrity digs” will likely occur during operations, it is not reasonable to conclude that the project will have no net effects during operations. - Enbridge should clarify this statement and indicate that the project will have net additive effects during its operational lifecycle. As such, Enbridge should (1) reconsider the study boundaries of the Panhandle project and (2) include an analysis of cumulative effects during the operation of this project within the ER. - CKSPFN is aware that the following projects will be adjacent to the Panhandle Regional Expansion Project with potential construction schedule overlaps, and as such Enbridge should include these projects in the cumulative effects assessment, including attention to effects on Agricultural Resources, Cultural Heritage Resources, Land Use and Communities, Natural Environment 	<p>We recognize that the language in Section 6.2 of the Environmental Report (ER) is unclear. Operations and maintenance activities were considered and are discussed in Section 6.4.2 Operations and Maintenance. While maintenance activities will be required during operations (i.e., inspections, monitoring, integrity work), leading to dust, noise, and exhaust from construction equipment (as noted in the ER), the activities are not anticipated to have significant adverse residual effects. Enbridge Gas has robust pipeline safety and monitoring programs to ensure our assets operate safely and in accordance with the current regulations of the day.</p> <p>It is possible that further integrity maintenance activities may be required as a result of unanticipated external impacts to the pipeline (e.g., third-party damage, environmental forces). In those instances, Enbridge Gas may need to undertake further ground disturbance. Such maintenance activities will go through a separate environmental review and permitting process outside of the scope of the ER. In addition, any assessment of impacts beyond the project components as described in Section 1.2 Project Description, such as fugitive emissions, are outside of the scope of the ER.</p> <p>The cumulative effects assessment was completed in accordance with the OEB Environmental Guidelines. The temporal boundary for the cumulative effects assessment of the Project construction phase is considered appropriate for the limited residual Project effects that are anticipated to remain after mitigation measures</p>

		<p>Resources (physical, atmospheric, surface water, groundwater, source water protection, designated or special natural areas, vegetation, fish and fish habitat, woodlands, species at risk, wildlife habitat, invasive species), Indigenous Community VECs and Interests, Recreational Resources, Visual and Aesthetic Resources, and Built Environment Infrastructure such as infrastructure crossings, and interactions with wind turbines, roads/highways/bridges, other pipelines, etc.</p> <ul style="list-style-type: none"> ○ Hydro One Networks Inc. - Chatham Switching Station ○ Hydro One Networks Inc. - Lake shore Transmission Stations Project Leamington Transformer Junction ○ Hydro One Networks Inc. - Chatham to Lakeshore Transmission Line ○ Hydro One Networks Inc. - St. Clair Transmission Line ○ Highway 401 Improvements - Tilbury to London ○ Enbridge - Dawn to Corunna 	<p>are implemented and interactive with other concurrent, unrelated projects. Sections 6.1, 6.3 and Table 6-1 in the ER reference the cumulative effects methodology and project inclusion list considered for the Project. The projects included in the project inclusion list were identified by reviewing publicly available information on current and planned projects in the area as well as through consultation with Hydro One, municipalities, etc. Any projects not listed within the project inclusion list fall outside of the temporal boundary and were not considered (i.e., Enbridge Gas Dawn to Corunna Project). Further, the cumulative effects assessment identified potential additive effects on soil, vegetation, wildlife and wildlife habitat, air quality and the acoustic environment. Enbridge Gas determined that, provided the mitigation and protective measures outlined in the ER are implemented and that concurrent projects implement similar mitigation and protective measures, potential cumulative effects are not anticipated to occur, or if they do occur, they are not anticipated to be significant.</p>
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Enbridge Gas Inc. ("Enbridge Gas") Response to Walpole Island First Nation (WIFN) Comments received June 20, 2022 re: Environmental Report on the Panhandle Regional Expansion Project ("Project")		
Item	Comment	Enbridge Gas Response
1.0 Contaminated Sites		
Comment 1	The report reviewed federal and provincial sources for formal records of landfills contaminated sites in the proposed pipeline area; however, these archives are not necessarily indicative of the presence of potential contaminated sites. The mitigation plan is reactive based on finding issues of concern not proactive by evaluating the potential for an impact prior to construction. A proactive approach to identify issues of concern prior to construction is much more effective.	No contaminated sites were uncovered within the vicinity of the Project Study Areas (PSAs) through review of major landfill locations, Provincial Registry ([Ministry of the Environment, Conservation and Parks] MECP Record of Site Condition (RSC) filings) and Federal Contaminated Sites Inventory. It is acknowledged in Section 4.4.8 of the Environmental Report (ER) that there is uncertainty as to the location of the 12 small landfills identified in the review. However, through mitigation measures summarized in Table 5-15, no significant adverse residual effects from Landfills and Contaminated Sites are anticipated.
Comment 2	The process should include (prior to construction) the completion of a Phase One Environmental Site Assessment (ESA) in accordance with Ontario Regulation 153/04 and CSA Standard CSA Z768-01 (Reaffirmed 2016) along the selected route. This will provide an indication of the potential to intersect contaminated sites in a well-structured fashion. The need for additional assessment such as a Phase Two ESA would be contingent on the findings of the Phase One ESA. This information would allow for a pre-construction understanding of the potential to disturb contamination and the creation of an impact mitigation plan. The comments on Hydrogeology would also be very relevant when installing linear infrastructure through contaminated areas. The preparation of the Phase One ESA will also assist in the preparation of the Assessment of Past Uses (APU) required by Ontario Regulation 406/19) for the importation of soil for backfill along the pipeline route.	Enbridge Gas performed a historical background check on lands within the PSA along with a search of contaminated sites as mentioned in Enbridge Gas' response to Comment 1. No contaminated sites were identified during this background review. Further investigative work will be completed during the excess soils work for the Project.
2.0 Hydrogeology		
Comment 3	The report addresses the short-term construction related impacts and mitigation but does not address long term impacts of the pipeline once it is in place. The pipeline has the potential to be a preferential pathway for groundwater migration and possibly a preferential pathway for contaminant migration. A mitigation plan is required to address how the creation of	With the implementation of the recommended mitigation measures to avoid changes in groundwater quantity and flow pattern, as summarized in ER Table 5-1, potential adverse environmental effects of the Project will largely be avoided and, where avoidance is not possible, effects have been minimized to the point where they are not likely significant.

	preferential groundwater pathways will be addressed to prevent impacts. This could include the use of clay plugs or other methods at sensitive places along the pipeline based on the hydrogeology of the surrounding area through which the pipeline passes. The philosophy of the installation should be to maintain the hydrogeological regime and not introduce any significant new flow pathways.	
3.0 Geotechnical		
Comment 4	The report recognizes the potential impacts and the proposed mitigation methods are reasonable. The comments regarding Hydrogeology should be taken into consideration as unnatural groundwater flow pathways created by the pipeline, if not appropriately mitigated, has the potential for a geotechnical impact. Comments on Contaminated Sites includes comments on the assessment and management of excess soil and selection of the appropriate soil quality Standards for importation along the pipeline route and must be considered in the geotechnical planning.	Enbridge Gas will implement all the required mitigative actions defined in the ER regarding the assessment and management of hydrogeology/excess soils conditions during construction and operation phases.
4.0 Infrastructure		
Comment 5	The report identifies the potential to intersect existing infrastructure of various types along the pipeline route and focuses on the impacts to social and economic impacts of construction activity but does not note the need for mitigation of impacts to physical infrastructure especially co-buried infrastructure. A mitigation plan is required to address the potential to impact physical buried infrastructure such as pipelines, cables, and other services. The mitigation plan should recognize that co-buried infrastructure must be identified, and impacts mitigated including reference to Contaminated Sites, Hydrogeological and Geotechnical comments.	Enbridge Gas will perform locates to identify any existing infrastructure and will work closely with utility companies to ensure avoidance and/or mitigation of any possible impacts, where required. Co-buried infrastructure is not anticipated for this project.
5.0 Terrestrial Ecology Impacts		
Future Commitments		
Comment 6	Please provide the proposed work plan when available including the survey locations, protocols, and survey timing	Ecological field surveys have been completed in 2022 and will be used to enhance the understanding of environmental features in the PSAs. WIFN was offered the opportunity to participate in the 2022 field program and continue to be invited for fieldwork days.

Comment 7	Please provide the results of field studies once they are available	Enbridge Gas has committed to providing WIFN with a report summarizing the 2022 field survey findings.
Environmental Monitoring and Contingency Plans		
Comment 8	Please specify who will be responsible for the development of a frac out plan if a horizontal directional drilling (HDD) approach will be used at watercourse crossings. If applicable, please provide the plan when available.	MECP has also requested the development of a frac out plan. Enbridge Gas is committed to producing such a plan and will provide it to WIFN .
Impacts		
Comment 9	As per the Ministry of the Environment, Conservation and Parks (MECP) comments, provide a rationale that if HDD will be used, will it be completed at a sufficient depth to ensure that overwintering reptiles and/or turtle eggs will not be impacted.	Enbridge Gas will use the horizontal directional drilling (HDD) at sufficient depths as the proposed pipeline installation method to allow the pipeline to cross under the Thames River and Baptiste and Jeanettes Creeks. Therefore, no impacts are proposed to the beds of those areas and no impacts to turtle eggs or overwintering reptiles are anticipated.
Mitigation Measures		
Comment 10	Will restoration measures beyond seeding (i.e., Plantings, habitat enhancement) be considered?	Yes, where required and where any necessary landowner permission is granted.
Comment 11	It is understood that trees directly above or adjacent to the pipeline infrastructure will be removed and will not be replaced to facilitate future maintenance. Will compensation plantings be completed for the lost trees? If compensation plantings will be employed, where will these plantings occur? Please refer to section 8.0 Cumulative Effects for further comments in regard to tree compensation.	Yes, compensation plantings will be completed for tree loss in consultation with landowners and other interested parties.
Comment 12	If significant wildlife habitat (SWH) features are identified within the project area and are likely to be impacted by the proposed project, feature-specific mitigation measures should be provided (i.e.,/ setbacks, timing windows, etc.).	Yes, where these features are identified, mitigation is proposed, where required.
Comment 13	All individuals responsible for the handling herpetofauna should be trained on how to handle reptiles correctly and safely.	Qualified individuals who have been trained on how to handle reptiles will be responsible for any relocations that might be required during construction.
Comment 14	Species at Risk (SAR) identification training should be provided to construction staff and contractors on-site regardless of the trenched installation method employed given the identified potential for the direct loss and/or damage of SAR habitat during site preparation, excavation, etc.	Trained personnel will be on-site to monitor construction and be responsible for checking that the ER's mitigation measures and monitoring requirements are executed. Enbridge Gas will implement an orientation program for inspectors and contractor personnel to provide information regarding Enbridge Gas's environmental program and commitments and safety measures.

<p>Comment 15</p>	<p>Please provide additional details regarding wildlife rescues including if permits and/or discussion with the Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNR) will be required.</p>	<p>Information on rescue plans can be found in Tables 5-7 and 5-9 of the ER. If during the course of wildlife rescue Species at Risk (SAR) are found to be present within the site, all local work will be stopped until a management plan has been determined with consultation, from MECP & the Department of Fisheries and Oceans Canada (DFO) if available and as appropriate. The most likely form of action will be an immediate relocation outside of the impact zone paired with additional monitoring to ensure no immediate negative effects. Regardless of SAR status, all wildlife rescues will employ methods that ensure safe capture, handling, and release to prevent harm or mortalities.</p>
<p>Comment 16</p>	<p>In areas where there is potential for reptiles to occur, erosion and sediment control (ESC)/ wildlife fencing should be designed in accordance with the recommendations provided in <i>Reptile and amphibian exclusion fencing</i> (MNR, 2020). Fencing design should consider species-specific height and burial recommendations provided in Table 1 of the MNR document where appropriate.</p>	<p>Stockpile areas placed prior to June 30 (turtle egg laying period; Ontario Nature, 2016) in proximity to suitable turtle habitat will be assessed by the environmental inspector to determine if they are suitable turtle nesting habitat, and exclusionary fencing will be installed where necessary. Stockpile areas that are placed after June 30 do not require assessment or installation of exclusionary fencing as this is after the typical period for turtle/snake egg laying. Exclusionary fencing may be installed along watercourses and the work areas to avoid fencing individual stockpiles.</p> <p>Stockpiles at watercourse crossings will not be in place long term. Short-term stockpiles at watercourse crossings will be monitored by a full-time environmental inspector and will be stabilized in such a manner to prevent erosion and sediment transportation.</p>
<p>Comment 17</p>	<p>Surveys of the work area should be completed prior to and following the installation of ESC measures to ensure wildlife has not become trapped in the work area.</p>	<p>All erosion and sediment control measures will be implemented under direction of an experienced environmental inspector who will ensure implementation of Erosion and Sediment Control (ESC) measures based on the site conditions.</p>
<p>Comment 18</p>	<p>Debris from vegetation removals should be kept and used as brush piles for snakes where feasible and appropriate.</p>	<p>Agreed, mitigation measures related to snakes will be developed and confirmed with MECP. However, it should be noted that debris will not be kept on the pipeline right-of-way and piling of debris outside of the pipeline right-of-way is subject to landowner approval.</p>
<p>Comment 19</p>	<p>Where there is potential for SAR snakes or turtles to occur within the project area, daily sweeps of the work limits and construction equipment should occur during the snake and turtle active windows.</p>	<p>Agreed, mitigation measures related to SARS snake or turtles will be developed and confirmed with MECP.</p>
<p>Comment 20</p>	<p>If site preparation will occur during the turtle nesting period and is within proximity to identified turtle habitat, the construction limits should be surveyed by an ecologist/ biologist to identify turtle nests. If any nests are presumed to be from an</p>	<p>Agreed.</p> <p>Stockpile areas placed prior to June 30 (turtle egg laying period; Ontario Nature, 2016) in proximity to suitable turtle habitat will be assessed by the environmental inspector to determine if they are suitable turtle nesting habitat, and exclusionary fencing will be</p>

	endangered or threatened species, the MECP should also be contacted for further direction.	installed where necessary. Stockpile areas that are placed after June 30 do not require assessment or installation of exclusionary fencing as this is after the typical period for turtle/snake egg laying. Exclusionary fencing may be installed along watercourses and the work areas to avoid fencing individual stockpiles.
6.0 Aquatic Ecology Impacts		
Comment 21	Overall, potential impacts to fish habitat and SAR and their habitat cannot be accurately assessed at this time until field studies confirm the fish habitat conditions, features, or Fisheries Act and species-specific SARA mitigation plans. Impacts to fish habitat will depend on the selected installation method. Per section 5.2.1 Construction, the installation method for watercourse crossings have not been confirmed at this point.	At this point it is determined that watercourse crossings will be completed using trenchless installations methods or Isolated Open-Cut (i.e., dam & pump). However, crossing techniques will be confirmed through detailed design and discussions with appropriate regulatory authorities (e.g., Lower Thames Valley Conservation Authority, Essex Region Conservation Authority) to avoid effects to fish and fish habitat.
Comment 22	The methodology for the aquatic habitat and fisheries community sampling are not provided. Please note, it is expected that targeted surveys for SAR fish and mussels will be conducted within the project area. Please provide the results of the fish community sampling and fish/mussel habitat assessments, when available.	The methodologies used for aquatic habitat and fisheries community sampling will be outlined in a memo that will be shared with WIFN. The memo will also include a summary of the results of the sampling.
Comment 24	Please provide WIFN the opportunity to assign field technicians to participate in the 2022 fish community sampling and fish/mussel habitat assessments.	Fish community sampling and fish/mussel habitat assessment was completed at the proposed watercourse crossings in 2022. WIFN was offered the opportunity to participate in the 2022 field program.
Comment 25	Previous and future correspondence with the MECP, Fisheries and Oceans Canada (DFO), NDMNRF, and St. Clair Region Conservation Authority (SCRCA) should be provided when available.	An up-to-date Ontario Pipeline Coordinating Committee (OPCC)/agency review summary table is being kept and can be provided to WIFN upon request.
Comment 26	It is mentioned that DFO will review the project for Fisheries Act approval, if required based on construction methodology, as well as for approval under SARA. Please note, it may be required to either register the project with MECP or obtain an overall benefit permit from MECP for aquatic SAR, depending on the footprint of the works in SAR habitat.	Agreed. As noted in the ER, if a watercourse containing provincially or federally listed SAR will be affected by the project, additional engagement with regulators such as DFO and MECP will be required. The DFO could require a Fisheries Act Authorization, which requires offsetting activities, and the MECP would also need to be contacted regarding the requirements under the Endangered Species Act (ESA). Potential requirements could come in the form of mitigation advice that would support avoidance of contravention of the ESA, a notification of activity or a permit.
Comment 24	On page 63 in <i>Table 5-7: Potential effects, Proposed Mitigation and Net Effects on Fish and Fish Habitat and Aquatic SAR</i> under the heading <i>Erosion and Sediment Control</i> the text refers to Appendix I:	Generic Sediment Control Plans for Dam & Pump, HDD, and Temporary Vehicle Crossings will be provided to WIFN for review.

	<p>“For detailed information on mitigation measures, contingency plans, and construction sequences of different types of watercourse crossings, refer to the Generic Sediment Control Plans provided in Appendix I.”</p> <p>Appendix I in the report contains only a generic sediment control fence diagram and no reference to detailed information on mitigation measures, contingency plans, and construction sequences for different types of water crossings. Please provide details from the referenced appendix for review.</p>	
<p>7.0 Socio-economic and Cultural Impacts</p>		
<p>Comment 25</p>	<p>As identified in Table 4-6, a significant portion of the population within the Project Study Areas (PSAs) identify as Indigenous. Walpole Island is located within 50 km of the PSAs. Please include details specific to local Indigenous communities, including WIFN, when available.</p>	<p>Enbridge Gas would like to work with WIFN to learn more on how we can gather this information (if publicly available) and include details specific to the local Indigenous communities in this section.</p>
<p>Comment 26</p>	<p>Section 4.4.5 Culture, Tourism and Recreation Facilities does not include recognition of the cultural landscape values held by WIFN in the PSAs. WIFN has occupied and used the lands of its territory since time immemorial, which would include cultural and spiritual use values and activities throughout its territorial and Treaty lands. Please be aware that the current conditions of the PSAs do not preclude WIFN from re-establishing conditions to support future desired cultural and spiritual uses.</p>	<p>Enbridge Gas would like to obtain further details from WIFN regarding its cultural and spiritual uses on lands in the area so that we can ensure that we can mitigate any potential impacts the Project or Enbridge Gas’s operations may have on WIFN’s ability to use this land in the future.</p>
<p>8.0 Cumulative Effects</p>		
<p>Comment 27</p>	<p>We recognize the justification for not replacing trees removed within the corridor, however we would like to ask if there is an opportunity for compensation plantings outside of the corridor. Through the continual development in the area and tree removal within the Enbridge corridors, there is an ongoing negative impact to the area. Cumulative effects are defined by the Cumulative Effects Assessment Practitioners Guide (1999) as changes to the environment that are caused by an action in combination with other past, present, and future human actions. Tree removal along the corridor associated with Enbridge</p>	<p>Where feasible, in consultation with directly impacted landowners, Enbridge Gas will restore the lands to pre-existing conditions with the exception of woodlands and trees within the permanent easement. Enbridge Gas committed to implementing a tree replacement program that replants 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).</p> <p>Directly impacted landowners are given first right of refusal for the tree planting under this program. If landowners are not interested in planting trees on their property,</p>

	<p>projects may be contributing to a “nibbling loss” through the gradual disturbance and loss of habitat in the area.</p> <p>Forest cover is already very low in this region. The Chatham-Kent Official Plan (2018) specifies the total land area has approximately 4% forest cover. The Lake Erie-Lake Ontario Ecoregion (7E) is also called the Carolinian Forest Ecoregion and contains the greatest species diversity in Canada. The on-going vegetation removals through Enbridge’s projects may result in less representation of these rare species on a regional scale. WIFN would like to see that the land is restored to a better condition than before the proposed development. WIFN requests that trees that are removed directly above and adjacent to the pipeline and trees removed on temporary construction areas are compensated with native tree seedlings at a ratio of 3:1.</p>	<p>Enbridge Gas will work with Indigenous communities and local conservation authorities to find suitable locations to plant trees.</p>
<p>Comment 28</p>	<p>The Environmental Guidelines (2016) set out by the Ontario Energy Board are temporally and spatially inadequate to assess cumulative effects and do not necessarily take Indigenous values into account. We do not anticipate that the existing gaps in evaluating cumulative effects as set out in the Environmental Guidelines (2016) will be addressed through this project.</p>	<p>Thank you for providing this comment. Enbridge Gas follows the Ontario Energy Board’s Environmental Guidelines for Hydrocarbon Pipelines and Facilities in Ontario (2016) when planning a pipeline project in Ontario. Section 4.3.14 of the Environmental Guidelines (2016) contains information on cumulative effects and how cumulative effects should be considered and assessed in the Environmental Report of a pipeline project. Enbridge Gas adheres to and applies the principles contained within Section 4.3.14 of the Environmental Guidelines (2016) for all our pipeline projects in Ontario.</p> <p>It should be noted that Enbridge Gas is open to continuing discussions on evaluating cumulative effects as it relates to Indigenous values and the environment to better improve the cumulative effects assessment process.</p>
<p>Comment 29</p>	<p>Due to the proponent’s on-going development and operation within the WIFN territory, we continue to encourage a collaborative approach to developing a cumulative effects assessment framework with WIFN. As identified in previous projects, we encourage Enbridge to consider how it may achieve net environmental gains through its on-going projects, there is an opportunity for Enbridge to collaborate with WIFN to determine what actions and policies could achieve new environmental gain to prevent and mitigate cumulative effects</p>	<p>The cumulative effects assessment was completed in accordance with the OEB Environmental Guidelines. Enbridge Gas reviewed publicly available information on current and planned projects in the area, then considered the effects that are additive or interact with the effects that have already been identified as resulting from the pipeline construction. The cumulative effects assessment identified potential additive effects on soil, vegetation, wildlife and wildlife habitat, air quality and the acoustic environment. Enbridge Gas determined that, provided the mitigation and protective measures outlined in the ER are implemented and that concurrent projects implement similar mitigation and</p>

	and begin to restore conditions to support WIFN future desired uses.	<p>protective measures, potential cumulative effects are not anticipated to occur, or if they do occur, they are not anticipated to be significant.</p> <p>Enbridge Gas offers capacity funding to all Indigenous communities to engage in meaningful consultation on projects. Enbridge Gas would be happy to discuss the completion of an Indigenous Knowledge, Land Use study with WIFN.</p>
Comment 30	WIFN requests the opportunity to assign field technicians to participate in environmental monitoring activities including tree/vegetation survival inspections and the one-year walking inspection to determine whether areas require further rehabilitation.	Enbridge Gas will work with WIFN to have field technicians participate in environmental monitoring activities including tree/vegetation survival inspections and the one-year walking inspection to determine whether areas require further rehabilitation.
9.0 Consultation	The consultation components of the ER were reviewed including Chapter 3 and Appendix B. This review is limited to consultation efforts made by Enbridge with First Nations, focusing on the specific comments raised by WIFN. The following comments are provided.	
Comment 31	Section 3.6 of the ER provides a summary of the feedback received from the public, agencies, Lower Thames Valley Conservation Authority, upper and lower tier municipalities, and interest groups. This section of the ER is missing information for the feedback received from the seven First Nations identified for consultation. A new section should be added to the ER to document the missing information.	A summary of feedback from the First Nations is provided with the Project application for OEB approval. These can be found in H1-1 Attachment 6 and 7 of the OEB filing.
Comment 32	Appendix B6 provides a log of engagement activities (emails, phone calls and meetings) with the seven First Nations identified for consultation. The ER does not include the records of correspondence (emails, minutes of meeting, etc.) that correspond to most of the log entries, except those relating to Notices.	The records of correspondence (emails, etc) are captured within the OEB filing due to their size. These can be found in H1-1 Attachment 7 of the OEB filing.
Comment 33	The Indigenous Engagement Log references comments raised by WIFN at a meeting with Enbridge on November 15, 2021. WIFN indicated the area between the Thames River and Jeanettes Creek is very significant to WIFN and the Three Fires Confederacy. The ER does not reference this discussion with WIFN. The cultural importance of this area to WIFN and the Three Fires Confederacy should be added to the ER including a	<p>Enbridge Gas, through discussions with WIFN, are aware of this sensitive area and it will be communicated with construction staff through training and identification in the Environmental Protection Plan.</p> <p>Enbridge Gas would welcome an elder or a cultural representative from WIFN to share their knowledge specific to the region with the Project team.</p>

	<p>commitment to continue to consult with WIFN about this culturally important area moving forward.</p> <p>Enbridge should seek discussions with WIFN for accommodation to work through the culturally significant area identified by WIFN between Jeanettes Creek and the Thames River.</p>	
<p>Comment 34</p>	<p>The Project Update letter to WIFN dated April 8, 2022 notes that the Wheatley Lateral Reinforcement, Talbot Road Reinforcement and Oak Street and Essex Road 33 reinforcement will no longer be considered part of the Panhandle regional Expansion Project. It is unclear if Enbridge will pursue these distribution pipelines in the future and through what process these pipelines would be undertaken. Clarification should be provided in Section 1.2 or the ER relating to the timing and process that would be used for these distribution pipelines and an acknowledgement that affected First Nations, including WIFN would be consulted early in the planning process.</p>	<p>At this time, Enbridge Gas has not determined whether the Wheatley Lateral Reinforcement, Talbot Road Reinforcement and Oak Street and Essex Road 33 reinforcement will proceed and if they do proceed, the expected timing. Should these pipelines be required, affected First Nations, including WIFN will be consulted early in the planning process.</p>

From: Lauren Whitwham <Lauren.Whitwham@enbridge.com>
Sent: June 10, 2022 11:30 AM
To: Brown, Gillian (ENERGY) <Gillian.Brown2@ontario.ca>
Cc: Gibson, Amy (ENERGY) <Amy.Gibson@ontario.ca>; Catherine Pennington <Catherine.Pennington@enbridge.com>; Kevin Berube <kevin.berube@enbridge.com>
Subject: Panhandle Regional Expansion Project: Filed with OEB

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Good morning Gillian,

Today Enbridge Gas filed the leave to construct application and evidence for the **Panhandle Regional Expansion Project** with the OEB. Please find attached our Indigenous Engagement summary and log for your review.

I will send the Virtual Open House slides under a separate email due to size restrictions.

Kevin and I are happy to connect on any questions, clarification or comments you might have. Kevin engages with Chippewas of the Thames and Oneida while I engage with the other Nations.

If you could please acknowledge receiving this email, that would be much appreciated.

Have a good weekend,

From: [Brown, Gillian \(ENERGY\)](#)
To: [Lauren Whitwham](#)
Cc: [Gibson, Amy \(ENERGY\)](#); [Catherine Pennington](#); [Kevin Berube](#)
Subject: [External] RE: Panhandle Regional Expansion Project: Filed with OEB
Date: Monday, June 13, 2022 10:45:31 AM

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Hi Lauren,

Thank you very much for alerting us to the Leave to Construct application and sharing the Indigenous Engagement summary and log for the Panhandle Regional Expansion Project.

We will be in touch if we have any questions. We will hopefully have some more team members soon, so you may hear from myself or a colleague if we have any follow-up questions.

Have a lovely day,
Gillian

From: Lauren Whitwham <Lauren.Whitwham@enbridge.com>
Sent: September 6, 2022 10:59 AM
To: Brown, Gillian (ENERGY) <Gillian.Brown2@ontario.ca>
Cc: Gibson, Amy (ENERGY) <Amy.Gibson@ontario.ca>; Catherine Pennington <Catherine.Pennington@enbridge.com>; Haris Ginis <Haris.Ginis@enbridge.com>; Kevin Berube <kevin.berube@enbridge.com>
Subject: Panhandle Regional Expansion Project update for OEB process

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Hi Gillian,

Hope this finds you well and you enjoyed your summer.

As you might know, Enbridge Gas is currently in the Interrogatory Responses (IRs) part of the OEB application for Panhandle Regional Expansion Project. One of the OEB Staff IRs is to "obtain an update from the MOE on the status and anticipated timeline of receiving a Letter of Opinion for the Project". Would you be able to provide us with an update and anticipated timeline?

We will be providing an updated log within the IRs and I will send that over to you once filed. Kevin and I are also available for any questions or concerns that might come up during your conversations with the First Nations during your engagement on the Project. Kevin engages with COTTFN and Oneida Nation while I engage with the others.

Feel free to reach out at any time.

Thanks so much,
Lauren

From: [Brown, Gillian \(ENERGY\)](#)
To: [Lauren Whitbam](#)
Cc: [Gibson, Amy \(ENERGY\)](#); [Catherine Pennington](#); [Haris Ginis](#); [Kevin Berube](#); [Ali-Khan, Farrah \(ENERGY\)](#)
Subject: [External] RE: Panhandle Regional Expansion Project update for OEB process
Date: Tuesday, September 6, 2022 3:12:55 PM

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Hi Lauren,

I'm well thanks, hope you had a great long weekend. Thanks very much for sharing the updated log when it is available.

My colleague Farrah and I have been following the OEB process as part of our sufficiency assessment work. We met with OEB staff on July 14th and they indicated they would need our Letter of Opinion by November (this was prior to Procedural Order No. 1). We will be working backwards from the timelines set, and will have our Letter to the OEB in time. Given that Three Fires Group is an intervenor, this impacts how early we can provide the Letter.

Status update for OEB

- ENERGY is in the process of discussing with communities their experiences with Enbridge's consultation to-date on the Panhandle project. ENERGY continues to monitor the OEB process, and is reviewing Three Fires Group's interests and concerns. ENERGY's intent is to provide the Letter of Opinion by the end of the record closing.

Additional information for Enbridge

- ENERGY began its reach outs to communities in early July 2022.
- ENERGY has met with Chippewas of the Thames First Nation and Aamjiwnaang First Nation. Follow up conversations will likely take place in mid-late September. COTTFFN shared they were waiting for Enbridge's response to their questions and comments sent on July 28th, and that a second meeting with ENERGY would be more useful after that had happened. Similarly, AFN indicated not meeting again until September would allow for AFN representatives to meet with Enbridge staff on the recommendations from the ER to better understand how Enbridge is addressing the community's concerns.
- ENERGY has not yet received a response from Walpole Island.
- Caldwell First Nation responded on theirs and Chippewas of Kettle and Stony Point's First Nation's behalf, and indicated they (as the Three First Nation Group) would like to discuss both Panhandle and Dawn Corunna (for which Caldwell was not identified). ENERGY replied indicating we would be happy to meet, but that we would be engaging with Caldwell on an interest basis for Dawn Corunna

project. ENERGY is still waiting for a response and a meeting.

- Due to timing availability for the Oneida Nation of the Thames rep, ENERGY proposed a discussion on both Panhandle and Dawn Corunna, but is still waiting to hear back.
- ENERGY will continue to follow up with all communities on a regular basis to ensure we can hear first-hand from communities. Reach-outs will be ramping up.

This is opportune timing, as I had reached out to Enbridge twice to share what we had heard from our COTTFFN meeting, but unfortunately did not receive a response. Perhaps we can schedule a touch-base in a few weeks with you and Kevin once we have had further meetings with communities to share what we have heard?

Best,
Gillian

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff (“STAFF”)

INTERROGATORY

Reference:

Exhibit A, Tab 2, Schedule 1

Preamble:

Enbridge Gas has applied for leave to construct facilities pursuant to section 90(1) of the Ontario Energy Board Act, 1998 (OEB Act).

The OEB’s standard conditions of approval for applications filed under section 90 of the OEB Act are provided below.

Question:

Please comment on the standard conditions of approval. If Enbridge Gas does not agree with any of the standard conditions of approval, please identify the specific conditions that Enbridge Gas disagrees with. Please specify any changes, amendments or additional conditions to the standard conditions. Explain the rationale for any proposed changes or amendments.

**Application under Section 90(1) of the OEB Act
Enbridge Gas Inc.
EB-2022-0157
DRAFT
Standard Conditions of Approval**

1. Enbridge Gas Inc. shall construct the facilities and restore the land in accordance with the OEB’s Decision and Order in EB-2022-0157 and these Conditions of Approval.
2. (a) Authorization for leave to construct shall terminate 12 months after the decision is issued unless construction has commenced prior to that date.
(b) Enbridge Gas Inc. shall give the OEB notice in writing:

- i. of the commencement of construction, at least 10 days prior to the date construction commences
 - ii. of the planned in-service date, at least 10 days prior to the date the facilities go into service
 - iii. of the date on which construction was completed, no later than 10 days following the completion of construction
 - iv. of the in-service date, no later than 10 days after the facilities go into service
3. Enbridge Gas Inc. shall obtain all necessary approvals, permits, licences, certificates, agreements and rights required to construct, operate and maintain the Project.
4. Enbridge Gas Inc. shall implement all the recommendations of the Environmental Report filed in the proceeding, and all the recommendations and directives identified by the Ontario Pipeline Coordinating Committee review.
5. Enbridge Gas Inc. shall advise the OEB of any proposed change to OEB-approved construction or restoration procedures. Except in an emergency, Enbridge Gas Inc. shall not make any such change without prior notice to and written approval of the OEB. In the event of an emergency, the OEB shall be informed immediately after the fact.
6. Concurrent with the final monitoring report referred to in Condition 7(b), Enbridge Gas Inc. shall file a Post Construction Financial Report, which shall provide a variance analysis of project cost, schedule and scope compared to the estimates filed in this proceeding, including the extent to which the project contingency was utilized. Enbridge Gas Inc. shall also file a copy of the Post Construction Financial Report in the proceeding where the actual capital costs of the project are proposed to be included in rate base or any proceeding where Enbridge Gas Inc. proposes to start collecting revenues associated with the Project, whichever is earlier.
7. Both during and after construction, Enbridge Gas Inc. shall monitor the impacts of construction, and shall file with the OEB one electronic (searchable PDF) version of each of the following reports:
 - (a) A post construction report, within three months of the in-service date, which shall:
 - i. provide a certification, by a senior executive of the company, of Enbridge Gas Inc.'s adherence to Condition 1
 - ii. describe any impacts and outstanding concerns

- identified during construction
 - iii. describe the actions taken or planned to be taken to prevent or mitigate any identified impacts of construction
 - iv. include a log of all complaints received by Enbridge Gas Inc., including the date/time the complaint was received, a description of the complaint, any actions taken to address the complaint, the rationale for taking such actions
 - v. provide a certification, by a senior executive of the company, that the company has obtained all other approvals, permits, licenses, and certificates required to construct, operate, and maintain the proposed project
- (b) A final monitoring report, no later than fifteen months after the in-service date, or, where the deadline falls between December 1 and May 31, the following June 1, which shall:
- i. provide a certification, by a senior executive of the company, of Enbridge Gas Inc.'s adherence to Condition 4
 - ii. describe the condition of any rehabilitated land
 - iii. describe the effectiveness of any actions taken to prevent or mitigate any identified impacts of construction
 - iv. include the results of analyses and monitoring programs and any recommendations arising therefrom
 - v. include a log of all complaints received by Enbridge Gas Inc., including the date/time the complaint was received; a description of the complaint; any actions taken to address the complaint; and the rationale for taking such actions
8. Enbridge Gas Inc. shall designate one of their employees as project manager who will be the point of contact for these conditions, and shall provide the employee's name and contact information to the OEB and to all affected landowners, and shall clearly post the project manager's contact information in a prominent place at the construction site.

Response

Enbridge Gas accepts these Standard Conditions of Approval.

ENBRIDGE GAS INC.

Answer to Interrogatory from
The Association of Power Producers of Ontario ("APPrO")

INTERROGATORY

References:

N/A

Preamble:

The IESO is planning to procure at least 3,500 MW through multiple procurements (Long-Term RFP, Expedited Long-Term RFP and Medium-Term RFPs, among other procurements). It is expected that some of this additional procurement will come from existing or expanded gas facilities.

Question:

- a) Has Enbridge included new or expanded gas generation facilities in its forecasts based on the current RFPs being launched by the IESO? If so, what amount and, if not, why?

Response

No, the demand forecast underpinning the need for the Project did not specifically include new or expanded gas generation facilities based on the current RFP's being launched by the IESO. The demand forecast underpinning the Project is based on the requests and commitments for new or incremental firm service and the conversion of existing interruptible service to firm service, as communicated by customers through the EOI process in early 2021 or after the EOI process. Through the EOI process Enbridge Gas did receive one bid from a large gas generation facility to convert their existing interruptible service to firm service, which has been included in the demand forecast for the Project.

The IESO is still in the process of securing the generation capacity through multiple procurements. While gas fired generators in the Panhandle Area of Benefit may be awarded contracts through the procurement process, supply solutions and options including locations are currently unknown. If Enbridge Gas were to include new or

expanded generation facilities in its forecasts, it would be on a speculative basis, and would not meet Enbridge Gas' standards for inclusion in the demand forecast.

ENBRIDGE GAS INC.

Answer to Interrogatory from
The Association of Power Producers of Ontario ("APPrO")

INTERROGATORY

References:

N/A

Preamble:

The 2021 APO from the IESO expects gas-fired generation to increase from 12 TWh annually in 2021 to 31 TWh by 2026 and nearly 34 TWh in 2030.

Question:

- a) Given the substantial increase in gas requirements to provide that amount of gas-fired generation, how much of that forecasted future gas-fired generation is included in the needs assessment for the Panhandle Regional Expansion Project ("Project")? If it is not included, please explain why.

Response

Please see the response to Exhibit I.APPrO.1.

ENBRIDGE GAS INC.

Answer to Interrogatory from
The Association of Power Producers of Ontario ("APPRO")

INTERROGATORY

References:

Exhibit C, Tab 1, Schedule 1

Preamble:

N/A

Question:

- a) Is it possible to increase the existing capacity of the Panhandle system through more moderate modifications to manage future demand growth? Please provide any additional analysis or studies that Enbridge has undertaken that are not included in the current application.
- b) Did Enbridge consider increasing the maximum operating pressure on the existing pipe lines to increase capacity? If so, why was this option rejected?

Response

- a) No, there were no additional alternatives identified by Enbridge Gas to accommodate the 5-year system shortfall. Please refer to Exhibit C, Tab 1, Schedule 1 for the Company's assessment of project alternatives, and the response at Exhibit I.STAFF.7.
- b) The Panhandle System maximum operating pressure is determined based on the design parameters of the existing pipeline materials and the inlet pressure at Dawn and Ojibway. The system is currently operating at its maximum operating pressure and this maximum operating pressure cannot be further increased.

ENBRIDGE GAS INC.

Answer to Interrogatory from
The Association of Power Producers of Ontario (“APPrO”)

INTERROGATORY

References:

Exhibit B, Tab 1, Schedule 1, Attachment 1 – “Panhandle Regional Expansion Project Expression 3 of Interest and Capacity Request Form”

Preamble:

N/A

Question:

- a) Given the need for new electricity generation capacity in the Southwestern region of the province, did Enbridge’s EOI include any potential new gas-fired generation companies or other electricity generation companies?
- b) Did Enbridge canvass the IESO to determine what amount of new (or expanded) gas-fired generation may materialize in the region? If so, please provide any documents provided to or received from the IESO.

Response

a) and b)

Please see the responses at Exhibit I.APPrO.1 and Exhibit I.PP.13.

ENBRIDGE GAS INC.

Answer to Interrogatory from
The Association of Power Producers of Ontario ("APPrO")

INTERROGATORY

References:

IESO Annual Planning Outlook

Preamble:

N/A

Question:

- a) If energy output from gas-fired generation is expected to increase by more than 20 TWh annually between now and 2030 – as it currently laid out in the IESO's APO – can the current configuration of the Panhandle pipeline accommodate that level of demand growth? And, if not, has Enbridge worked with the IESO to study the reliability implications?
- b) Given that many gas-fired generators are located across the province, does the inability of the Panhandle system to manage future growth have any impact on large gas-fired generation facilities in other parts of the province?
- c) Please provide any system-wide impacts on the province's electricity sector that have been undertaken by Enbridge or the IESO in response to the capacity shortfall in the Panhandle system.
- d) Has Enbridge undertaken any analysis on the impact to the variable operating costs of gas-fired generators – both within the southwestern region of the province and elsewhere – due to supply constraints in the Panhandle system? If so, please provide the analysis.

Response

a) - c)

No, Enbridge Gas has not worked with the IESO to study reliability implications.

No, the inability of Enbridge Gas's Panhandle System to manage future growth without a capacity solution does not have any direct impact on gas-fired generation facilities in

other parts of the province, as there is no physical relationship between the existing Panhandle System capacity and other areas of the province.

Please also see the responses to Exhibit I.APPrO.1 and Exhibit I.PP.13.

- d) No, Enbridge Gas has not completed the analysis sought by APPrO regarding the impacts to variable operating costs of gas-fired electricity generators.

ENBRIDGE GAS INC.

Answer to Interrogatory from
The Association of Power Producers of Ontario ("APPrO")

INTERROGATORY

References:

Exhibit B, Tab 1, Schedule 1, Page 7 of 19

Exhibit B, Tab 2, Schedule 1, Page 9 of 16

Preamble:

"There are additional industrial customers requesting Panhandle System capacity, but which were not part of the EOI process. These additional customers are not currently included in the demand forecast for the Project due to the preliminary nature of their requests, but their requests provide further support for the growing need for capacity on the Panhandle System."

"The general service (Rate M1 and Rate M2) demand consists of residential, commercial, and small industrial customers. Approximately 45% of the firm demand served by the Panhandle System is for the general service customers.

The contract rate (M/BT4, M/BT5, M/BT7, T-1 and T-2) demand accounts for about 55% of the firm demand served by the Panhandle System. The contract rate demand consists of power generation, greenhouse and large commercial/industrial. The current mix is 29% power generation, 52% greenhouse and 19% large commercial/industrial customers."

Question:

- a) Please provide a high-level estimate of the potential demand that is not included in this application, but may materialize over the next decade.
- b) Please provide the additional capacity that may be required based on preliminary requests that were not included in Enbridge's current forecast for the Panhandle system.
- c) What will the future split be between the "System General Service Market" and "System Firm Contract Market" with: (i) current forecasts; and (ii) the potential demand that is not included in the application over the next decade?
- d) What will the future demand mix be with: (i) current forecasts; and (ii) the potential demand that is not included in the application over the next decade?

Response

a) and b)

Enbridge Gas forecasts the demands on the Panhandle System based on commitments formally received from new or existing customers, as well as requests that have a high probability of proceeding.

Confidential informal requests received from potential customers to date indicate to the Company that additional demand may exist beyond that received through the formal EOI process, with these requests ranging from 9 to 29 TJ/d. No formal commitments from these confidential informal requests have been made yet, and as such, Enbridge Gas will continue to work with these proponents on a first-come, first-serve basis.

No incremental capacity is required at this time. However, confirmation of incremental demand in the future may accelerate the need for an additional capacity solution.

c)

- i) By Winter 2030/2031, General Service demands are estimated to account for 33% of the total firm Panhandle System Market, and Firm Contract demands are estimated to account for 67% of the total firm Panhandle System Market.
- ii) Enbridge Gas is unable to estimate with certainty the future proportional split of customer types for the Panhandle System Market as requested by APPrO at this time.

d)

- i) By Winter 2030/2031, the breakdown of firm contract demands excluding general service is estimated to be:
 - Power Generation: 24%
 - Greenhouse: 60%
 - Large Commercial/Industrial: 16%
- ii) Enbridge Gas is unable to estimate with certainty the future demand mix for the Panhandle System Market as requested by APPrO at this time.

ENBRIDGE GAS INC.

Answer to Interrogatory from
The Association of Power Producers of Ontario ("APPrO")

INTERROGATORY

References:

Exhibit B, Tab 1, Schedule 1, Page 7 of 19

Preamble:

"This conclusion is further reinforced by the Company's expectation that any capacity created on the Panhandle System could also be relied upon in the future to support transmission and distribution of renewable natural gas and/or hydrogen gas volumes."

Question:

- a) Has Enbridge undertaken any studies on forecasted growth of hydrogen or RNG in Ontario? If so, please provide these reports.

Response

No, Enbridge Gas has not undertaken any studies on forecasted growth of hydrogen or RNG in Ontario.

ENBRIDGE GAS INC.

Answer to Interrogatory from
The Association of Power Producers of Ontario ("APPrO")

INTERROGATORY

References:

Exhibit B, Tab 1, Schedule 1

Preamble:

"As noted in the IESO's December 2021 Annual Planning Outlook, the Brighton Beach Generating Station ("BBGS") will play a particularly critical role in meeting localized power generation needs between 2024 and 2028. With demand for electricity continuing to grow, it is expected that the BBGS will continue to play a significant role in meeting the region's electricity supply needs beyond 2028. It is Enbridge Gas's understanding that these near-term and longer-term needs have driven the request for incremental firm service from this customer."

Question:

- a) Does Enbridge expect the BBGS generating station to operate beyond 2030?
- b) Has Enbridge discussed the long-term operation of the BBGS with the IESO?
- c) Has Enbridge discussed the reliability implications to Ontario's electricity grid of the retirement of the BBGS by 2030 or earlier? Please provide any analysis Enbridge provided or received from the IESO.

Response

- a) Yes. The IESO's planning outlooks suggest that the availability of existing resources including gas-fired generators (including BBGS) will be required beyond 2030.

Figures 21 & 22 of the IESO's 2021 Annual Planning Outlook imply that without the continued availability of existing resources, including electricity produced by natural gas generators, an energy shortfall is expected to start in 2026 and continue to grow sharply through 2042.¹

¹ <https://www.ieso.ca/-/media/Files/IESO/Document-Library/planning-forecasts/apo/Dec2021/2021-Annual-Planning-Outlook.ashx>, Page 48.

Figure 13 of the IESO's 2022 Annual Acquisition Report implies that potential contribution of existing resources will play a significant role in meeting adequacy needs from 2027 to 2034.²

b) No.

c) No.

² <https://www.ieso.ca/-/media/Files/IESO/Document-Library/planning-forecasts/aar/Annual-Acquisition-Report-2022.ashx>, Pages 39-40.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (“ED”)

INTERROGATORY

Reference:

Ex. B, Tab 1, Schedule 1.

Question:

- (a) Please provide a copy of table 1 on page 11 with the figures converted to m³/d.
- (b) Please provide conversion factors for TJ to m³.
- (c) On page 14, Enbridge states: “The greenhouse sector does not currently have a viable economic alternative to replace natural gas for heat and CO₂ production.” Please provide an analysis comparing the cost of heating a greenhouse with gas versus a high-efficiency heat pump. Please provide this analysis over a 15 year time horizon, including the federal government’s planned increases to the carbon price.

Response

a) Please see Table 1.

Table 1

	Historical Actuals (m3/d)		FORECAST (m3/d)									
	Winter 19/20	Winter 20/21	Winter 21/22	Winter 22/23	Winter 23/24	Winter 24/25	Winter 25/26	Winter 26/27	Winter 27/28	Winter 28/29	Winter 29/30	Winter 30/31
General Service Firm (Total System Demand)	8,137,760	7,853,302	7,887,525	7,916,371	7,946,009	7,972,468	8,001,661	8,030,459	8,055,890	8,081,401	8,110,039	8,136,470
Contract Firm (Total System Demand)	8,289,833	8,851,338	9,200,285	9,728,285	10,978,010	13,077,936	13,710,861	14,343,786	14,976,711	15,609,636	16,242,561	16,875,486
Total System Demand Forecast	16,427,593	16,704,639	17,087,809	17,644,656	18,924,019	21,050,403	21,712,522	22,374,244	23,032,601	23,691,037	24,352,600	25,011,956
General Service Firm (Total Incremental Demand)	487,429	(222,306)	42,212	28,846	29,638	26,458	29,194	28,797	25,431	25,511	28,639	26,431
Contract Firm (Total Incremental Demand)	76,963	636,456	357,952	528,000	1,249,725	2,099,925	632,925	632,925	632,925	632,925	632,925	632,925
Total Incremental Demand Forecast	564,392	414,150	400,164	556,846	1,279,363	2,126,384	662,119	661,722	658,356	658,436	661,564	659,356
Total Incremental Demand Forecast (Cumulative)	-	-	400,164	957,010	2,236,374	4,362,757	5,024,876	5,686,599	6,344,955	7,003,391	7,664,954	8,324,311

- b) The conversion factor from TJ per day to m^3 per day is based on the System Wide Average Heating Value ("SWAHV"). This value changes each year. The conversions are as follows:
- For Winter 2019/2020: 0.00003898 TJ/ m^3
 - For Winter 2020/2021: 0.00003928 TJ/ m^3
 - For Winter 2021/2022 to Winter 2030/2031: 0.00003932 TJ/ m^3
- c) Enbridge Gas has not developed an analysis comparing the cost of heating a greenhouse with natural gas versus an electric heat pump. The reference to the viability of alternative solutions for heating and CO₂ production for greenhouses is based on the utility's understanding of greenhouse operations, as well as greenhouse customer requirements for natural gas via the EOI process. Enbridge Gas is not aware of any large greenhouse customers that use electric heat pumps for heating and CO₂ production.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (“ED”)

INTERROGATORY

Reference:

Ex. B, Tab 1, Schedule 1.

Preamble:

Enbridge states as follows on page 9: “Approximately 45% of the firm demand served by the Panhandle System is for general service customers. Enbridge Gas forecasts that general service customer demand in the Panhandle Market will increase by approximately 3.7% between winter 2021/2022 and 2030/2031. Incremental demands from general service customers make up approximately 2.5% of the incremental capacity of the proposed Project.”

Question:

- (a) Please provide a table listing the forecast number of general service customers, broken down by customer type, and showing the per-customer average demand for each customer type, for 2021/2022 and 2030/2031, for the relevant area.
- (b) Please provide the customer attachment forecast for the 2021/2022 and 2030/2031, including a breakdown by customer type and a breakdown by new construction versus conversion of existing building

Response

a) and b)
Please see Table 1 below.

Table 1: Forecast General Service Attachments, Panhandle Market (2021-2030)

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential Attachments	1194	1190	1190	1188	1188	1188	1188	1188	1188	1188
Commercial Attachments	122	121	121	121	121	121	121	121	121	121
Industrial Attachments	2	0	1	0	1	0	1	0	1	0

The number of general services customers in the relevant area is estimated to currently be, approximately:

- Residential: 178,200
- Commercial/Industrial: 14,200

The Company does not have a 2030/2031 general service customer forecast specific to the Panhandle Market, however an estimation can be inferred using the current estimated customer count and Table 1, above.

The per-customer average demand for each customer attachment type is assumed to be 0.97 m³/hr for residential, 4.4 m³/hr for small commercial, 50.3 m³/hr for large commercial, and 12.4 m³/hr for industrial demands in this area.

The general service attachments on the Panhandle System is assumed to be approximately 2-5% fuel conversions.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (“ED”)

INTERROGATORY

Reference:

Ex. B, Tab 1, Schedule 1.

Preamble:

On page 15, Enbridge states: “As noted in the IESO’s December 2021 Annual Planning Outlook, the Brighton Beach Generating Station (“BBGS”) will play a particularly critical role in meeting localized power generation needs between 2024 and 2028.¹¹ With demand for electricity continuing to grow, it is expected that the BBGS will continue to play a significant role in meeting the region’s electricity supply needs beyond 2028. It is Enbridge Gas’s understanding that these near-term and longer-term needs have driven the request for incremental firm service from this customer.”

Question:

- (a) Please reproduce the table 1 on page 11 with an additional row to indicate the historical and forecast design day demand attributable to power generation.
- (b) Seeing as Ontario is a summer peaking jurisdiction, please explain how Enbridge determines the design day demand associated with power generation.
- (c) Please provide the actual demand from power generation on the three highest demand days in each of the last ten years for the project area.
- (d) Please provide the design day demand from power generation for the last ten years as assumed in Enbridge’s gas supply planning processes.

Response

a) Please see Table 1 below.

Table 1: Panhandle System Design Day Demand Forecast, with Attribution to Power Generators

	Historical Actuals (TJ/d)		FORECAST (TJ/d)									
	Winter 19/20	Winter 20/21	Winter 21/22	Winter 22/23	Winter 23/24	Winter 24/25	Winter 25/26	Winter 26/27	Winter 27/28	Winter 28/29	Winter 29/30	Winter 30/31
General Service Firm (Total System Demand)	317	308	310	311	312	313	315	316	317	318	319	320
Contract Firm (Total System Demand excluding Power Generators)	218	242	256	277	326	351	375	400	425	450	475	500
Power Generators - Firm Contract only	105	106	106	106	106	164	164	164	164	164	164	164
Total System Demand Forecast	640	656	672	694	744	828	854	880	906	932	958	983
General Service Firm (Total Incremental Demand)	19	-9	2	1	1	1	1	1	1	1	1	1
Contract Firm (Incremental excluding Power Generators)	3	25	14	21	49	25	25	25	25	25	25	25
Power Generators - Firm Contract only (incremental)			0	0	0	58	0	0	0	0	0	0
Total Incremental Demand Forecast	22	16	16	22	50	84	26	26	26	26	26	26
Total Incremental Demand Forecast (Cumulative)			16	38	88	172	198	224	249	275	301	327

- b) Design day demand for power generators is equivalent to their firm contract demand. Power generators can exercise their contract at any time including during the design day. Enbridge Gas must plan to meet all contractual obligations and must plan to meet these requirements on the design day.
- c) Please see Table 2 below.

Table 2: Natural Gas-fired Power Generation on the Three Highest Demand Days

Year	Date	Power Generation Demand (10 ³ m ³ /day)
2022	20-Jan-2022	2311
2022	21-Jan-2022	1549
2022	14-Feb-2022	1774
2021	5-Feb-2021	11
2021	15-Feb-2021	7
2021	16-Feb-2021	14
2020	13-Feb-2020	64
2020	26-Feb-2020	44
2020	27-Feb-2020	48
2019	29-Jan-2019	654
2019	30-Jan-2019	684
2019	31-Jan-2019	1492
2018	04-Jan-2018	1258
2018	05-Jan-2018	1563
2018	16-Jan-2018	1545
2017	6-Jan-2017	1639
2017	7-Jan-2017	302
2017	13-Mar-2017	69
2016	4-Jan-2016	2198
2016	17-Jan-2016	1112
2016	18-Jan-2016	1128
2015	19-Feb-2015	3215
2015	20-Feb-2015	3578
2015	23-Feb-2015	3172
2014	21-Jan-2014	4261
2014	22-Jan-2014	4241
2014	11-Feb-2014	4114
2013	21-Jan-2013	1854
2013	22-Jan-2013	3229
2013	23-Jan-2013	2822

d) As outlined in Exhibit I.ED.4 part b), the design day demand forecast in the Gas Supply Plan is shown by rate zone and not by individual transmission pipeline system. Table 3 below shows the design day demand for the power generation customers served by the Panhandle System from Winter 2012/2013 to Winter 2021/2022.

Table 3: Power Generation Design Day Demand

	Design Day Demands (TJ/d)									
	Winter 12/13	Winter 13/14	Winter 14/15	Winter 15/16	Winter 16/17	Winter 17/18	Winter 18/19	Winter 19/20	Winter 20/21	Winter 21/22
Power Generators - Firm Only (TJ/d)	108	108	129	130	131	131	127	105	106	106

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (“ED”)

INTERROGATORY

Reference:

Exhibit B, Tab 2

Question:

- (a) Please provide excerpts from Enbridge most recent gas supply plan that are relevant to this proceeding.
- (b) Please explain how the demand described in this application is reflected in the gas supply plan.

Response

- a) Please see the response to part b) below. At Exhibit B, Tab 3, Schedule 1, page 8, Enbridge Gas references contracts on the Panhandle Eastern Pipeline to Ojibway that are held by the Company for sales service customers (all of which influence Panhandle System design). Enbridge Gas’s Panhandle capacity is referenced throughout the 2022 Annual Gas Supply Plan Update (EB-2022-0072), including details on the parameters of the contracts which appear on Page 2 of Appendix C. Enbridge Gas’s Panhandle Eastern capacity required to meet Design Day demand on the Panhandle System is discussed in the 5 year Annual Gas Supply Plan (EB-2019-0137) at page 80.
- b) The Panhandle System design day demand forecast is included in Table 1 of Exhibit B, Tab 1, Schedule 1. The design day demand described in Enbridge Gas’s gas supply plan is detailed by the larger rate zone. The Panhandle System’s design day demand is included within the Union South rate zone design day demand and is included in the Enbridge Gas 2022 Annual Gas Supply Plan Update (EB-2022-0072) at page 26, Table 4, Row 4. The design day demand forecast in the 2022 Annual Gas Supply Plan Update reflects information known during the completion of the 2021/2022 gas supply plan in the summer of 2021. The Winter 2021/2022 Panhandle System design day demand is about 20% of the total 2021/2022 Union

South rate zone design day demand forecast shown in the 2022 Annual Gas Supply Plan Update.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (“ED”)

INTERROGATORY

Reference:

Exhibit C, Tab 1, Schedule 1

Question:

- (a) Please provide list of all references to this project in previous AMPs and other capital planning documents.
- (b) Please indicate when Enbridge first anticipated the need for this project.
- (c) Please indicate when Enbridge first considered potential IRPAs.
- (d) Please describe the steps taken by Enbridge prior to the IRP proceeding decision to comply with previous directives of the OEB regarding IRP.

Response

- a) Please see Table 1 below.

Table 1: List of References to Project in Previous AMPs and Other Capital Planning Documents

Document	Case Number(s)	Reference(s)
Union Gas Asset Management Plan 2018-2027	EB-2017-0306/EB-2017-0307	Exhibit C.STAFF.54, Attachment 2, Pages 7, 39-40, 41, 79
Union Gas Asset Management Plan 2019-2028	EB-2018-0305	Exhibit C1, Tab 3, Schedule 1, Pages (14, 74, 77, 176)
EGI Asset Management Plan Addendum (2020)	EB-2019-0194	Exhibit C, Tab 1, Schedule 1, Pages (9, 69, 72, 171-172)
EGI Asset Management Plan 2021-2025	EB-2020-0181	Exhibit C, Tab 2, Schedule 1, Page (88)
EGI Asset Management Plan Addendum (2022)	EB-2021-0148	Exhibit B, Tab 2, Schedule 3, Pages (8, 14, 18)

- b) Enbridge Gas anticipated a potential need for incremental future facilities of this nature while developing the Kingsville Transmission Reinforcement Project (EB-2018-0013), in 2018. At the time, the need for incremental future facilities was anticipated to arise in 2026. This need was reaffirmed in 2021 when the forecasted demand growth accelerated the need for the current Project to Winter 2023/2024, as discussed in Exhibit B, Tab 1, Schedule 1, pages 2-11.
- c) Enbridge Gas began reviewing IRP alternatives in Q1 2021 when the EOI for the Project was issued. Enbridge Gas conducted similar IRP alternative assessments for the 2016 Panhandle Reinforcement Project and 2018 Kingsville Transmission Reinforcement Project¹ which yielded similar results to those assessed in relation to the current Project.
- d) Please refer to Exhibit C, Tab 1, Schedule 1, and Exhibit I.STAFF.7 for details on Enbridge Gas's assessment of alternatives related to the Project. Enbridge Gas submits that activities prior to the OEB establishing the IRP Framework, unrelated to the Project, are not relevant to this proceeding. Please also see the response to part c) for discussion of previous assessments for the 2016 Panhandle Reinforcement Project and the 2018 Kingsville Transmission Reinforcement Project.

¹ EB-2016-0186, Exhibit A, Tab 6 and EB-2018-0013, respectively.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (“ED”)

INTERROGATORY

Reference:

Exhibit C, Tab 1, Schedule 1

Question:

- (a) Please reproduce table 1 on page 11 of Ex. B, Tab 1, Schedule 1, adding rows with the following additional information:
- i. The potential capacity that could be feasibly sourced from Ojibway, in terms of the TJ/d at Ojibway and the TJ/d at the Leamington-Kingsville area;
 - ii. The potential capacity that could be cost-effectively sourced from Ojibway, in terms of the TJ/d at Ojibway and the TJ/d at the Leamington-Kingsville area;
 - iii. The potential capacity that could be obtained through targeted cost-effective energy efficiency programming;
 - iv. The potential capacity that could be obtained via demand response contracts (i.e. incenting customers to switch to interruptible service); and
 - v. The forecast demand from power generation.
- (b) Please provide a table showing the annual cost for items (i) to (iv) above.

- ii. There is no Panhandle System capacity that could be cost-effectively sourced from Ojibway compared to the proposed Project. This alternative was evaluated and deemed a non-viable alternative. Please see the response to Exhibit I.STAFF.7, Attachment 2.
- iii. Enbridge Gas reviewed potential capacity that could be obtained through targeted cost-effective energy efficiency programming and determined that a maximum peak hour reduction potential of 6,900 m³/hour (5.43 TJ/d) could be obtained. For additional details please refer to Exhibit C, Tab 1, Schedule 1, Pages 23-24, Paragraph 71, and the response at Exhibit I.STAFF.7, Attachment 2.
- iv. There is no potential capacity that could be obtained via demand response. Please see the response at Exhibit I.STAFF.9, part b).
- v. Please see the response to Exhibit I.ED.3, part a).

b) Please see Table 2 below.

Table 2: Costs of Additional Capacity and ETEE

Item #	Potential Panhandle System Capacity Source	Estimated Costs
i, ii	21 TJ/d Firm Exchange between Dawn and Ojibway	\$4.2 million Annually
iii	5.43 TJ/d Enhanced Targeted Energy Efficiency (ETEE)	~\$50 million Total

Please also see the response to Exhibit I.STAFF.7, Attachment 2.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (“ED”)

INTERROGATORY

Reference:

Exhibit C, Tab 1, Schedule 1, Attachment 2

Question:

- (a) Please provide all data sheets, assumptions, and calculations underlying the Posterity Group analysis, including live spreadsheets where possible.
- (b) How did the Posterity Group generate peak hour savings figures based on the 2019 Achievable Potential Study, which focused on annual savings?
- (c) Posterity Group found that the “[p]eak hour reduction from demand side management is approximately 6,900 m³/hr by winter 2029/2030.” Please provide an annual breakdown up to 2029/2030.
- (d) Posterity Group found that the “[p]eak hour reduction from demand side management is approximately 6,900 m³/hr by winter 2029/2030.” Please ask the Posterity Group to provide the corresponding annual savings (m³) and peak day (m³/d) savings.
- (e) For the energy efficiency programming described by the Posterity Group, please provide (i) the lifetime gas savings (m³), (ii) the lifetime avoided tonnes of GHGs (t CO₂e), (iii) the approximate value of the avoided gas, and (iv) the approximate value of the avoided carbon emissions (accounting for carbon price escalation).
- (f) Please compare the Posterity “mirror model” with the 2019 Achievable Potential Study. Does one find that there are greater potential savings than the other? If yes, by how much (%) and why?
- (g) Please ask the Posterity Group to estimate the potential based on double the incentives, including an appropriate adjustment to the free ridership rate.
- (h) Why does the Posterity Group provide figures in based on the peak hour whereas the rest of the application uses design day figures?
- (i) Please provide all communications between Enbridge and Posterity Group regarding this matter.

Response

- a) Please see Attachment 1 to this response for the “IRP Analysis project Leamington Interconnect Modelling Approach” memo, which details the assumptions and methodology used in Posterity Group’s analysis. The calculations are completed via Posterity’s proprietary model/software and the results are outputted.

Please see Attachment 2 to this response for Enbridge Gas’s growth assumptions. Customer data for individual general service customers was also provided to Posterity, however has not been included in Attachment 2. Enbridge Gas submits that individual customer names, locations, and consumption volumes are not relevant to the request.

Please see Attachment 3 to this response for the Posterity output file.

- b) Please see Attachment 4 to this response for Posterity’s Peak Modelling Method Memo for information on the methodology.
- c) Please see Table 1 below.

Table 1: Annual Peak Hour Reduction by Sector

Hourly Peak Reduction (m ³ /hr)				
Year	Residential	Commercial	Industrial	Total
2023	471	63	279	813
2024	1,155	139	556	1,849
2025	2,105	186	821	3,112
2026	2,987	215	1,070	4,272
2027	3,799	230	1,291	5,319
2028	4,527	238	1,475	6,240
2029	5,027	241	1,606	6,874

- d) The corresponding annual savings is 17,009,470 m³.

The comparable peak day savings is 5.43TJ/d. For clarity, the scope of Posterity’s analysis was for general service customers on the distribution network within the Leamington, Kingsville and Wheatley area. The focus of the analysis was on peak hour, and therefore the model was calibrated only for peak hour. The peak hour value was then converted to peak day to allow for comparison to the project need.

e) Please see Table 2 below.

Table 2: Lifetime Savings from Energy Efficiency Programming from Posterity Group Report

Year	Lifetime Natural Gas Savings (m ³) ¹	Lifetime Emissions Savings (tonnes CO ₂ e) ²	Lifetime Natural Gas Cost Savings (\$) ³	Lifetime Carbon Cost (\$/tonne) ⁴	Lifetime Carbon Cost Savings (\$)
2023	26,859,755	52,672	3,760,366	65	3,423,679
2024	34,676,992	68,002	4,854,779	80	5,440,126
2025	44,815,044	87,882	6,274,106	95	8,348,819
2026	47,200,739	92,561	6,608,103	110	10,181,671
2027	46,978,047	92,124	6,576,927	125	11,515,494
2028	40,411,740	79,247	5,657,644	140	11,094,639
2029	28,631,131	56,146	4,008,358	155	8,702,575
2030	22,147,829	43,432	3,100,696	170	7,383,422

NOTES:

- 1 - The lifetime savings were calculated by multiplying the annual savings of each new measure implemented in a given year by the lifetime of that measure.
- 2 - Assumed Emission Factor: 0.001961 tCO₂e/m³.
- 3 - Assumed Natural Gas Cost: \$0.14/m³.
- 4 - Assumed Carbon Cost based on Minimum National Carbon Pollution Price Schedule for 2023-2030.

f) Please see Attachment 5 to this response for the outputs (in annual m3 savings) of the 2019 Achievable Potential Study and Posterity’s “mirror model”. The comparison is provided for Scenario B, as this is the scenario relevant to Posterity’s mirror model. There are several components to the outputs, therefore the Company cannot provide a specific percentage difference as requested.

To understand the challenges of comparing the two outputs, and to provide an understanding of the factors driving differences between the two outputs, see below for a summary of the work completed by Enbridge Gas and Posterity to arrive at the “mirror model”:

- Through Posterity’s effort, an original model was created to mimic the 2019 Achievable Potential Study as closely as possible.
- A large number of issues were identified and documented through the joint analysis of Posterity and Enbridge Gas, which included the following four categories:
 - Misalignment of reference case sector structure and assumptions;
 - Measure assumptions that were not substantiated or not applicable;

- Measure adoption and diffusion assumptions on achievable potential that did not align with historic market experience; and,
- Program delivery cost assumptions that don't reflect historic experience.
- A "mirror model" was created which reflects the impacts of the recommended modifications that were made to the original model in attempt to address some of the deficiencies identified.

For clarity, for the purpose of completing an assessment on peak hour demand reduction for IRP, Posterity developed an IRPA model based off the "mirror model". The updates that were incorporated to support the IRPA modelling are outlined in Attachment 1 of this response, and include:

- Calibrated the base year to weather adjusted 2021 consumption and updated the reference case to align with Enbridge's forecast of customer growth;
- Corrected customer regional mapping for the base year and reference case according to customer data supplied by Enbridge;
- Added rate class and customer account data;
- Developed hours-use peak factors for each region, sector, segment, and end use; and,
- Added a residential demand response measure.

Given this subsequent evolution of the model, and the change in model objective from annual savings to a peak hour focus, the outputs between the IRPA Model and the 2019 APS would be meaningfully different.

- g) The Posterity analysis was completed using Scenario B from the APS, which assumes unconstrained potential where incentives are set at 100% of incremental cost of each measure. Therefore, the results provided would illustrate the maximum achievable potential assuming no program cost or incentive constraints. Increasing incentives beyond 100% of the incremental cost is beyond the scope of the 2019 APS, and more research would be required to complete the analysis.
- h) The scope of Posterity analysis was for general service customers on the distribution network within the Leamington, Kingsville and Wheatley area, where peak hour analysis was most applicable, as distribution networks are designed based on peak hour basis.

The Panhandle Transmission System is designed using daily demand on Design Day, or peak day basis.

i) Please see Attachment 6 to this response for all email correspondences.



IRP Analysis project

Leamington Interconnect Modelling Approach

Project: Integrated Resource Planning Alternative Analysis (IRPA Analysis)

Re: Leamington Interconnect LTC

Submitted by: Posterity Group (PG)

Date: May 27, 2022

This memo presents information on the approach that was taken to develop the model used for the Leamington Interconnect IRPA Analysis project.

1 Notes on the Modeling Approach

The following sections summarize the modelling method used to conduct the analysis:

1.1 Model Updates

We started with the Posterity 'mirror model' of the 2019 Achievable Potential Study (APS), and incorporated the following updates to support IRPA modelling (creating the Posterity IRPA model):

- Calibrated the base year to weather adjusted 2021 consumption and updated the reference case to align with Enbridge's forecast of customer growth for the Leamington region.
- Corrected customer regional mapping for the base year and reference case according to customer data supplied by Enbridge.
- Added rate class and customer account data
- Developed hours-use peak factors for each region, sector, segment, and end use
- Added a residential demand response measure

1.2 Adjustments to Produce a Regional Model

We made the following adjustments to the Posterity IRPA model to produce a regional model:

- The Union South gas region in the West IESO zone was selected. All other regions were ignored.
- Scenario B was used (the scenario with the greatest potential from the achievable potential study)
- Only the following rates were selected:
 - Residential: M1
 - Commercial: M1, M2
 - Industrial: M1, M2





- Using customer data for the Leamington region, scaling factors were developed for each segment within the three sectors that were studied: residential, commercial, and industrial. These scaling factors were calculated by comparing the 2021 consumptions from the Leamington dataset provided by EGI and the 2021 consumptions for the Union South region from Posterity’s IRPA model. This step was done to determine the proportion of accounts in Union South that can be attributed to the Leamington region. The scaling factors were applied to the accounts in Posterity’s IRPA model to scale down the Union South region to represent Leamington.
- Accounts were added to each segment in the proportion that they were present in 2021 in the Union South region from Posterity’s IRPA model such that the total account growth in each sector matched the growth forecast provided by Enbridge for each year in the reference case. More information on the segments analyzed is provided in the following section.
- The hours-use peak factors for new accounts in the residential and commercial sectors were calibrated to match the expected per customer 2022 peak hourly demand provided in the EGI dataset. These peak hourly demands are lower than the average peak hourly demand per customer of existing customers. Since the model incorporates a 2 percent demolition rate of existing residential and commercial buildings that are replaced by new buildings and treated as new accounts, the overall peak hourly demand in these sectors decreases over time.
- Although there is no account growth forecasted in the industrial sector, the Unit Energy Consumption (UEC) assumptions built into the 2019 APS model, which this model is based on, increase over time, leading to an increase in peak hourly demand in the industrial sector. There is also no demolition rate applied to the industrial sector so the decrease in peak hourly demand due to lower peak hourly demand assumptions of new versus existing customers seen in other sectors does not affect the industrial sector.

1.3 Segment Scaling Factors

Exhibit 1 below shows the segments that are accounted for in the IRPA model, the Union South and Leamington consumptions for 2021, and the consumption scaling factor derived from them. There are additional segments in the model that were not present in the Leamington dataset and were thus assigned a consumption scaling factor of zero.

Exhibit 1– Segment Consumption Scaling Factors

Sector	Segment	2021 Union South Consumption (m ³)	2021 Leamington Consumption (m ³)	Consumption Scaling Factor
Residential	Attached/Row House	81,782,679	3,253,137	0.0398
	Detached House	644,444,094	33,746,171	0.0524
	Multi-Residential Low Rise	10,174,171	1,577,494	0.1550





Commercial	Food Retail	13,187,733	460,361	0.0349
	Hospital	2,675,515	187,030	0.0699
	Large Office	20,952,283	386,362	0.0184
	Long Term Care	14,002,358	1,025,345	0.0732
	Other Commercial	139,667,949	14,411,820	0.1032
	Other Motel/Hotel	2,796,486	270,920	0.0969
	Other Non-Food Retail	44,674,594	1,559,513	0.0349
	Other Office	45,594,773	968,056	0.0212
	Restaurant	28,997,970	983,865	0.0339
	School	27,747,189	817,859	0.0295
	Warehouse	25,968,045	1,434,872	0.0553
Industrial	Agriculture	110,007,131	60,668,167	0.5515
	Chemicals Manufacturing	8,017,914	215,210	0.0268
	Food and Beverage Manufacturing	12,486,198	1,400,532	0.1122
	Other Industrial	88,495,953	4,947,998	0.0559
	Pulp, Paper, and Wood Products Manufacturing	7,238,873	41,182	0.0057
	Utility	3,943,216	34,670	0.0088

Exhibit 2 shows the segments that are accounted for in the IRPA model, the number of accounts for both the M1 and M2 rate class in 2021 in Union South, and the corresponding account scaling factors used to implement the growth forecast provided by Enbridge. The account scaling factors are calculated as a percentage of the total number of accounts within the sector, in both the M1 and M2 rate class, with the sum of all of the account scaling factors for each sector adding up to one. These account scaling factors are then multiplied by the number of new accounts for each sector in a given year to reflect the growth rate with accurate proportions. Due to the fact that there was no growth rate forecasted in the general service industrial sector during the years analyzed, account scaling factors are not required for that sector. As with the consumption scaling, there are additional segments in the model that were not present in the Leamington dataset and were thus assigned an account scaling factor of zero.





Exhibit 2 – Segment Accounts Scaling Factors

Sector	Segment	M1 2021 Union South Accounts	M2 2021 Union South Accounts	M1 Accounts Scaling Factor	M2 Accounts Scaling Factor
Residential	Attached/Row House	492,401	n/a	0.1513	n/a
	Detached House	272,355	n/a	0.8367	n/a
	Multi-Residential Low Rise	3,907	n/a	0.0120	n/a
Commercial	Food Retail	1,434	40	0.0557	0.0015
	Hospital	9	9	0.0004	0.0004
	Large Office	1,670	64	0.0648	0.0025
	Long Term Care	86	83	0.0033	0.0032
	Other Commercial	9,095	460	0.3531	0.0179
	Other Motel/Hotel	79	15	0.0031	0.0006
	Other Non-Food Retail	4,858	134	0.1886	0.0052
	Other Office	3,633	140	0.1410	0.0054
	Restaurant	1,808	98	0.0702	0.0038
	School	324	195	0.0126	0.0076
	Warehouse	1,425	101	0.0553	0.0039



General Service Growth

*Based on 2018 FBP for Leamington, Kingsville and Wheatley

GENERAL SERVICE GROWTH COUNTS*																				
Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
RESIDENTIAL	181	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112
COMMERCIAL	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
INDUSTRIAL	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Peak Load Assumptions Per Customer	
Customer Type	Peak Load (m3/hr)
Residential	0.97
Commercial	4.4

Contract Growth

Incremental Firm Demand Growth Over time per Design Day Demand Forecast													
TJ/d	W 21/22	W 22/23	W 23/24	W 24/25	W 25/26	W 26/27	W 27/28	W 28/29	W 29/30	W 30/31	W 31/32	W 32/33	W 33/34
Incremental Contract Firm Growth *		21	30	25	25	25	25	25	25	25	25	25	21

*A 20hr factor and Heating Value of 39.32 (MJ/m3) can be assumed to convert from TJ/day to m3/hr

*Majority of this contract growth is agricultural (greenhouses)

Assumptions

- For any customers with no rate numbers in SAP, the last active rate number was used. If no last active rate number was available, then M1 was assumed for consumption less than 50,000 m3/hr and M2 was assumed for consumption greater than 50,000 m3/hr
- All own-use customers will be excluded from the assesment
- Contract customers will contribute to the refernece case growth but should be excluded from the ETEE analysis

Measure Name	Peak Hour Reduction (m3/hr) in 2029
Com Adaptive Thermostats	0.0
Com Air Curtains	-
Com Boilers - Advanced Controls (Steam Systems)	2.4
Com CEE Tier 2/Energy Star Clothes Washers	0.0
Com Condensing Boiler Std	23.7
Com Condensing Make Up Air Unit	4.8
Com Condensing Storage Water Heater	-
Com Demand Control Kitchen Ventilation	4.8
Com Demand Control Ventilation	4.6
Com Demand controlled Circulating Systems	0.1
Com Destratification	51.1
Com Dock Door Seals	-
Com Drain Water Heat Recovery (DWHR) Retro	0.0
Com Drain Water Heat Recovery (DWHR) New	0.0
Com Energy Efficient Laboratory Fume Hood	92.8
Com Energy Recovery Ventilation and Ventilation (Enhanced)	6.8
Com ENERGY STAR Dishwasher	0.8
Com ENERGY STAR Fryer (84% eff)	3.4
Com ENERGY STAR Griddle (74% eff)	1.5
Com ENERGY STAR Steam Cooker	2.3
Com Furnace Tune-Up	0.0
Com Gas Convection Oven	-
Com Gas Fired Heat Pump	1.0
Com Gas Fired Rooftop Units	8.8
Com Heat Recovery Ventilator	3.4
Com High Efficiency Condensing Furnace AFUE 95% from 80% code	-
Com High Efficiency Underfired Broilers	2.0
Com HOTEL OCCUPANCY CONTROLS (HVAC + LIGHTING)	-
Com Ice Rink Heat Recovery	-
Com Infrared Heaters	0.7
Com Low Flow Pre-Rinse Spray Nozzle	2.5
Com Ozone Laundry Treatment	2.4
Com Roof Insulation/Ceiling Insulation (R25 Code to R35)	-
Com Solar Water Preheat (Pools/DHW)	0.4
Com Steam System Optimization	-
Com Super High Perf Glazing New	-
Com Super High Perf Glazing RET	-
Com Super-High Efficiency Furnaces (Emerging Tech)	-
Com Wall Insulation	20.4
Ind Air Compressor Heat Recovery	1.7
Ind Boiler Tune Up	-
Ind Boiler Upgrade	250.7
Ind Direct Contact Water Heaters	69.0
Ind Gas Turbine Optimization	0.2
Ind Greenhouse Envelope Improvements	75.7
Ind HE HVAC Controls	91.3
Ind HE HVAC Units	0.8
Ind HE Stock Tank	0.5
Ind High Efficiency Burners	17.7
Ind High Efficiency Furnaces	-
Ind High Efficiency HVAC Fans (Gas)	592.2
Ind Improved Controls -Process Heating Gas	3.2

Measure Name	Peak Hour Reduction (m3/hr) in 2029
Ind Insulation - Steam	3.8
Ind Loading Dock Seals	91.3
Ind Process Heat Improvements	63.8
Ind Process Heat Recovery (Gas)	5.7
Ind Process Optimization (Gas)	0.1
Ind Recommissioning	0.0
Ind Solar Walls	4.6
Ind Steam Leak Repairs	-
Ind Steam Trap Repair	1.0
Ind Steam Turbine Optimization	0.2
Ind VAV Conversion Project (Gas)	325.2
Ind Ventilation Optimization (Gas)	7.5
Res Adaptive Thermostat	5.5
Res Air Sealing	964.6
Res Attic Insulation	131.7
Res Basement Wall Insulation	167.9
Res Condensing Boiler	175.4
Res Condensing Storage Water Heater	-
Res DHW Recirculation Systems	-
Res Drain Water Heat Recovery	-
Res Early Hot Water Heater Replacement	-
Res Energy Star Clothes Dryer	-
Res Energy Star Windows	-
Res Floor Insulation	-
Res Furnace Tune Up	-
Res Heat Recovery Ventilator	44.7
Res Heat Recovery Ventilator 0% Baseline	558.3
Res Heat Recovery Ventilator 55% Baseline	278.0
Res High Efficiency Condensing Furnace	-
Res High Efficiency Gas Pool Heater	-
Res Solar Water Preheat (Pools/DHW)	-
Res Tankless Water Heater	-
Res Wall Insulation	344.1
Res Whole Home Building Envelope	1,479.9
Shift Heating Off Peak	877.4

Sector(s)	End Use	Peak Hour Reduction (m3/hr) in 2029
Residential	Washing/Drying Appliances	-
Residential	Misc Residential	-
Residential/Commercial	Space Heating	5,252.7
Residential/Commercial	Cooking	9.2
Residential/Commercial	Water Heating	6.2
Commercial	Misc Commercial	0.0
Industrial	HVAC	1,188.5
Industrial	Process Heating (Water and Steam)	325.1
Industrial	Process Heating (Direct)	92.0
Industrial	Process Cooling	-
Industrial	Other Process	0.5
Industrial	Power and Utility	-

Sector	Customer Type	Peak Hour Reduction (m3/hr) in 2029
Residential	Attached or Row House	257
Residential	Detached House	4,742
Residential	Multi-Res: Low Rise	28
Residential	Total	5,027
Commercial	Food Retail	2
Commercial	Hospital	20
Commercial	Large Office	17
Commercial	Long Term Care	7
Commercial	Other Commercial	32
Commercial	Other Hotel_Motel	10
Commercial	Other Non-Food Retail	5
Commercial	Other Office	60
Commercial	Restaurant	15
Commercial	School	11
Commercial	Warehouse	60
Commercial	Total	241
Industrial	Agriculture	1,212
Industrial	Chemicals Mfg	2
Industrial	Food and Beverage Mfg	26
Industrial	Other Industrial	366
Industrial	Power and Other Utility	-
Industrial	Pulp, Paper, and Wood Products Mfg	1
Industrial	Total	1,606

Year	Incentive Costs	Non Incentive Costs
2023	2,484,039.80	993,632.49
2024	3,451,900.61	1,380,782.62
2025	5,081,612.83	2,032,672.63
2026	5,344,992.65	2,138,030.28
2027	5,388,896.92	2,155,596.99
2028	4,599,532.79	1,839,856.71
2029	3,406,098.13	1,362,468.71
2030	2,355,478.01	942,202.66
2031	1,619,098.26	647,643.84
2032	1,101,252.12	440,505.43
2033	448,176.00	179,274.94
2034	319,164.74	127,670.43
2035	1,046,223.79	418,494.18
2036	911,566.99	364,631.41
2037	808,353.39	323,345.95

Measure Name	Total Incentive Costs (2023-2037)	Total Non-Incentive Costs (2023-2037)
Com Adaptive Thermostats	10,535.66	4,214.26
Com Air Curtains	5,065.84	2,026.33
Com Boilers - Advanced Controls (Steam Systems)	1,620.93	648.37
Com CEE Tier 2/Energy Star Clothes Washers	367.42	146.97
Com Condensing Boiler Std	50,103.28	20,041.31
Com Condensing Make Up Air Unit	18,560.53	7,424.21
Com Condensing Storage Water Heater	-	-
Com Demand Control Kitchen Ventilation	8,923.64	3,569.45
Com Demand Control Ventilation	15,802.87	6,321.15
Com Demand controlled Circulating Systems	132.06	52.82
Com Destratification	177,685.43	71,074.20
Com Dock Door Seals	-	-
Com Drain Water Heat Recovery (DWHR) Retro	48.86	19.55
Com Drain Water Heat Recovery (DWHR) New	19.42	7.77
Com Energy Efficient Laboratory Fume Hood	21,794.16	8,717.67
Com Energy Recovery Ventilation and Ventilation (Enhanced)	58,089.51	23,235.80
Com ENERGY STAR Dishwasher	6,359.83	2,543.93
Com ENERGY STAR Fryer (84% eff)	64,127.52	25,651.01
Com ENERGY STAR Griddle (74% eff)	36,906.75	14,762.70
Com ENERGY STAR Steam Cooker	10,202.19	4,080.88
Com Furnace Tune-Up	17.35	6.94
Com Gas Convection Oven	-	-
Com Gas Fired Heat Pump	78,750.20	31,500.08
Com Gas Fired Rooftop Units	16,763.28	6,705.31
Com Heat Recovery Ventilator	29,803.85	11,921.54
Com High Efficiency Condensing Furnace AFUE 95% from 80% code	-	-
Com High Efficiency Underfired Broilers	9,013.09	3,605.24
Com HOTEL OCCUPANCY CONTROLS (HVAC + LIGHTING)	-	-
Com Ice Rink Heat Recovery	-	-
Com Infrared Heaters	2,932.89	1,173.15
Com Low Flow Pre-Rinse Spray Nozzle	8,142.99	3,257.20
Com Ozone Laundry Treatment	21,612.39	8,644.95
Com Roof Insulation/Ceiling Insulation (R25 Code to R35)	-	-
Com Solar Preheat Make up Air	-	-
Com Solar Water Preheat (Pools/DHW)	1,423.31	569.33
Com Steam System Optimization	-	-
Com Super High Perf Glazing New	894,248.32	357,699.45
Com Super High Perf Glazing RET	1,016,374.70	406,550.03
Com Super-High Efficiency Furnaces (Emerging Tech)	-	-
Com Wall Insulation	12,322.88	4,929.15
Ind Air Compressor Heat Recovery	20,478.64	8,191.46
Ind Boiler Tune Up	-	-
Ind Boiler Upgrade	8,661,582.01	3,464,633.26
Ind Direct Contact Water Heaters	-	-
Ind Gas Turbine Optimization	826.33	330.53
Ind Greenhouse Envelope Improvements	83,944.16	33,577.68
Ind HE HVAC Controls	207,081.02	82,832.42
Ind HE HVAC Units	2,947.16	1,178.86
Ind HE Stock Tank	2,150.38	860.15
Ind High Efficiency Burners	229,375.10	91,750.02
Ind High Efficiency Furnaces	-	-
Ind High Efficiency HVAC Fans (Gas)	681,851.05	272,740.45
Ind Improved Controls -Process Heating Gas	20,991.89	8,396.76
Ind Insulation - Steam	11,723.56	4,689.43
Ind Loading Dock Seals	175,173.71	70,069.49
Ind Process Heat Improvements	523,615.49	209,446.17
Ind Process Heat Recovery (Gas)	101,070.72	40,428.28
Ind Process Optimization (Gas)	897.95	359.18
Ind Recommissioning	2,533,308.20	1,013,323.01
Ind Solar Walls	87,531.20	35,012.49
Ind Steam Leak Repairs	-	-
Ind Steam Trap Repair	11,622.77	4,649.11
Ind Steam Turbine Optimization	968.17	387.27
Ind VAV Conversion Project (Gas)	724,204.35	289,681.53
Ind Ventilation Optimization (Gas)	-	-
Res Adaptive Thermostat	1,125,829.02	450,331.62
Res Air Sealing	2,140,510.55	856,204.24

Measure Name	Total Incentive Costs (2023-2037)	Total Non-Incentive Costs (2023-2037)
Res Attic Insulation	792,364.16	316,945.74
Res Basement Wall Insulation	332,541.74	133,016.66
Res Condensing Boiler	1,625,931.84	650,372.88
Res Condensing Storage Water Heater	-	-
Res DHW Recirculation Systems	-	-
Res Drain Water Heat Recovery	-	-
Res Early Hot Water Heater Replacement	-	-
Res Energy Star Clothes Dryer	-	-
Res Energy Star Windows	-	-
Res Floor Insulation	-	-
Res Furnace Tune Up	-	-
Res Heat Recovery Ventilator	788,066.29	315,226.61
Res Heat Recovery Ventilator 0% Baseline	2,836,325.31	1,134,530.07
Res Heat Recovery Ventilator 55% Baseline	633,976.99	253,590.84
Res High Efficiency Condensing Furnace	-	-
Res High Efficiency Gas Pool Heater	-	-
Res Solar Water Preheat (Pools/DHW)	-	-
Res Tankless Water Heater	-	-
Res Wall Insulation	2,371,865.50	948,745.92
Res Whole Home Building Envelope	8,988,136.35	3,595,252.94
Shift Heating Off Peak	71,744.31	28,953.46

Measure Name	Peak Hour Reduction (m3/hr) in 2029	
	Incentive Spending	Non-Incentive Spending
Com Adaptive Thermostats	-	-
Com Air Curtains	-	-
Com Boilers - Advanced Controls (Steam Systems)	-	-
Com CEE Tier 2/Energy Star Clothes Washers	27.78	11.11
Com Condensing Boiler Std	0.00	0.00
Com Condensing Make Up Air Unit	1,452.80	581.12
Com Condensing Storage Water Heater	-	-
Com Demand Control Kitchen Ventilation	152.43	60.97
Com Demand Control Ventilation	716.77	286.71
Com Demand controlled Circulating Systems	-	-
Com Destratification	1,427.08	570.83
Com Dock Door Seals	-	-
Com Drain Water Heat Recovery (DWHR) Retro	-	-
Com Drain Water Heat Recovery (DWHR) New	1.40	0.56
Com Energy Efficient Laboratory Fume Hood	-	-
Com Energy Recovery Ventilation and Ventilation (Enhanced)	3,645.53	1,458.21
Com ENERGY STAR Dishwasher	274.17	109.67
Com ENERGY STAR Fryer (84% eff)	4,894.73	1,957.89
Com ENERGY STAR Griddle (74% eff)	2,862.21	1,144.88
Com ENERGY STAR Steam Cooker	756.46	302.58
Com Furnace Tune-Up	-	-
Com Gas Convection Oven	-	-
Com Gas Fired Heat Pump	5,869.09	2,347.64
Com Gas Fired Rooftop Units	1,289.32	515.73
Com Heat Recovery Ventilator	1,354.42	541.77
Com High Efficiency Condensing Furnace AFUE 95% from 80% code	-	-
Com High Efficiency Underfired Broilers	664.37	265.75
Com HOTEL OCCUPANCY CONTROLS (HVAC + LIGHTING)	-	-
Com Ice Rink Heat Recovery	-	-
Com Infrared Heaters	236.07	94.43
Com Low Flow Pre-Rinse Spray Nozzle	1,000.69	400.28
Com Ozone Laundry Treatment	411.02	164.41
Com Roof Insulation/Ceiling Insulation (R25 Code to R35)	-	-
Com Solar Water Preheat (Pools/DHW)	111.06	44.43
Com Steam System Optimization	-	-
Com Super High Perf Glazing New	-	-
Com Super High Perf Glazing RET	-	-
Com Super-High Efficiency Furnaces (Emerging Tech)	-	-
Com Wall Insulation	-	-
Ind Air Compressor Heat Recovery	3,612.38	1,444.95
Ind Boiler Tune Up	-	-
Ind Boiler Upgrade	1,315,164.56	526,065.90
Ind Direct Contact Water Heaters	-	-
Ind Gas Turbine Optimization	1.17	0.47
Ind Greenhouse Envelope Improvements	6,003.85	2,401.54
Ind HE HVAC Controls	40,413.23	16,165.29
Ind HE HVAC Units	511.06	204.43
Ind HE Stock Tank	324.87	129.95
Ind High Efficiency Burners	3,811.52	1,524.61
Ind High Efficiency Furnaces	-	-

Measure Name	Peak Hour Reduction (m3/hr) in 2029	
	Incentive Spending	Non-Incentive Spending
Ind High Efficiency HVAC Fans (Gas)	16,430.39	6,572.16
Ind Improved Controls -Process Heating Gas	827.21	330.88
Ind Insulation - Steam	2,328.03	931.21
Ind Loading Dock Seals	34,186.31	13,674.53
Ind Process Heat Improvements	8,797.65	3,519.06
Ind Process Heat Recovery (Gas)	16,967.75	6,787.10
Ind Process Optimization (Gas)	126.64	50.65
Ind Recommissioning	354,825.41	141,930.12
Ind Solar Walls	4,450.08	1,780.03
Ind Steam Leak Repairs	-	-
Ind Steam Trap Repair	483.61	193.44
Ind Steam Turbine Optimization	1.37	0.55
Ind VAV Conversion Project (Gas)	11,604.81	4,641.92
Ind Ventilation Optimization (Gas)	-	-
Res Adaptive Thermostat	90,726.82	36,290.73
Res Air Sealing	49,236.96	19,694.78
Res Attic Insulation	-	-
Res Basement Wall Insulation	2,401.51	960.60
Res Condensing Boiler	122,584.43	49,033.79
Res Condensing Storage Water Heater	-	-
Res DHW Recirculation Systems	-	-
Res Drain Water Heat Recovery	-	-
Res Early Hot Water Heater Replacement	-	-
Res Energy Star Clothes Dryer	-	-
Res Energy Star Windows	-	-
Res Floor Insulation	-	-
Res Furnace Tune Up	-	-
Res Heat Recovery Ventilator	62,038.48	24,815.40
Res Heat Recovery Ventilator 0% Baseline	505,626.24	202,250.47
Res Heat Recovery Ventilator 55% Baseline	123,943.87	49,577.57
Res High Efficiency Condensing Furnace	-	-
Res High Efficiency Gas Pool Heater	-	-
Res Solar Water Preheat (Pools/DHW)	-	-
Res Tankless Water Heater	-	-
Res Wall Insulation	123,874.86	49,549.92
Res Whole Home Building Envelope	469,374.24	187,749.63
Shift Heating Off Peak	8,271.42	3,338.05

Peak Reduction and Cost by Measure Type in 2029			
	Peak Hour Reduction (m3/hr)	Incentive Spending	Non-Incentive Spending
ETEE Measures	5,997	3,397,827	1,359,131
DR Measures	877	8,271	3,338
Total	6,874	3,406,098	1,362,469



Peak Modelling Method

Peak hour outputs in the “Mirror Model” are modelled using this two-step approach (details on each step are provided in the text that follows):

1. End-use based ‘hours-use’ peak factors were developed for each region, sector, segment, and end use.
2. ‘Hours-use’ peak factors are applied to annual volume outputs for each scenario to calculate Peak-hour estimates.

1. Method for developing hours-use peak factors

PG worked with EGI to develop ‘hours-use’ peak factors by following this approach:

- Peak hour values were provided by EGI for each rate-zone region, by sector.
- End-use load shapes were imported from other regions.
- Load shapes for space heating-related end uses were calibrated to align with peak hour target values at the regional level and used to develop hours-use peak factors for use in Step 2. (Load shapes for end uses not related to space heating vary much less from one region to another.)

Peak hour targets

Peak hour values were provided by EGI’s network planning department for each of the legacy EGI and Union Gas rate-zone regions.

Our understanding is these values come from EGI’s hydraulic model, which starts at a very detailed level geographically and rolls up to larger zones and regions.

The peak analysis method being used in this project is a bottom-up approach, but rather than rolling up different regional gate-stations, Navigator is rolling up peak information starting at the end-use level, rolling up into whole buildings, segments, sectors, and regions. If both methods are working correctly, they should match at the top level.

Imported load shapes from other regions

PG worked with a subcontractor who employed an extensive library of load shapes from studies all over North America to identify the shapes that were most suitable for Ontario’s climate and building mix.

Load shape calibration and developing hours-use factors

To calibrate the load shapes, the following steps were undertaken:

- The load shapes for most end-uses were left unchanged from those the subcontractor provided because most do not vary greatly from one jurisdiction to another and are not very sensitive to climate.
- For weather-related end-use load shapes:
 - First, weather-related end-use load shapes were adjusted to include the heating degree baseline that was most suitable for each building type in that region. This approach was used because the heating load varies from one jurisdiction to another.





- Second, we applied factors to the weather-related end-uses to calibrate the peak hour, by region, as closely as we could to the target numbers supplied by EGI.¹

Hours-use factors

The exhibits below present hours-use factors by sector for the base-year:

Exhibit 1 – Residential End-Use Peak Factors

End Uses	Hours-Use	Weightings
Cooking	2,956	1.10%
Misc. Residential	3,578	6.93%
Space Heating	1,895	74.05%
Washing/Drying	24,380	1.70%
Water Heating	3,578	16.21%
Grand Total	2,174	

Exhibit 2 – Commercial End-Use Peak Factors

End Uses	Hours-Use	Weightings
Cooking	6,178	3.68%
Misc. Commercial	4,464	4.59%
Space Heating	1,234	80.15%
Water Heating	5,223	11.58%
Grand Total	1,454	

¹ The calibration factors were limited within reasonable ranges and applied across all sectors at once. Therefore, if the total all-sector peak hour value was too low, the weather-related end-use factors were adjusted for all sectors.





Exhibit 3 – Industrial End-Use Peak Factors

End Uses	Hours-Use	Weightings
HVAC	803	14.42%
Other Process	8,329	6.05%
Power and Utility	3,400	10.14%
Process Cooling	10,397	0.47%
Process Heating (Direct)	7,889	49.31%
Process Heating (Water and Steam)	7,877	19.61%
Transportation	8,760	0.00%
Grand Total	3,284	

2. Applying peak factors

Here is an example of what ‘Hours-Use’ factors represent, referring to the residential end-use peak factors exhibit above.

- Hours-Use factor for Res Space Heating = residential space heating component of peak hour (m3/hour) = annual res space heating volume / 1,895 hours

The weighted average factors in the Grand Total rows in the tables above may seem counterintuitive. It is important to remember that hours-use factors are used as dividing factors; their inverses are used in the calculation of peak loads.



Net Annual m3 savings

	SC B - APS			SC B - Mirror		
	Commercial	Industrial	Residential	Commercial	Industrial	Residential
2022	86,553,572	127,132,889	77,431,303	83,127,292	189,317,536	176,579,624
2023	96,742,273	130,319,904	84,471,575	77,133,602	355,834,405	241,259,042
2024	105,268,386	141,560,289	89,703,318	57,659,996	535,506,982	333,247,483
2025	111,240,289	144,556,417	92,906,928	29,401,812	631,347,963	284,645,694
2026	114,454,049	150,775,613	94,278,263	17,995,893	490,298,446	244,204,443
2027	114,047,422	144,555,879	93,988,964	13,664,256	224,664,139	191,664,643
2028	112,250,324	139,878,486	93,007,533	10,182,987	123,952,791	145,419,496
2029	108,885,777	131,082,389	90,988,593	8,410,176	72,403,605	97,349,181
2030	102,555,434	119,958,393	89,077,626	9,488,715	73,954,184	61,681,308

Paula Claudino

From: Alex Tiessen
Sent: March 30, 2022 8:39 AM
To: Amrit Kuner
Cc: Paula Claudino
Subject: Re: [External] Scoping Document - Leamington Interconnect IRPA

Thanks, that worked!

Alex Tiessen, P.Eng., CMVP, PMP | Principal | 613.219.5312 | tiessen@posteritygroup.ca
POSTERITY GROUP | posteritygroup.ca

On Wed, Mar 30, 2022 at 8:19 AM Amrit Kuner <Amrit.Kuner@enbridge.com> wrote:

Hey Alex,

Sorry about that, I just checked it in – let me know if that worked?

Thanks,

Amrit

From: Alex Tiessen <tiessen@posteritygroup.ca>
Sent: Tuesday, March 29, 2022 7:40 PM
To: Amrit Kuner <Amrit.Kuner@enbridge.com>
Cc: Paula Claudino <paula@posteritygroup.ca>
Subject: Re: [External] Scoping Document - Leamington Interconnect IRPA

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Hi - getting closer I think :) I see the 'PREP Leamington' folder now, but when I go into it, there aren't any files.

Is it possible that you still might need to check it in?

-Alex

Alex Tiessen, P.Eng., CMVP, PMP | Principal | 613.219.5312 | tiessen@posteritygroup.ca
POSTERITY GROUP | posteritygroup.ca

On Tue, Mar 29, 2022 at 5:00 PM Amrit Kuner <Amrit.Kuner@enbridge.com> wrote:

Thanks Alex, I think external access for our sharepoint sites can take a bit of time so I have saved it at the link you provided below, you can access it [here](#).

Hope that works, let me know.

Thanks,

Amrit

From: Alex Tiessen <tiessen@posteritygroup.ca>
Sent: Tuesday, March 29, 2022 3:42 PM
To: Amrit Kuner <Amrit.Kuner@enbridge.com>
Cc: Paula Claudino <paula@posteritygroup.ca>
Subject: Re: [External] Scoping Document - Leamington Interconnect IRPA

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Thanks, Amrit.

Sharepoint has asked why i need access to this data!

I provided the following reason "Project data sent from Project manager".

It is telling me I need to wait for approval now.

Just wanted to give you a heads up.

Another option might be to save it here:

<https://esites.enbridge.com/sites/csd/EGDcarbonstrategy/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2Fsites%2Fcsd%2FEGDcarbonstrategy%2FShared%20Documents%2FEnergy%20Transition%2FScenario%20Planning%2FPosterity%20Related%20Documents%2FIRPA%20Files&FolderCTID=0x01200000C75F39DB208D429152E471DD291A79&View=%7B3AEF3AE7%2DE532%2D422E%2DBB47%2D81BC19FC8792%7D>

Presumably, we could access it right away if it was located here.

-Alex

Alex Tiessen, P.Eng., CMVP, PMP | Principal | 613.219.5312 | tiessen@posteritygroup.ca
POSTERITY GROUP | posteritygroup.ca

On Tue, Mar 29, 2022 at 1:41 PM Amrit Kuner <Amrit.Kuner@enbridge.com> wrote:

Hi Alex,

Please proceed with this work, we are just sorting out the PO on our end so you should see that shortly. Here is a link to the existing customer data set for Leamington: [Customer Extract - Leamington](#)

2020 and 2021 annual consumption has been added in as well but please note that these values are not weather normalized.

I am still waiting on a couple details for the growth forecast so I will send that over once I get it.

Thanks,

Amrit

From: Alex Tiessen <tiessen@posteritygroup.ca>
Sent: Tuesday, March 22, 2022 6:02 PM
To: Amrit Kuner <Amrit.Kuner@enbridge.com>
Cc: Chris Ripley <CRipley@uniongas.com>; Paula Claudino <paula@posteritygroup.ca>
Subject: Re: [External] Scoping Document - Leamington Interconnect IRPA

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Hi Amrit,

Per our discussion this morning, if you can provide written authorization to proceed, we are happy to begin the work while we await the PO.

I'll keep an eye out for a link to the customer dataset - once you have it posted to sharepoint.

-Alex

Alex Tiessen, P.Eng., CMVP, PMP | Principal | 613.219.5312 | tiessen@posteritygroup.ca
POSTERITY GROUP | posteritygroup.ca

On Tue, Mar 15, 2022 at 9:23 AM Amrit Kuner <Amrit.Kuner@enbridge.com> wrote:

Thanks Alex, I have submitted this in for a PO so hopefully you will see that come through shortly.

For the Wheatley costs, once you send me an invoice for the work completed I can get that processed.

Thanks,

Amrit

From: Alex Tiessen <tiessen@posteritygroup.ca>
Sent: Tuesday, March 8, 2022 12:48 PM
To: Amrit Kuner <Amrit.Kuner@enbridge.com>
Cc: Erika Aruja <aruja@posteritygroup.ca>; Chris Ripley <CRipley@uniongas.com>
Subject: Re: [External] Scoping Document - Leamington Interconnect IRPA

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Hi Amrit,

I have attached an updated scoping document where I have made edits to address your comments.

- Can we be more clear that the IRPA being assessed is ETEE?

Language updated in scoping document to be more specific. I have mentioned ETEE and DR

- Can the peak hour reduction be provided by customer type as well?

Yes, I have updated to reflect this.

- Can the peak reduction and associated cost be shown for both ETEE and Demand Response combined and separately?

Yes, I have updated to reflect this.

- For the normalized annual volume by customer, is there a preferred year that would make the most sense to use?

We don't have a preferred year because we end up calibrating the baseyear to align with the normalized actuals provided by EGI. Then Yr 1 of peak reduction potential = Year provided + 1. It likely makes sense for EGI to select the most recent calendar year for which it has a complete set of normalized annual volume data.

-Alex

Alex Tiessen, P.Eng., CMVP, PMP | Principal | 613.219.5312 | tiessen@posteritygroup.ca
POSTERITY GROUP | posteritygroup.ca

On Tue, Mar 8, 2022 at 10:17 AM Amrit Kuner <Amrit.Kuner@enbridge.com> wrote:

Hi Alex,

Just a couple comments on this scoping document:

- Can we be more clear that the IRPA being assessed is ETEE?
- Can the peak hour reduction be provided by customer type as well?
- Can the peak reduction and associated cost be shown for both ETEE and Demand Response combined and separately?
- For the normalized annual volume by customer, is there a preferred year that would make the most sense to use?

I am meeting with our System Planning team this week to discuss approach on data pulls so I will send you that info as soon as I can and I am currently working on getting that PO set-up.

Thanks,

Amrit

From: Alex Tiessen <tiessen@posteritygroup.ca>

Sent: Thursday, March 3, 2022 2:10 PM

To: Amrit Kuner <Amrit.Kuner@enbridge.com>

Cc: Erika Aruja <aruja@posteritygroup.ca>

Subject: [External] Scoping Document - Leamington Interconnect IRPA

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This email originated from outside Enbridge and could be a phish. Criminals can pretend to be anyone. Do not interact with the email unless you are 100% certain it is legitimate. Report any suspicious emails.

Hi Amrit,

During our call on Tuesday we discussed the need for IRPA analysis on the Leamington Interconnect project.

I have attached a scoping document that presents details on approach, timing, level-of-effort and budget for the Leamington IRPA. The last section of the scoping document includes a checklist of information we will need for these types of assignments moving forward.

Please let me know if you have any questions, or would like to discuss revisions.

-Alex

Alex Tiessen, P.Eng., CMVP, PMP | Principal | 613.219.5312 | tiessen@posteritygroup.ca
POSTERITY GROUP | posteritygroup.ca

Paula Claudino

From: Amrit Kuner <Amrit.Kuner@enbridge.com>
Sent: April 18, 2022 10:42 AM
To: Julian Nappert
Cc: Paula Claudino; Alex Tiessen; Whitney Wong
Subject: RE: [External] Leamington Interconnect IRPA dataset

Hi Julian,

I think we can stick with just showing the customers that the ETEE program is being applied to, i.e. general service so Option 1. However, in the memo we should be clear that the driver for this project is growth, mainly on the contract side so the reference case will show growth.

I hope that makes sense, we can have a quick chat about it this week in more detail if you would like.

Thanks,
Amrit

From: Julian Nappert <nappert@posteritygroup.ca>
Sent: Wednesday, April 13, 2022 4:01 PM
To: Amrit Kuner <Amrit.Kuner@enbridge.com>
Cc: Paula Claudino <paula@posteritygroup.ca>; Alex Tiessen <tiessen@posteritygroup.ca>
Subject: Re: [External] Leamington Interconnect IRPA dataset

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Hi Amrit,

We had previously said that we did not need the contract customer data for our analysis but now that we are going through the data, we realize that it may actually be required. This depends how Enbridge wants to position the outputs:

1. Is Enbridge looking to show just the customers where the ETEE program is being applied, in which case we would not need the contract customer data and would ignore the contract customer growth rate?
2. Or does Enbridge want to show the entire picture including the contract customers (we can exclude DSM on these customers and just show their growth over the years)?

If it is the second option, we would need the weather normalized data for the contract customers (with their rate classes) in the same format as the overall dataset. Let me know what you think. I'm also happy to jump on a call to clarify anything if need be.

Cheers,

Julian

On Mon, Apr 4, 2022 at 2:37 PM Amrit Kuner <Amrit.Kuner@enbridge.com> wrote:

Hi Paula,

Please see my responses below. I will try to get as much of this information as possible by the end of this week.

Thanks,

Amrit

From: Paula Claudino <paula@posteritygroup.ca>
Sent: Friday, April 1, 2022 12:57 PM
To: Amrit Kuner <Amrit.Kuner@enbridge.com>
Cc: Alex Tiessen <tiessen@posteritygroup.ca>; Julian Nappert <nappert@posteritygroup.ca>
Subject: [External] Leamington Interconnect IRPA dataset

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Hello Amrit,

Thank you for providing the dataset for the Leamington Interconnect IRPA. Now that we have had a chance to take a look, we have a few questions/requests:

1. You noted that the 2020 and 2021 annual consumption figures are not weather normalized. Would it be possible to receive the weather normalized version?

Working on this request with another team at EGI, will share this information shortly

2. This dataset is missing the "rate number" column, which we need in order to map customers to rate classes in the model. Can you please provide an updated dataset that includes this column?

Thanks for flagging this, I will get the spreadsheet updated.

3. Are there any hourly peak reduction target(s) and timelines associated with peak reduction targets (e.g., Are there milestone years that are important?) that we should be aware of?

I will confirm this with our System Planning teams.

4. Are there any customers included in this dataset that should be excluded from IRPAs?

For now, do not exclude any customers.

5. When can we expect to receive the updated growth rates?

We are just finalizing the contract growth piece, I will share hopefully this week.

We are also awaiting direction for the following two items in order to prepare appropriate proposals:

For the 2 items below, I have another internal meeting on Thursday which will help determine the direction on them so I will be in touch on this items later this week/early next week.

1. Support for asset management plan screening
2. Support for non-specific IRPA projects. I believe you mentioned you would have a discussion with internal folks this week to develop a list of priorities.

Thanks,

Paula

--

Paula Claudino, P.Eng., M.ASc | Senior Consultant | 613.608.8000 | paula@posteritygroup.ca

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--

Julian Nappert | Consultant

613-850-5915 | http://secure-web.cisco.com/1rYAV9dI9FIhhRZCETQpww4zW-FoKDC0GWrZwEqQVT_Nx1sNPUhW4eDtG9bISk0RcWRkBgYB4g8l1J7mzY4lZ9r63fvFEFDXTwN_CsbPVqafQYyeYc7iS4mM81SbJaKliEgYgl5TXRqd2JJAZRc0V3RitRtrXd8le-MYNdBXOoJkfVzzLZm7mDbf5zhc-cic5pARCu9YPv7eCFWQ0eg6vSZzvKCL4XDJ-nikMfyCzkDN7j5NC3BFSsz5s4-5HMcZn0_0gMGjfAHnIdY_guQG2Z6FtkP7BQViGutPOJqxOHJlbdrahU-DkZ7KiQM6QTDzu/http%3A%2F%2Fwww.posteritygroup.ca



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Paula Claudino

From: Amrit Kuner <Amrit.Kuner@enbridge.com>
Sent: May 11, 2022 2:21 PM
To: Paula Claudino
Subject: RE: [External] Leamington IRP analysis memos

Sounds good, thanks Paula!

From: Paula Claudino <paula@posteritygroup.ca>
Sent: Wednesday, May 11, 2022 2:17 PM
To: Amrit Kuner <Amrit.Kuner@enbridge.com>
Cc: Julian Nappert <nappert@posteritygroup.ca>; Alex Tiessen <tiessen@posteritygroup.ca>; Chris Ripley <CRipley@uniongas.com>; Geoff Chung <Geoff.Chung@enbridge.com>
Subject: Re: [External] Leamington IRP analysis memos

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Hi Amrit,

We will send you our responses, updated memos, and updated results later today. We will be meeting shortly to go over a couple of final items and will send everything over shortly thereafter.

Thanks,
Paula

On Wed, May 11, 2022 at 12:22 PM Amrit Kuner <Amrit.Kuner@enbridge.com> wrote:

Hi Paula,

Just wanted to follow-up on this, when can we expect to get this back?

Thanks!

Amrit

From: Paula Claudino <paula@posteritygroup.ca>
Sent: Friday, May 6, 2022 3:14 PM
To: Amrit Kuner <Amrit.Kuner@enbridge.com>
Cc: Julian Nappert <nappert@posteritygroup.ca>; Alex Tiessen <tiessen@posteritygroup.ca>; Chris Ripley <CRipley@uniongas.com>; Geoff Chung <Geoff.Chung@enbridge.com>
Subject: Re: [External] Leamington IRP analysis memos

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Hi Amrit,

Thank you for providing these additional questions. We are still working through responses to a couple of the questions, so we will get back to you with our full response by early next week.

Have a nice weekend,

Paula

On Wed, May 4, 2022 at 4:43 PM Amrit Kuner <Amrit.Kuner@enbridge.com> wrote:

Thanks Paula, a couple additional questions from our DSM team on these memos:

- Approach Memo
 - What is the residential demand response measure? I don't see it in the excel file
 - What are the hours-use peak factors by region and segment? I have only seen the Sept 2020 memo with the 14 factors by sector and end use
 - When reviewing the approach, how as the data we provided used? Isolating for residential:
 - the 2021 residential Leamington Consumption is ~38.6M m3 in the table of the Approach memo,
 - the weather normalized 2021 consumption for residential based on USERDATA2 in the data file EGI provided (~37.5M m3),
 - The Posterity Excel data file has residential consumption for 2019 of 38.9M m3; 2021 of 35.4M m3; 2023 of 37.7M m3
 - All the values are close but not close enough to understand the flow
- Results Memo
 - Confirmation that the reduction costs are shown as net cost amounts? (I think it should be gross costs, but not sure what NTG conversion should be used)
 - There is no mention of the starting year of when the ETEE would start? The data file shows that it starts in 2023

If you think it might be easier to have a quick meeting about this, let me know.

Thanks,

Amrit

From: Paula Claudino <paula@posteritygroup.ca>
Sent: Wednesday, May 4, 2022 3:50 PM
To: Amrit Kuner <Amrit.Kuner@enbridge.com>
Cc: Julian Nappert <nappert@posteritygroup.ca>; Alex Tiessen <tiessen@posteritygroup.ca>; Chris Ripley <CRipley@uniongas.com>; Geoff Chung <Geoff.Chung@enbridge.com>
Subject: Re: [External] Leamington IRP analysis memos

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Hi Amrit,

Thanks for providing your comments. We should be able to respond by the end of the week.

We confirm it would be fine for these documents to be filed as part of the regulatory proceeding for this project with the caveat that the method document is not comprehensive, as it was written for an internal audience and might raise questions. We would not have any issue with the scoping document also being filed, if necessary.

Best regards,

Paula

On Tue, May 3, 2022 at 1:23 PM Amrit Kuner <Amrit.Kuner@enbridge.com> wrote:

Hi Paula,

Attached are my comments, I didn't have too many comments but I did want to understand the reference case numbers a bit more. For any customers that have no consumption in 2021, we can remove them from the analysis. And thanks for flagging the conservation target vs. the total forecasted demand – since this area has a significant amount of contract demand and growth, that is not surprising.

Also I wanted to confirm – were both of these documents developed assuming that they could be filed as part of the regulatory proceeding for this project? We likely would file the results memo in evidence but may be asked for the methodology during IRs. Similarly, we may be asked for the scoping document during IRs as well.

Please let me know if you would like to chat about this more, thanks.

Amrit

From: Paula Claudino <paula@posteritygroup.ca>
Sent: Tuesday, April 26, 2022 1:28 PM
To: Amrit Kuner <Amrit.Kuner@enbridge.com>
Cc: Julian Nappert <nappert@posteritygroup.ca>; Alex Tiessen <tiessen@posteritygroup.ca>
Subject: [External] Leamington IRP analysis memos

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Hello Amrit,

Attached is our first draft of the results and approach memos for the Leamington IRP analysis. Alex will provide a link to the supporting MS Excel file shortly.

We would like to flag a couple of issues:

- In the dataset provided, there are customers with no consumption that have peak demand
- The conservation target you mentioned (105,544 m3/hr by W29/30) is greater than the total forecasted demand of the customers included in our analysis (approximately 88,000 m3/hr by W29/30).

Best regards,

Paula

--

Paula Claudino, P.Eng., M.ASc | Senior Consultant | [613.608.8000](tel:613.608.8000) | paula@posteritygroup.ca

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Paula Claudino

From: Geoff Chung <Geoff.Chung@enbridge.com>
Sent: May 26, 2022 9:28 AM
To: Whitney Wong; Alex Tiessen; Julian Nappert
Cc: Paula Claudino; Amrit Kuner; Chris Ripley; Kurtis Lubbers
Subject: RE: [External] Leamington IRP analysis memos - responses to questions and updated memos

Just another comment to potentially add a footnote indicating that the costs presented in the results memo also do not include fixed portfolio overhead costs (based on my understanding).

Thanks,
 Geoff

From: Whitney Wong <Whitney.Wong@enbridge.com>
Sent: Wednesday, May 25, 2022 5:16 PM
To: Alex Tiessen <tiessen@posteritygroup.ca>; Julian Nappert <nappert@posteritygroup.ca>
Cc: Paula Claudino <paula@posteritygroup.ca>; Amrit Kuner <Amrit.Kuner@enbridge.com>; Chris Ripley <CRipley@uniongas.com>; Geoff Chung <Geoff.Chung@enbridge.com>; Kurtis Lubbers <Kurtis.Lubbers@enbridge.com>
Subject: RE: [External] Leamington IRP analysis memos - responses to questions and updated memos

Thanks Alex & Julian for the quick turnaround in making the updates!

Just a few more (hopefully minor) requests:

- To confirm, are the peak hour reduction and costs presented as net values? Can the modeled results be updated to gross values by applying a blanket 75% NTG conversion factor, and if that could that stated somewhere as a high level assumption. For the purposes of assessing the technical potential, providing the gross values would be more illustrative. But since there was no NTG conversion factor specified in the original APS, we're suggesting a general blanket conversion for now.
- With regards to the growth demand in 2029, the 71,600m3/hr still seems higher than what was forecasted. Looking at the General Service Growth, we should only be taking into account the growth between 2021 to 2029 – which would be ~1572m3/hr. Since the customer extract was pulled fairly recently, any growth before 2021 that would have already been captured in the existing customer extract.

General Service Growth														
*Based on 2018 FBP for Leamington, Kingsville and Wheatley														
GENERAL SERVICE GROWTH COUNTS*														
Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
RESIDENTIAL	181	112	112	112	112	112	112	112	112	112	112	112	112	112
COMMERCIAL	15	15	15	15	15	15	15	15	15	15	15	15	15	15
INDUSTRIAL	2	0	0	0	0	0	0	0	0	0	0	0	0	0
			Residential	109	109	109	109	109	109	109	109	109	109	978
			Commercial	66	66	66	66	66	66	66	66	66	66	594
														Total Growth (2021-2029) 1571.76 m3/
Peak Load Assumptions Per Customer														
Customer Type	Peak Load (m3/hr)													
Residential	0.97													
Commercial	4.4													

Let me know if you require any additional details!

Thanks,

Whitney Wong

C: 437.234.1293

From: Alex Tiessen <tiessen@posteritygroup.ca>
Sent: Wednesday, May 25, 2022 1:48 PM
To: Julian Nappert <nappert@posteritygroup.ca>
Cc: Whitney Wong <Whitney.Wong@enbridge.com>; Paula Claudino <paula@posteritygroup.ca>; Amrit Kuner <Amrit.Kuner@enbridge.com>; Chris Ripley <CRipley@uniongas.com>; Geoff Chung <Geoff.Chung@enbridge.com>; Kurtis Lubbers <Kurtis.Lubbers@enbridge.com>
Subject: Re: [External] Leamington IRP analysis memos - responses to questions and updated memos

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The accompanying excel output file is located here:

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Alex Tiessen, P.Eng., CMVP, PMP | Principal | 613.219.5312 | tiessen@posteritygroup.ca
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On Wed, May 25, 2022 at 12:56 PM Julian Nappert <nappert@posteritygroup.ca> wrote:

Hi Whitney,

I have attached the two updated memos to reflect the comments brought forward last week. Alex will provide the link to the supporting MS Excel file shortly.

We were able to calibrate the peak hourly load in the model to match the existing 2021 peak hourly load and have updated the new customers' peak hourly volumes to match those provided in the growth rate data. This has been added to the Approach Memo and the updated findings are reflected in the Results Memo (where the findings for 2037 have also been removed).

Please let us know if you have any further questions or comments!

Cheers,

Julian

On Tue, May 24, 2022 at 9:20 AM Whitney Wong <Whitney.Wong@enbridge.com> wrote:

Hi Paula,

That's understandable and appreciate you working within the tight timelines. Please do track the additional time spent on this request, we can sort out the payment for that afterwards.

With regards to question 2, it would be the intent that all new customers/growth have the same hourly volumes applied (0.97m³/hr for RES and 4.4m³/hr for COM) over the entire reference period. That would help align with our internal modelling assumptions for growth.

Let me know if you have any additional questions/clarifications!

Thanks,

Whitney

-----Original Message-----

From: Paula Claudino <paula@posteritygroup.ca>

Sent: Thursday, May 19, 2022 5:25 PM

To: Whitney Wong <Whitney.Wong@enbridge.com>

Cc: Julian Nappert <nappert@posteritygroup.ca>; Alex Tiessen <tiessen@posteritygroup.ca>; Amrit Kuner <Amrit.Kuner@enbridge.com>; Chris Ripley <CRipley@uniongas.com>; Geoff Chung <Geoff.Chung@enbridge.com>; Kurtis Lubbers <Kurtis.Lubbers@enbridge.com>

Subject: Re: [External] Leamington IRP analysis memos - responses to questions and updated memos

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Hi Whitney,

We should be able to make these changes but they represent a scope change as this approach differs from the approach we agreed to and it will take us extra time compared to our budget to make these changes to the model.

We will track our time spent modifying the model separately and we request that we be approved to bill hourly for this additional time spent. We will do our best to meet your deadline but it will be difficult due to vacation schedules around the long weekend.

We will be able to calibrate the model to peak hourly load rather than to annual consumption but we are not yet sure if we can use Enbridge's assumed hourly volumes for RES and COM for new accounts. Would the intent be that all new customers have the same hourly volumes (0.97 m³/hr for RES and 4.4 m³/hr for COM) over the entire reference period?

We can certainly edit the memo to only include data up to 2029/2030.

If you can provide further guidance on what you mean in your second question (i.e. do you want all new customers to have hourly volumes of

0.97 m³/hr for RES and 4.4 m³/hr for COM over the entire reference period?), we can work to update the model accordingly tomorrow and try to have the updated memo ready for you by next week.

Thanks,

Paula

On Thu, May 19, 2022 at 12:24 PM Whitney Wong <Whitney.Wong@enbridge.com> wrote:

>

> Hi Paula,

>

>

>

> Thanks for providing the updated files. We did have a few additional comments with regards to the memos. We're hoping to address some of the differences in the modelling inputs to better align Posterity's reference demand forecast with our model outputs.

>

- >
- >
- > For the peak hourly load in the 2021 reference case, would it be
- > possible to use the existing peak hourly loads to calibrate the
- > Posterity model instead of calibrating to annual consumption? (i.e.
- > align to the ~67,000m³/hr from the spreadsheet)
- >
- >
- >
- > For the expected peak hourly load, instead of using the average peak demand from existing accounts, can Enbridge's assumed hourly volumes of 0.97 m³/hr for RES and 4.4 m³/hr for COM be applied instead?
- >
- >
- >
- > The forecast for our Leamington filing only goes up to 2029/2030, can we remove the forecasted 2037 peak hour reduction (in Section 1) and provide the 2029 growth forecast in Section 3 instead of the 2037 (i.e. the 94,000m³/hr in 2037)?
- >
- >
- >
- > Unfortunately we are on somewhat tight timelines with this, and hoping to have a finalized memo by mid next week (May 25th). Can you let us know if it any/all of the above updates could be accommodated within this timeframe?
- >
- >
- >
- > Let me know if you require any additional clarifications or would like to set up a quick call to discuss!
- >
- >

>

> Thanks,

>

>

>

> Whitney Wong | P.ENG

> ADVISOR, INTEGRATED RESOURCE PLANNING

>

> ENERGY TRANSITION PLANNING

>

> C: 437.234.1293

>

>

>

> From: Paula Claudino <paula@posteritygroup.ca>

> Sent: Wednesday, May 11, 2022 3:28 PM

> To: Amrit Kuner <Amrit.Kuner@enbridge.com>

> Cc: Julian Nappert <nappert@posteritygroup.ca>; Alex Tiessen

> <tiessen@posteritygroup.ca>

> Subject: [External] Leamington IRP analysis memos - responses to

> questions and updated memos

>

>

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>

> Hello Amrit,

>

>

>

> Attached are our updated drafts of the results and approach memos as well as a question tracker, which includes answers to each of your questions. Alex will provide a link to the supporting MS Excel file shortly.

>

>

>

> Please note both the reference case and estimated savings figures have changed since the first draft as we made several changes to the model to address a couple of your questions. These changes include:

>

> - We removed the years 2019 and 2020 to prevent any further confusion

>

> - We added in the missing residential demand response measure, which

> had been accidentally omitted from the first version

>

> - We adjusted the measure implementation timing so that all measures

> begin to be applied in 2023

>

> - We accounted for a missing set of accounts in the industrial sub

> sector, which had been missed earlier

>

>

>

> We would be happy to answer any further questions you may have or discuss any of the answers we have already provided.

>

>

>

> Thanks,

>

> Paula

> --

>

> Paula Claudino, P.Eng., M.ASc | Senior Consultant | 613.608.8000 |

> paula@posteritygroup.ca

>

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--

Julian Nappert | Consultant

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Paula Claudino

From: Whitney Wong <Whitney.Wong@enbridge.com>
Sent: May 27, 2022 5:23 PM
To: Julian Nappert
Cc: Paula Claudino; Alex Tiessen
Subject: RE: [External] Leamington IRP analysis memos - responses to questions and updated memos

Thanks Julian - really appreciate the quick turnaround! I've circulated it once more internally and hoping we can close the books on this one.

For my own understanding as I'm still getting up to speed with the APS and everything - the NTG factor was only applied to the costs, would that imply that the peak hour savings are already considered gross values?

Thanks & hope you all have a great weekend!

Whitney

From: Julian Nappert <nappert@posteritygroup.ca>
Sent: Friday, May 27, 2022 3:14 PM
To: Whitney Wong <Whitney.Wong@enbridge.com>
Cc: Paula Claudino <paula@posteritygroup.ca>; Kurtis Lubbers <Kurtis.Lubbers@enbridge.com>; Geoff Chung <Geoff.Chung@enbridge.com>; Chris Ripley <CRipley@uniongas.com>; Alex Tiessen <tiessen@posteritygroup.ca>
Subject: Re: [External] Leamington IRP analysis memos - responses to questions and updated memos

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Hi Whitney,

We have updated the Results Memo to reflect the change to gross costs using the 75% NTG factor provided by EGI. The forecasted growth demand for 2029 has been left as is in the Results Memo but a note on the effect of the 2% demolition rate and the increasing industrial sector energy usage has been added to the Approach Memo in case it needs to be referenced. As we have not updated any of the underlying results in the supporting MS Excel file, the previous link Alex sent out is still the most up to date version.

Please let us know if anything else comes up from this new update. Enjoy your weekend!

Cheers,

Julian

On Fri, May 27, 2022 at 1:29 PM Whitney Wong <Whitney.Wong@enbridge.com> wrote:

Hi Paula,

We've decided on just updating the memo to reflect gross peak hour reduction and costs instead of net, using an assumed 75% blanket NTG factor. And some corresponding wording/footnote that the costs do not include fixed portfolio overhead costs.

With regards to the forecasted growth demand in 2029, we can leave that as is. Thinking we can document those assumptions separately and not in the memo (i.e. 2% demolition rate and inc industrial energy usage); just to be prepared in case we get any questions around that value.

Would it be possible to get the memo updated by Monday latest?

Thanks!

Whitney Wong

C: 437.234.1293

From: Whitney Wong
Sent: Thursday, May 26, 2022 4:20 PM
To: Paula Claudino <paula@posteritygroup.ca>
Cc: Julian Nappert <nappert@posteritygroup.ca>; Kurtis Lubbers <Kurtis.Lubbers@enbridge.com>
Subject: RE: [External] Leamington IRP analysis memos - responses to questions and updated memos

Hi Paula,

Just wanted to drop you a note - we are still discussing what to do with the forecasted demand. Hoping we can confirm and get back to you by late tomorrow morning.

I'll also find out if we can push out the deadline for this memo to Monday to help accommodate for all these last minute requests.

Thanks!

Whitney Wong

C: 437.234.1293

From: Paula Claudino <paula@posteritygroup.ca>
Sent: Thursday, May 26, 2022 11:38 AM
To: Whitney Wong <Whitney.Wong@enbridge.com>
Subject: Re: [External] Leamington IRP analysis memos - responses to questions and updated memos

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Would 12:30 work? I think we only need about 10-15 minutes.

On Thu, May 26, 2022 at 11:25 AM Whitney Wong <Whitney.Wong@enbridge.com> wrote:

Hi Paula, sorry I had to step out of the office for a bit this morning. I'm free anytime today, except 2-3pm.

Let me know what time works best for you. I can set up a quick meeting and loop in Geoff and Kurtis if their calendars allow.

Thanks,

Whitney Wong

C: 437.234.1293

From: Paula Claudino <paula@posteritygroup.ca>
Sent: Thursday, May 26, 2022 9:34 AM
To: Whitney Wong <Whitney.Wong@enbridge.com>
Cc: Alex Tiessen <tiessen@posteritygroup.ca>; Julian Nappert <nappert@posteritygroup.ca>; Amrit Kuner <Amrit.Kuner@enbridge.com>; Chris Ripley <CRipley@uniongas.com>; Geoff Chung <Geoff.Chung@enbridge.com>;

Kurtis Lubbers <Kurtis.Lubbers@enbridge.com>

Subject: Re: [External] Leamington IRP analysis memos - responses to questions and updated memos

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Hi Whitney,

I think it would be best if we have a quick call to discuss the results. Will you be free to chat this morning at 11am?

Thanks,

Paula

On Wed, May 25, 2022 at 5:16 PM Whitney Wong <Whitney.Wong@enbridge.com> wrote:

Thanks Alex & Julian for the quick turnaround in making the updates!

Just a few more (hopefully minor) requests:

- To confirm, are the peak hour reduction and costs presented as net values? Can the modeled results be updated to gross values by applying a blanket 75% NTG conversion factor, and if that could that stated somewhere as a high level assumption. For the purposes of assessing the technical potential, providing the gross values would be more illustrative. But since there was no NTG conversion factor specified in the original APS, we're suggesting a general blanket conversion for now.
- With regards to the growth demand in 2029, the 71,600m³/hr still seems higher than what was forecasted. Looking at the General Service Growth, we should only be taking into account the growth between 2021 to 2029 – which would be ~1572m³/hr. Since the customer extract was pulled fairly recently, any growth before 2021 that would have already been captured in the existing customer extract.

General Service Growth													
*Based on 2018 FBP for Leamington, Kingsville and Wheatley													
GENERAL SERVICE GROWTH COUNTS*													
Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
RESIDENTIAL	181	112	112	112	112	112	112	112	112	112	112	112	112
COMMERCIAL	15	15	15	15	15	15	15	15	15	15	15	15	15
INDUSTRIAL	2	0	0	0	0	0	0	0	0	0	0	0	0
			Residential	109	109	109	109	109	109	109	109	109	978
			Commercial	66	66	66	66	66	66	66	66	66	594
													Total Growth (2021-2029) 1571.76
Peak Load Assumptions Per Customer													
Customer Type	Peak Load (m3/hr)												
Residential	0.97												
Commercial	4.4												

Let me know if you require any additional details!

Thanks,

Whitney Wong

C: 437.234.1293

From: Alex Tiessen <tiessen@posteritygroup.ca>
Sent: Wednesday, May 25, 2022 1:48 PM
To: Julian Nappert <nappert@posteritygroup.ca>
Cc: Whitney Wong <Whitney.Wong@enbridge.com>; Paula Claudino <paula@posteritygroup.ca>; Amrit Kuner <Amrit.Kuner@enbridge.com>; Chris Ripley <CRipley@uniongas.com>; Geoff Chung <Geoff.Chung@enbridge.com>; Kurtis Lubbers <Kurtis.Lubbers@enbridge.com>
Subject: Re: [External] Leamington IRP analysis memos - responses to questions and updated memos

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The accompanying excel output file is located here:

<https://esites.enbridge.com/sites/csd/EGDcarbonstrategy/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2Fsites%2Fcsd%2FEGDcarbonstrategy%2FShared%20Documents%2Fenergy%20Transition%2Fscenario%20Planning%2Fposterity%20Related%20Documents%2FIRPA%20Files%2FPREP%20Leamington&FolderCTID=0x01200000C75F39DB208D429152E471DD291A79&view=%7B3AEF3AE7%2DE532%2D422E%2DBB47%2D81BC19FC8792%7D&InitialTabId=Ribbon%2ERead&VisibilityContext=WSSTabPersistence#InplviewHash3aef3ae7-e532-422e-bb47-81bc19fc8792=RootFolder%3D%252Fsites%252Fcsd%252FEGDcarbonstrategy%252FShared%2520Documents%252Fenergy%252>

[OTransition%252FScenario%2520Planning%252FPosterity%2520Related%2520Documents%252FIRPA%2520Files%252FPREP%2520Leamington](#)

Alex Tiessen, P.Eng., CMVP, PMP | Principal | 613.219.5312 | tiessen@posteritygroup.ca
POSTERITY GROUP | posteritygroup.ca

On Wed, May 25, 2022 at 12:56 PM Julian Nappert <nappert@posteritygroup.ca> wrote:

Hi Whitney,

I have attached the two updated memos to reflect the comments brought forward last week. Alex will provide the link to the supporting MS Excel file shortly.

We were able to calibrate the peak hourly load in the model to match the existing 2021 peak hourly load and have updated the new customers' peak hourly volumes to match those provided in the growth rate data. This has been added to the Approach Memo and the updated findings are reflected in the Results Memo (where the findings for 2037 have also been removed).

Please let us know if you have any further questions or comments!

Cheers,

Julian

On Tue, May 24, 2022 at 9:20 AM Whitney Wong <Whitney.Wong@enbridge.com> wrote:

Hi Paula,

That's understandable and appreciate you working within the tight timelines. Please do track the additional time spent on this request, we can sort out the payment for that afterwards.

With regards to question 2, it would be the intent that all new customers/growth have the same hourly volumes applied (0.97m³/hr for RES and 4.4m³/hr for COM) over the entire reference period. That would help align with our internal modelling assumptions for growth.

Let me know if you have any additional questions/clarifications!

Thanks,

Whitney

-----Original Message-----

From: Paula Claudino <paula@posteritygroup.ca>

Sent: Thursday, May 19, 2022 5:25 PM

To: Whitney Wong <Whitney.Wong@enbridge.com>

Cc: Julian Nappert <nappert@posteritygroup.ca>; Alex Tiessen <tiessen@posteritygroup.ca>; Amrit Kuner <Amrit.Kuner@enbridge.com>; Chris Ripley <CRipley@uniongas.com>; Geoff Chung <Geoff.Chung@enbridge.com>; Kurtis Lubbers <Kurtis.Lubbers@enbridge.com>

Subject: Re: [External] Leamington IRP analysis memos - responses to questions and updated memos

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Hi Whitney,

We should be able to make these changes but they represent a scope change as this approach differs from the approach we agreed to and it will take us extra time compared to our budget to make these changes to the model. We will track our time spent modifying the model separately and we request that we be approved to bill hourly for this additional time spent. We will do our best to meet your deadline but it will be difficult due to vacation schedules around the long weekend.

We will be able to calibrate the model to peak hourly load rather than to annual consumption but we are not yet sure if we can use Enbridge's assumed hourly volumes for RES and COM for new accounts. Would the intent be that all new customers have the same hourly volumes (0.97 m3/hr for RES and 4.4 m3/hr for COM) over the entire reference period?

We can certainly edit the memo to only include data up to 2029/2030.

If you can provide further guidance on what you mean in your second question (i.e. do you want all new customers to have hourly volumes of

0.97 m3/hr for RES and 4.4 m3/hr for COM over the entire reference period?), we can work to update the model accordingly tomorrow and try to have the updated memo ready for you by next week.

Thanks,

Paula

On Thu, May 19, 2022 at 12:24 PM Whitney Wong <Whitney.Wong@enbridge.com> wrote:

>

> Hi Paula,

>

>

>

> Thanks for providing the updated files. We did have a few additional comments with regards to the memos. We're hoping to address some of the differences in the modelling inputs to better align Posterity's reference demand forecast with our model outputs.

>

>

>

> For the peak hourly load in the 2021 reference case, would it be

- > possible to use the existing peak hourly loads to calibrate the
- > Posterity model instead of calibrating to annual consumption? (i.e.
- > align to the ~67,000m³/hr from the spreadsheet)
- >
- >
- >
- > For the expected peak hourly load, instead of using the average peak demand from existing accounts, can Enbridge's assumed hourly volumes of 0.97 m³/hr for RES and 4.4 m³/hr for COM be applied instead?
- >
- >
- >
- > The forecast for our Leamington filing only goes up to 2029/2030, can we remove the forecasted 2037 peak hour reduction (in Section 1) and provide the 2029 growth forecast in Section 3 instead of the 2037 (i.e. the 94,000m³/hr in 2037)?
- >
- >
- >
- > Unfortunately we are on somewhat tight timelines with this, and hoping to have a finalized memo by mid next week (May 25th). Can you let us know if it any/all of the above updates could be accommodated within this timeframe?
- >
- >
- >
- > Let me know if you require any additional clarifications or would like to set up a quick call to discuss!
- >
- >
- >
- > Thanks,

>
>
>
> Whitney Wong | P.ENG
> ADVISOR, INTEGRATED RESOURCE PLANNING
>
> ENERGY TRANSITION PLANNING
>
> C: 437.234.1293
>
>
>
> From: Paula Claudino <paula@posteritygroup.ca>
> Sent: Wednesday, May 11, 2022 3:28 PM
> To: Amrit Kuner <Amrit.Kuner@enbridge.com>
> Cc: Julian Nappert <nappert@posteritygroup.ca>; Alex Tiessen
> <tiessen@posteritygroup.ca>
> Subject: [External] Leamington IRP analysis memos - responses to
> questions and updated memos
>
>
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>

> Hello Amrit,

>

>

>

> Attached are our updated drafts of the results and approach memos as well as a question tracker, which includes answers to each of your questions. Alex will provide a link to the supporting MS Excel file shortly.

>

>

>

> Please note both the reference case and estimated savings figures have changed since the first draft as we made several changes to the model to address a couple of your questions. These changes include:

>

> - We removed the years 2019 and 2020 to prevent any further confusion

>

> - We added in the missing residential demand response measure, which

> had been accidentally omitted from the first version

>

> - We adjusted the measure implementation timing so that all measures

> begin to be applied in 2023

>

> - We accounted for a missing set of accounts in the industrial sub

> sector, which had been missed earlier

>

>

>

> We would be happy to answer any further questions you may have or discuss any of the answers we have already provided.

>

>

>

> Thanks,

>

> Paula

> --

>

> Paula Claudino, P.Eng., M.ASc | Senior Consultant | 613.608.8000 |

> paula@posteritygroup.ca

>

> POSTERITY GROUP | posteritygroup.ca

>

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>

> Many Posterity Group staff are taking on additional family responsibilities during this period. To the extent that these responsibilities affect deadlines and deliverables, this will be communicated directly.

>

> We remain committed to providing our clients the same flexibility and responsiveness that they have come to expect.

--

Paula Claudino, P.Eng., M.ASc | Senior Consultant | 613.608.8000 | paula@posteritygroup.ca POSTERITY GROUP | posteritygroup.ca

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--

Julian Nappert | Consultant

613-850-5915 | http://secure-web.cisco.com/1daNGMesNUsNwxqKMSwBQLdcNMnPXVDS13KdlRuT2dsGJgtHDGGZSKEwkOdDv6RwDInNFHzKikCE7F4WAroentbiRbiElhVwugyF1eXupTgA5gwGj28mlrJhIPt-Bx0-7930Yoh_ygDA9IAkXJDQnT4Ef8x6GqL5yaaUTLFVAODawf6hNY5vA5IJ2FZ4jCpgPc8hlm73aQjce3OF_zpMsTTPVjyV77s0xvhGXp66YQg9yThMXcAl8fjeEHJ3laymVjx5ubhtC8ikN0Krm8GmYwoVHxJCfziuh7-Zbv_wFwMqTgShStPL-zgvNjFQPk9/http%3A%2F%2Fwww.posteritygroup.ca



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--

Paula Claudino, P.Eng., M.ASc | Senior Consultant | **613.608.8000** | paula@posteritygroup.ca

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--

Julian Nappert | Consultant

613-850-5915 | http://secure-web.cisco.com/13Jhv3YrMNb-sijqDxIMfHeuQ7sLjTnxMKIEYUzItsCSYFc8J9RwmNtXuHTO_fgDFLUgX3FjlgenCQrixzTkSHYK4pNI6SyBhEqV-MRFhybiwKXyRr0TziVETac0iB2LXzRQejBTYDJaAiZNPoWziGRs1d80GLuTZ0pWADiH8zWLuTduw-aRbhlc39gnbQhZ0_6X7gU-6TqRUAtbR7Oyx6SSJWsbRHLepIfdcuYmcNoX5Br54zPEekNSHllcEZ_vBA8Ca31akGFR4Qla3hisp-Qeh0BrgdDTZojn-xXmuG06fcwd2hv35oRhHmjDMA3/http%3A%2F%2Fwww.posteritygroup.ca



Please note: Posterity Group staff are following social distancing guidelines and will be working remotely until further notice. Our office space will be closed during this time.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (“ED”)

INTERROGATORY

Reference:

Exhibit E, Tab 1, Schedule 5

Question:

- (a) Please provide the DCF analysis in a live excel format.
- (b) Please re-calculate the project NPV and PI based on there being zero revenue attributable to the expansion project (i) from 2035 onward, (ii) from 2040 onward, and (iii) from 2050 onward. We are not asking Enbridge to opine on these figures as if they are likely scenarios.
- (c) If the project is built but demand does not increase above the current capacity of 713 TJ/d, does Enbridge agree that there would be no incremental revenue attributable to the project? If Enbridge disagrees, please explain.
- (d) If the project is built, demand initially increases beyond 713 TJ/d, but then declines to below 713 TJ/d from 2035 onward, does Enbridge agree that there would be no incremental revenue attributable to the project from 2035? If Enbridge disagrees, please explain.
- (e) In light of federal decarbonization mandates, what is the probability that the design day demand of the panhandle system is at or below 713 TJ/d in (i) 2035, (ii) 2040, or (iii) 2050. Please provide an answer on a best estimate basis.

Response

- a) Please see Attachment 1.
- b) See Table 1 below.

Table 1: Project NPV and PI Based on Zero Revenue from 2035, 2040, and 2050 Onwards

Scenario	NPV (\$million)	PI
i 2035 onward	(164)	0.36
ii 2040 onward	(143)	0.44
iii 2050 onward	(115)	0.55

c) and d)

Enbridge Gas agrees that incremental revenue is tied to incremental demands.

However, as set out in Exhibit B, Tab 1, Schedule 1, the needs for the Project were determined by demands reported by customers through the EOI process. As such, the Company has no basis to expect system demands will decline in the manner suggested by ED.

e) ED's question seeks to have the Company create new evidence based on hypothetical scenarios that would see demand for natural gas decline significantly from current levels. It is not reasonably possible to produce the forecast sought by ED with any certainty as it is unclear how and when the Federal Guidelines will be implemented in Ontario, and what the rate of adoption and/or conversion to alternative energy sources will ultimately be.

Not only does Enbridge Gas not routinely produce forecasts for the durations sought by ED (in part due to escalating forecast uncertainty that is increasingly inherent in longer term forecasts), but it is not practically possible for the Company to completely re-assess the hydraulic models, demand forecasting methodology, engineering design principles, and other factors that currently guide its assessment of projects as part of a response to interrogatories in the current proceeding.

Panhandle Regional Expansion Project
DCF Analysis
InService Date: Nov-01-2023

<u>Project Year</u> (\$000's)	<u>Project Total</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>
<u>Operating Cash Flow</u>											
Revenue	428,859	1,657	6,253	7,697	9,142	10,586	11,202	11,245	11,245	11,245	11,245
Expenses:											
O & M Expense	(5,060)	(127)	(127)	(127)	(127)	(127)	(127)	(127)	(127)	(127)	(127)
Municipal Tax	(38,843)	(818)	(975)	(975)	(975)	(975)	(975)	(975)	(975)	(975)	(975)
Income Tax	(100,799)	776	(1,115)	(1,748)	(2,131)	(2,513)	(2,677)	(2,688)	(2,688)	(2,688)	(2,688)
Net Operating Cash Flow	(144,702)	1,489	4,036	4,848	5,909	6,971	7,424	7,455	7,455	7,455	7,455
<u>Capital</u>											
Incremental Capital	(260,174)	(207,255)	(49,571)	(3,348)	-	-	-	-	-	-	-
Change in Working Capital	(6)	(6)	-	-	-	-	-	-	-	-	-
Total Capital	(260,180)	(207,261)	(49,571)	(3,348)	-	-	-	-	-	-	-
<u>CCA Tax Shield</u>											
CCA Tax Shield	65,898	8,560	6,467	5,676	4,912	4,272	3,733	3,278	2,891	2,561	2,277
<u>Net Present Value</u>											
PV of Operating Cash Flow	116,814	1,452	3,747	4,284	4,970	5,580	5,655	5,405	5,144	4,896	4,659
PV of Capital	(257,466)	(207,261)	(47,173)	(3,032)	-	-	-	-	-	-	-
PV of CCA Tax Shield	46,113	8,351	6,004	5,015	4,131	3,419	2,844	2,376	1,995	1,681	1,423
Total NPV by Year	(94,538)	(197,458)	(37,421)	6,267	9,101	8,999	8,499	7,781	7,139	6,577	6,082
Project NPV	(94,538)										
Project PI	0.63										

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (“ED”)

INTERROGATORY

Reference:

Exhibit E, Tab 1, Schedule 1

Question:

- (a) Please confirm that Canada’s 2030 Emissions Reduction Plan includes a target for carbon emissions associated with buildings to decline by 41% by 2030 from 2019 levels (to 53 CO₂e from 91 CO₂e) and that it targets a 22% reduction by 2026 from 2019 levels (to 71 CO₂e from 91 CO₂e).¹ If not, please explain.
- (b) Please confirm that Canada’s 2030 Emissions Reduction Plan has formal legal status under s. 9 of the *Canadian Net-Zero Emissions Accountability Act* in relation to the legally binding targets under that Act.² If not, please explain.
- (c) Please complete the following table:

Demand Reduction Scenarios					
	2019 Levels	Reduced by 5%	Reduced by 10%	Reduced by 22%	Reduced by 41%
Annual demand for the relevant area (TJ)					
Design day demand for the relevant area (TJ/d)					

- (d) Please complete the table above but in m³ figures instead of joules.
- (e) Approximately what percent of Enbridge customer demand is used for buildings?

¹ <https://www.canada.ca/en/environment-climate-change/news/2022/03/2030-emissions-reduction-plan--canadas-next-steps-for-clean-air-and-a-strong-economy.html>

² *Canadian Net-Zero Emissions Accountability Act*, s. 9.

- (f) Please confirm that Canada has committed to net-zero emissions from electricity generation by 2035. If not, please explain.
- (g) Please confirm that Canada’s 2030 Emissions Reduction Plan includes its commitment to net-zero emissions from electricity generation by 2035. If not, please explain.

Response

- a) f) and g)
 Please refer to the federal government’s 2030 Emissions Reduction Plan for information related to any such targets established by the government.³
- b) Please refer to the *Canadian Net-Zero Emissions Accountability Act, (2021)* for information regarding the legal status of the federal government’s 2030 Emissions Reduction Plan.⁴
- c) and d)

Table 1

Demand		
	2019 Levels	
Annual demand for the relevant area (TJ) Conversion assumes heat value of 38.98 GJ/10 ³ m ³	58,414 TJ	1,498,556,891 m ³
Design day demand for the relevant area Conversion assumes heat value of 38.98 GJ/10 ³ m ³	640 TJ/day	16,427,593m ³ /day

Note: Annual demand was calculated using (contract customer consumption in the Project area) + (general service consumption actuals for the Windsor/Chatham region). The Company does not have general service consumption actuals for the Project area specifically.

ED can reduce 2019 demands set out in Table 1 at whatever rate it desires. However, Enbridge Gas cautions that there is no simplifying correlation between annual demand and design day demand in the Project area.

³ <https://www.canada.ca/en/environment-climate-change/news/2022/03/2030-emissions-reduction-plan--canadas-next-steps-for-clean-air-and-a-strong-economy.html>

⁴ <https://laws-lois.justice.gc.ca/eng/acts/c-19.3/FullText.html>

- e) Please see the response at Exhibit I.ED.11 for a breakdown of volumes in the Project area by sector.

Enbridge Gas is not able to separate natural gas demand for commercial or industrial sectors in the Project area into separate end-uses. However, certain commercial or industrial demand would also be attributed to building heating (in addition to the residential sector).

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (“ED”)

INTERROGATORY

Reference:

Exhibit E, Tab 1, Schedule 1

Preamble:

For the below questions, please make and state assumptions as needed. Please also include any necessary caveats.

Question:

- (a) On a best efforts basis, please estimate the impact on the gas demand in the project area if Canada achieves (or at least comes close to achieving) its 2030 Emissions Reduction Plan, including its a target for carbon emissions associated with buildings to decline by 41% by 2030 from 2019 levels.
- (b) Please reflect the answer to (a) in a reproduction of table 1 on page 11 of Ex. B, Tab 1, Schedule 1.
- (c) Please estimate how the answer to (a) would impact the project economics, including the NPV and PI.
- (d) On a best efforts basis, please estimate the impact on the gas demand in the project area if Canada achieves its legislated mandate 2050 net zero target.
- (e) Please reflect the answer to (c) in a reproduction of table 1 on page 11 of Ex. B, Tab 1, Schedule 1.
- (f) Please estimate how the answer to (c) would impact the project economics, including the NPV and PI.

Response

a) - f)

ED’s questions seek to have the Company alter its demand forecast in order to perform unique analysis based on hypothetical scenarios, namely the federal 2030 Emissions Reduction Plan and 2050 net-zero targets.

Enbridge Gas utilizes a demand forecasting methodology that includes known and quantifiable data, such as: economic forecast data, public policy information municipal planning data, individual customer data, tacit knowledge, and historical growth rates in geographic areas to inform the Project economics set out at Exhibit E. It is not reasonably possible to produce the forecasts sought by ED with any certainty as it is unclear how and when the federal 2030 Emission Reduction Plan and 2050 net-zero targets will be implemented in Ontario, and what the rate of adoption and/or conversion to alternative energy sources will be.

It is not practically possible for the Company to completely re-assess the hydraulic models, demand forecasting methodology, engineering design principles, and other factors that currently guide its assessment of projects (including the Project NPV and PI) as part of a response to interrogatories in the current proceeding.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence ("ED")

INTERROGATORY

Reference:

Exhibit E, Tab 1, Schedule 1

Question:

- (a) Please reproduce table 1 on page 11 of Ex. B, Tab 1, Schedule 1, adding rows showing:
- i. A breakdown of the demand based on customer classes (residential, commercial, and industrial); and
 - ii. A breakdown of demand for forecast years based on that from new versus existing customers.

Please also add three columns to the left with three additional years of historical figures.

Response

a)

- i. Below is the summary of demand breakdown by the customer classes indicated (residential, commercial, and industrial) using best available information.

	Historical Actuals (TJ/d)					FORECAST (TJ/d)									
	Winter 16/17	Winter 17/18	Winter 18/19	Winter 19/20	Winter 20/21	Winter 21/22	Winter 22/23	Winter 23/24	Winter 24/25	Winter 25/26	Winter 26/27	Winter 27/28	Winter 28/29	Winter 29/30	Winter 30/31
General Service Firm (Total System Demand)	298	291	298	317	308	310	311	312	313	315	316	317	318	319	320
Residential Demand (estimated M1)	161	157	161	171	166	167	168	169	169	170	171	171	172	172	173
Commercial/Industrial Demand (estimated M1/M2)	137	134	137	146	142	143	143	144	144	145	145	146	146	147	147
Contract Firm (Total System Demand)	259	321	326	323	348	362	383	432	514	539	564	589	614	639	664
Total System Demand Forecast	557	612	624	640	656	672	694	744	828	854	880	906	932	958	983

- ii. There is no forecast demand change for existing general service customers.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (“ED”)

INTERROGATORY

Reference:

Exhibit E, Tab 1, Schedule 1

Question:

- (a) What is the expected lifetime of the proposed pipeline?
- (b) When would the proposed pipeline be fully depreciated?
- (c) What will the undepreciated balance of the proposed pipeline costs be in (i) 2035, (ii) 2040, and (iii) 2050?
- (d) Has Enbridge conducted an analysis to assess the likelihood, if any, that the proposed pipeline will be stranded or underutilized before the end of its lifetime? If yes, please file said analysis.
- (e) Please estimate the probability (if any) that the proposed pipeline will be stranded or underutilized before the end of its lifetime. Please provide the response as a probability (%) or a range of probabilities. For instance, if there is no chance, please indicate the probability as 0%.

Response

- a) The current OEB-approved depreciation rate for transmission pipelines in the Union Rate Zone assumes an economic life of 55 years.
- b) Assuming current OEB-approved depreciation rates, the proposed NPS 36 pipeline will be fully depreciated in 2074 and the proposed NPS 16 pipeline will be fully depreciated in 2075.
- c) The undepreciated balance of the proposed pipeline(s) is:
 - i. in 2035 = \$126 million
 - ii. in 2040 = \$110 million
 - iii. in 2050 = \$77 million

d) and e)

No, the proposed Project is based on best available demand forecasts, customer commitments, and is designed to reliably serve known increased demands for firm service in the Panhandle Market, including, in particular, incremental demands from the greenhouse, automotive, and power generation sectors. The Company has no basis to believe the proposed pipeline will be undersubscribed or stranded.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (“ED”)

INTERROGATORY

Reference:

Exhibit E, Tab 1, Schedule 1

Question:

- (a) How many cubic metres of gas is associated with the incremental revenue included in the stage 1 DCF calculations?
- (b) How many tonnes of carbon emissions will be emitted due to the combustion of those m3s of gas?
- (c) Does Enbridge believe that carbon emissions are a public interest consideration relevant to stage 3 of the test?

Response

- a) Approximately 25.5 billion m³.
- b) The greenhouse gas (“GHG”) emissions emitted due to the combustion of the natural gas volumes provided in part a) above are approximately 49 million tonnes of carbon dioxide equivalent (“tCO₂e”). Enbridge Gas notes that approximately half of the gas will be delivered to greenhouse customers, and as such a portion of these emissions will be sequestered within plants.
- c) Enbridge Gas believes carbon emissions are relevant to stage 2 of the Project economics.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (“ED”)

INTERROGATORY

Reference:

Exhibit E, Tab 1, Schedule 6

Question:

- (a) Please provide all spreadsheets and detailed calculations underlying Exhibit E, Tab 1, Schedule 6. Please include live excel spreadsheets.
- (b) Please provide Enbridge’s best forecast of gas prices starting at the in-service date for (i) 20 years and (ii) 40 years.
- (c) Please approach the gas supply group and the DSM group and ask them to provide their best forecast of gas prices.
- (d) Please provide ICF’s latest annual gas price forecast. As this is proprietary, this can be provided confidentially. Please also provide the forecast as percent increases and apply those values to the prices in the relevant area.
- (e) Please describe how Enbridge generated its electricity price, including underlying calculations.
- (f) Please provide Enbridge’s best forecast of electricity prices starting at the in-service date for (i) 20 years and (ii) 40 years.
- (g) Please justify the assumption that the carbon tax will remain at \$170 from 2031 to 2063. How confident is Enbridge in this prediction?
- (h) Please confirm that Enbridge estimated the cost of electric heating on the assumption that resistance heating is used, not a high efficiency heat pump.
- (i) Please describe the methodology used to generate Exhibit E, Tab 1, Schedule 6. Please also how this meets the requirements in E.B.O. 134 with specific references to the relevant sections of E.B.O. 134.
- (j) Please confirm whether Enbridge used customer-facing prices or avoided costs in this analysis. Please provide Enbridge’s understanding of what E.B.O. 134 requires in this regard.
- (k) Please confirm that in the stage 2 analysis in EB-2016-0186 (Panhandle Reinforcement Project), which was filed in June if 2016, Union Gas used the following assumption: “Gas and alternative fuel prices are the average posted prices for the 12 month period June 2015 to May 2016.”

Response

- a) Please see Attachment 1.
- b) - d)
Please see the response at Exhibit I.PP.11. Enbridge Gas is not able to produce the forecast information sought by ED at this time.
- e) Enbridge Gas generated its electricity pricing based upon the posted electricity pricing from the Ontario Energy Board website for the year 2021.¹ The posted pricing was converted from a cents per kilowatt hour to a dollar per gigajoule. The dollar per gigajoule was then converted to a dollar per m³ assuming a heat content of 0.03932 GJ per m³. Please see Attachment 2 to this response for the supporting calculation.
- f) Enbridge Gas is not able to produce the forecast information sought by ED at this time. Electricity prices can be found at the IESO website, and any questions regarding electricity prices are more appropriately directed to the IESO:
<https://www.ieso.ca/en/Power-Data/Monthly-Market-Report>
- g) To date, the Government of Canada has only announced the annual carbon price to 2030; however, the updated pricing has not been included in the Greenhouse Gas Pollution Pricing Act. Further, the Government of Canada has not provided any indication if carbon pricing will continue in 2031 or beyond, or at what rates. Absent this information, Enbridge Gas has assumed that carbon pricing will continue beyond 2030 remaining at a cost of \$170 per tonne.
- h) The Stage 2 analysis does not consist of an explicit variable related to the type of end-use equipment, for any fuel types. Enbridge Gas does not believe E.B.O. 134 identifies a specific requirement in this regard. Please see parts a) and e) above for more information on the methodology employed.
- i) The Stage 2 analysis determines the net present value of the difference in energy prices of alternative energy sources (heating oil, propane, electricity) versus natural gas. The price difference is applied to the forecast natural gas energy that the Project will provide to future general service customers. This aligns with E.B.O. 134 paragraph 6.74 which states:

¹ <https://www.oeb.ca/consumer-information-and-protection/electricity-rates/historical-electricity-rates>

The second stage should be designed to quantify other public interest factors not considered at stage one. All quantifiable other public interest information as to costs and benefits should be provided at the stage.²

This methodology has been accepted by the OEB in numerous past applications. For details on the methodology used to develop Exhibit E, Tab 1, Schedule 6, please refer to part a) above.

- j) Enbridge Gas used retail costs in this analysis (please see the response to Exhibit I.STAFF.15 c) part iii). Enbridge Gas does not believe that E.B.O. 134 identifies a specific requirement in this regard.
- k) Confirmed.

² Ontario Energy Board, E.B.O. 134 Report of the Board, June 1, 1987, paragraph 6.74

				2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Incremental Growth	Constant	Units	Total	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Discount Rate	4.00%																						
Discount Factor (Mid Period)	0.5000			0.9806	0.9429	0.9066	0.8717	0.8382	0.8060	0.7750	0.7452	0.7165	0.6889	0.6624	0.6370	0.6125	0.5889	0.5663	0.5445	0.5235	0.5034	0.4840	0.4654
Assumed Mix of Alt Fuel Market Share if Gas Not Available																							
Residential & Commercial																							
Heating Oil	%			24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%
Propane	%			10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Electricity	%			67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%
Total				100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Energy Prices				\$/m^3	Gas \$/m^3	Diff \$/m^3																	
Natural Gas		0.144		0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	
Heating Oil		1.169	0.14	1.0257	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	
Propane		0.968	0.14	0.8247	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	
Electricity		1.102	0.14	0.9581	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	
Factors for Carbon Calc																							
Natural Gas		0.001958																					
Heating Oil		0.002872																					
Propane		0.002384																					
Electricity		-																					
Carbon Cost Estimate (ICF)	\$/ ton			65	80	95	110	125	140	155	170	170	170	170	170	170	170	170	170	170	170	170	
Cost of Carbon Applied to Fuel Price Forecast																							
Natural Gas	\$/ M3			0.1273	0.1566	0.1860	0.2154	0.2448	0.2741	0.3035	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	
Heating Oil	\$/ M3			0.1867	0.2298	0.2728	0.3159	0.3590	0.4021	0.4451	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	
Propane	\$/ M3			0.1550	0.1907	0.2265	0.2623	0.2980	0.3338	0.3695	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	
Electricity	\$/ M3			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Trigger to Apply Carbon Cost		1		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
Fuel Prices Applied																							
Natural Gas				0.2710	0.3004	0.3298	0.3591	0.3885	0.4179	0.4473	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	
Heating Oil				1.3561	1.3992	1.4423	1.4854	1.5285	1.5715	1.6146	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	
Propane				1.1234	1.1592	1.1949	1.2307	1.2664	1.3022	1.3380	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	
Electricity				1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	
YoY change Incremental Growth																							
Residential	10^3M^3/Yr		15,143	1,264	2,525	2,523	2,523	2,523	2,523	1,262													
Small Commercial	10^3M^3/Yr		5,708	476	951	951	951	951	951	476													
Large Commercial	10^3M^3/Yr		3,358	280	560	560	560	560	560	280													
Small Industrial	10^3M^3/Yr		44	7	7	7	7	7	7	-													
Total YoY Gen Serv Incremental Growth	10^3M^3/Yr		24,253	2,026	4,044	4,041	4,041	4,041	4,041	2,017													
Cumulative Growth																							
Residential	10^3M^3/Yr		863,155	1,264	3,789	6,312	8,835	11,358	13,881	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	
Small Commercial	10^3M^3/Yr		325,377	476	1,427	2,378	3,330	4,281	5,233	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	
Large Commercial	10^3M^3/Yr		191,397	280	839	1,399	1,959	2,518	3,078	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	
Small Industrial	10^3M^3/Yr		2,513	7	15	22	29	36	44	44	44	44	44	44	44	44	44	44	44	44	44	44	
Total Cummulative Gen Serv Incremental Growth	10^3M^3/Yr		1,382,442	2,026	6,070	10,111	14,153	18,194	22,236	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	
Assumed Fuel Mix																							
Heating Oil	\$/ M3	\$1.17		24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	
Propane	\$/ M3	\$1.10		10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	
Electricity	\$/ M3	\$0.97		67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	
Weighted Cost of Alt Fuels																							
Cost of Gas	\$/ M^3			\$1.16	\$1.18	\$1.19	\$1.21	\$1.22	\$1.23	\$1.25	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	
Difference	\$/ M^3			\$0.27	\$0.30	\$0.33	\$0.36	\$0.39	\$0.42	\$0.45	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	
Cumulative Gen Serv & Contract																							
Alt Fuel Saving	\$/ M^3			0.89	0.88	0.86	0.85	0.83	0.81	0.80	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	
Res & Comm Fuel Savings with Gas	\$ 000's			1,811	5,328	8,716	11,978	15,113	18,120	19,383	19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002	
Discount Factor (Mid Period)				0.981	0.943	0.907	0.872	0.838	0.806	0.775	0.745	0.717	0.689	0.662	0.637	0.612	0.589	0.566	0.544	0.524	0.503	0.484	
Fuel Savings Discounted				1,775	5,024	7,902	10,442	12,667	14,604	15,021	14,160	13,615	13,091	12,588	12,104	11,638	11,191	10,760	10,346	9,948	9,566	9,198	
Cumulative Fuel Savings: Discounted	\$ 000's			1,775	6,799	14,701	25,143	37,810	52,415	67,436	81,595	95,210	108,302	120,890	132,993	144,631	155,822	166,582	176,928	186,877	196,442	205,640	

NPV Term (yrs)	20	40
NPV of Fuel Savings \$millions	214	335

				2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062
Incremental Growth	Constant	Units	Total	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Discount Rate	4.00%																						
Discount Factor (Mid Period)	0.5000			0.4475	0.4303	0.4138	0.3978	0.3825	0.3678	0.3537	0.3401	0.3270	0.3144	0.3023	0.2907	0.2795	0.2688	0.2584	0.2485	0.2389	0.2297	0.2209	0.2124
Assumed Mix of Alt Fuel Market Share if Gas Not Available																							
Residential & Commercial																							
Heating Oil	%			24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%
Propane	%			10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Electricity	%			67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%
Total				100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Energy Prices																							
		\$/m^3	Gas \$/m^3	Diff \$/m^3																			
Natural Gas		0.144			0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	0.1438	
Heating Oil		1.169	0.14	1.0257	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	1.1695	
Propane		0.968	0.14	0.8247	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	0.9684	
Electricity		1.102	0.14	0.9581	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	
Factors for Carbon Calc																							
Natural Gas		0.001958																					
Heating Oil		0.002872																					
Propane		0.002384																					
Electricity		-																					
Carbon Cost Estimate (ICF)		\$/ ton			170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170
Cost of Carbon Applied to Fuel Price Forecast																							
Natural Gas		\$/ M3			0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329
Heating Oil		\$/ M3			0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882
Propane		\$/ M3			0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053
Electricity		\$/ M3			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trigger to Apply Carbon Cost		1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Fuel Prices Applied																							
Natural Gas					0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766	0.4766
Heating Oil					1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577	1.6577
Propane					1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737	1.3737
Electricity					1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019	1.1019
YoY change Incremental Growth																							
YoY change Incremental Growth Residential		10^3M^3/Yr	15,143																				
YoY change Incremental Growth Small Commercial		10^3M^3/Yr	5,708																				
YoY change Incremental Growth Large Commercial		10^3M^3/Yr	3,358																				
YoY change Incremental Growth Small Industrial		10^3M^3/Yr	44																				
Total YoY Gen Serv Incremental Growth		10^3M^3/Yr	24,253	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cumulative Growth Residential		10^3M^3/Yr	863,155	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143
Cumulative Growth Small Commercial		10^3M^3/Yr	325,377	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708
Cumulative Growth Large Commercial		10^3M^3/Yr	191,397	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358
Cumulative Growth Small Industrial		10^3M^3/Yr	2,513	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Total Cummulative Gen Serv Incremental Growth		10^3M^3/Yr	1,382,442	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253
Assumed Fuel Mix																							
		\$/ M3																					
Heating Oil		\$1.17			24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%
Propane		\$1.10			10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Electricity		\$0.97			67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%
Weighted Cost of Alt Fuels																							
		\$/ M^3			\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26	\$1.26
Cost of Gas		\$/ M^3			\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48	\$0.48
Difference		\$/ M^3			\$0.78	\$0.78	\$0.78	\$0.78	\$0.78	\$0.78	\$0.78	\$0.78	\$0.78	\$0.78	\$0.78	\$0.78	\$0.78	\$0.78	\$0.78	\$0.78	\$0.78	\$0.78	\$0.78
Cumulative Gen Serv & Contract																							
		10^3M^3/Yr			24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253
Alt Fuel Saving		\$/ M^3			0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Res & Comm Fuel Savings with Gas		\$ 000's			19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002	19,002
Discount Factor (Mid Period)					0.448	0.430	0.414	0.398	0.383	0.368	0.354	0.340	0.327	0.314	0.302	0.291	0.280	0.269	0.258	0.248	0.239	0.230	0.221
Fuel Savings Discounted					8,504	8,177	7,862	7,560	7,269	6,990	6,721	6,462	6,214	5,975	5,745	5,524	5,312	5,107	4,911	4,722	4,540	4,366	4,198
Cumulative Fuel Savings: Discounted		\$ 000's			222,988	231,165	239,027	246,587	253,856	260,846	267,567	274,029	280,243	286,217	291,962	297,486	302,798	307,905	312,816	317,538	322,078	326,444	330,641

NPV Term (yrs)
NPV of Fuel Savings \$millions

Date	OEB Posted Rate (cents / kWh)			kWh to GJ Conversion	\$ / GJ			Weighted Average
	Off-peak	Mid-peak	On-peak		Off-peak	Mid-peak	On-peak	
Jan 1, 2021	8.5	8.5	8.5	0.36	23.61	23.61	23.61	23.61
Feb 23, 2021	8.5	11.9	17.6		23.61	33.06	48.89	29.81
May 1, 2021	8.2	11.3	17.0		22.78	31.39	47.22	28.68
Nov 1 2021	8.2	11.3	17.0		22.78	31.39	47.22	28.68

Date	Price (\$/GJ)
Jan 2021	23.61
Feb 2021	23.61
Mar 2021	29.81
Apr 2021	29.81
May 2021	28.68
Jun 2021	28.68
Jul 2021	28.68
Aug 2021	28.68
Sep 2021	28.68
Oct 2021	28.68
Nov 2021	28.68
Dec 2021	28.68
Average	28.02
GJ to m3 conversion	0.03932
Electricity Price (\$/m3) \$	1.102

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (“ED”)

INTERROGATORY

Reference:

Exhibit E, Tab 1, Schedule 6

Question:

- (a) Please recalculate Exhibit E, Tab 1, Schedule 6 with the following assumptions and provide both the output (i.e. Schedule 6) and the underlying excel spreadsheet:
- i. Gas and alternative fuel prices are the average posted prices for the most recent 12 month period; and
 - ii. Use of electricity is on average three times as efficient as the use of gas (e.g. cold climate heat pump versus gas furnace).
- (b) Please recalculate Exhibit E, Tab 1, Schedule 6 with the following assumptions and provide both the output (i.e. Schedule 6) and the underlying excel spreadsheet:
- i. Gas and alternative fuel prices are the average posted prices for the most recent 12 month period;
 - ii. Use of electricity is on average three times as efficient as the use of gas (e.g. cold climate heat pump versus gas furnace); and
 - iii. Carbon prices increase by \$15/tonne to 2035 and increase with inflation thereafter.

Response

- a) Please see Attachment 1 to this response for the Stage 2 results using the average posted prices for the 12 months ending August 2022. Please see Attachment 2 to this response for the underlying excel spreadsheet.

Enbridge Gas is unable to complete the calculation using the requested assumption of electricity being on average three times as efficient as the use of gas, as this is not an explicit variable included in the calculation. Please see the response to Exhibit I.ED.14 part h).

- b) Please see Attachment 3 to this response for the Stage 2 results using the average posted prices for the 12 months ending August 2022 and the increasing carbon pricing scenario requested by ED. Please see Attachment 4 for the underlying excel spreadsheet.

Enbridge Gas is unable to complete the calculation using the requested assumption of electricity being on average three times as efficient as the use of gas, as this is not an explicit variable included in the calculation. Please see the response to Exhibit I.ED.14 part h).

Stage 2 (Customer Fuel Savings) Data for Panhandle Regional Expansion Project

Line	Assumptions				Fuel Mix in the Event Gas is Not Available		
	(a)	(b)	(c)	(d)=(b)-(c)	(e)	(f)=(d)*(e)	
			Gas		General Service		
	Fuel Prices	\$/m ³	\$/m ³	Diff \$/m ³		Fuel Mix	Wt Ave Diff \$/ M ³
1	Heating Oil	1.64	0.20	1.43	Heating Oil	24%	0.342
2	Propane	1.14	0.20	0.93	Propane	10%	0.089
3	Electricity	1.11	0.20	0.91	Electricity	67%	0.604
4					Total %	100%	
5					Weighted Savings \$/m ³		1.035

Gas and alternative fuel prices are the average posted prices for the 12 month period ending August 2022
 Prices in the table are before the added cost of Carbon.

Carbon Prices The cost of carbon is added to the price of each fuel excluding electricity.

	2023	2024	2025	2026	2027	2028	2029	2030
Cost per tonne	\$65	\$80	\$95	\$110	\$125	\$140	\$155	\$170
Cost per tonne	Future Yrs 2031 and beyond \$170							

Calculation for Stage 2 Incremental Energy Demand

Estimated Energy Demand with Pipeline Built
 Equals Potential annual energy demand (for Stage 2 calculations)
 Times Weighted Average Savings per M3 plus Cost of Carbon
 Equals Annual Fuel Savings: Natural Gas Vs Alt Fuels

Discount Rate for Net Present Values 4.0%

Length of Term for Fuel Savings

Stage 2 estimated based on 20 years and 40 years

Present Value of Customer Fuel Savings

For conservatism, the NPV is assessed over 20 years with sensitivity at 40 years

Figures in \$ Millions	20 Years	40 Years
General Service Fuel Savings	234	366

NPV Fuel Savings Range from \$234 Mil over 20 yrs to \$366 Mil over 40 yrs

				2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Incremental Growth	Constant	Units	Total	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Discount Rate	4.00%																						
Discount Factor (Mid Period)	0.5000			0.9806	0.9429	0.9066	0.8717	0.8382	0.8060	0.7750	0.7452	0.7165	0.6889	0.6624	0.6370	0.6125	0.5889	0.5663	0.5445	0.5235	0.5034	0.4840	0.4654
Assumed Mix of Alt Fuel Market Share if Gas Not Available																							
Residential & Commercial																							
Heating Oil	%			24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%
Propane	%			10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Electricity	%			67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%
Total				100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Energy Prices																							
	\$/m^3	Gas \$/m^3	Diff \$/m^3																				
Natural Gas	0.202			0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017
Heating Oil	1.637	0.20	1.4349	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366
Propane	1.136	0.20	0.9348	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365
Electricity	1.108	0.20	0.9067	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084
Factors for Carbon Calc																							
Natural Gas	0.001958																						
Heating Oil	0.002872																						
Propane	0.002384																						
Electricity	-																						
Carbon Cost Estimate (ICF)	\$/ ton			65	80	95	110	125	140	155	170	170	170	170	170	170	170	170	170	170	170	170	170
Cost of Carbon Applied to Fuel Price Forecast																							
Natural Gas	\$/ M3			0.1273	0.1566	0.1860	0.2154	0.2448	0.2741	0.3035	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329
Heating Oil	\$/ M3			0.1867	0.2298	0.2728	0.3159	0.3590	0.4021	0.4451	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882
Propane	\$/ M3			0.1550	0.1907	0.2265	0.2623	0.2980	0.3338	0.3695	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053
Electricity	\$/ M3			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trigger to Apply Carbon Cost	1			1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Fuel Prices Applied																							
Natural Gas				0.3290	0.3583	0.3877	0.4171	0.4464	0.4758	0.5052	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346
Heating Oil				1.8233	1.8663	1.9094	1.9525	1.9956	2.0387	2.0817	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248
Propane				1.2914	1.3272	1.3630	1.3987	1.4345	1.4703	1.5060	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418
Electricity				1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084

YoY change Incremental Growth Residential	10^3M^3/Yr	15,143	1,264	2,525	2,523	2,523	2,523	2,523	1,262														
YoY change Incremental Growth Small Commercial	10^3M^3/Yr	5,708	476	951	951	951	951	951	476														
YoY change Incremental Growth Large Commercial	10^3M^3/Yr	3,358	280	560	560	560	560	560	280														
YoY change Incremental Growth Small Industrial	10^3M^3/Yr	44	7	7	7	7	7	7	-														
Total YoY Gen Serv Incremental Growth	10^3M^3/Yr	24,253	2,026	4,044	4,041	4,041	4,041	4,041	2,017	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cumulative Growth Residential	10^3M^3/Yr	863,155	1,264	3,789	6,312	8,835	11,358	13,881	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143
Cumulative Growth Small Commercial	10^3M^3/Yr	325,377	476	1,427	2,378	3,330	4,281	5,233	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708
Cumulative Growth Large Commercial	10^3M^3/Yr	191,397	280	839	1,399	1,959	2,518	3,078	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358
Cumulative Growth Small Industrial	10^3M^3/Yr	2,513	7	15	22	29	36	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Total Cummulative Gen Serv Incremental Growth	10^3M^3/Yr	1,382,442	2,026	6,070	10,111	14,153	18,194	22,236	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253
Assumed Fuel Mix																							
Heating Oil	\$/ M3	\$1.64		24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%
Propane	\$/ M3	\$1.11		10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Electricity	\$/ M3	\$1.14		67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%
Weighted Cost of Alt Fuels																							
Cost of Gas	\$/ M^3			\$1.30	\$1.31	\$1.32	\$1.34	\$1.35	\$1.36	\$1.38	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39
Difference	\$/ M^3			\$0.33	\$0.36	\$0.39	\$0.42	\$0.45	\$0.48	\$0.51	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53
Cumulative Gen Serv & Contract																							
Alt Fuel Saving	\$/ M^3			0.97	0.95	0.94	0.92	0.90	0.89	0.87	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Res & Comm Fuel Savings with Gas	\$ 000's			1,960	5,775	9,461	13,020	16,452	19,757	21,168	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787
Discount Factor (Mid Period)				0.981	0.943	0.907	0.872	0.838	0.806	0.775	0.745	0.717	0.689	0.662	0.637	0.612	0.589	0.566	0.544	0.524	0.503	0.484	0.465
Fuel Savings Discounted				1,922	5,445	8,577	11,350	13,790	15,924	16,405	15,490	14,894	14,321	13,771	13,241	12,732	12,242	11,771	11,318	10,883	10,464	10,062	9,675
Cumulative Fuel Savings: Discounted	\$ 000's			1,922	7,367	15,944	27,294	41,084	57,007	73,412	88,902	103,796	118,117	131,888	145,129	157,860	170,102	181,874	193,192	204,075	214,539	224,601	234,276

NPV Term (yrs)	
NPV of Fuel Savings \$millions	

20	40
234	366

Incremental Growth	Constant	Units	Total	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062
Discount Rate	4.00%																						
Discount Factor (Mid Period)	0.5000			0.4475	0.4303	0.4138	0.3978	0.3825	0.3678	0.3537	0.3401	0.3270	0.3144	0.3023	0.2907	0.2795	0.2688	0.2584	0.2485	0.2389	0.2297	0.2209	0.2124
Assumed Mix of Alt Fuel Market Share if Gas Not Available																							
Residential & Commercial																							
Heating Oil	%			24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%
Propane	%			10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Electricity	%			67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%
Total				100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Energy Prices																							
	\$/m^3	Gas \$/m^3	Diff \$/m^3																				
Natural Gas	0.202			0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017
Heating Oil	1.637	0.20	1.4349	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366
Propane	1.136	0.20	0.9348	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365
Electricity	1.108	0.20	0.9067	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084
Factors for Carbon Calc																							
Natural Gas	0.001958																						
Heating Oil	0.002872																						
Propane	0.002384																						
Electricity	-																						
Carbon Cost Estimate (ICF)	\$/ ton			170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170
Cost of Carbon Applied to Fuel Price Forecast																							
Natural Gas	\$/ M3			0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329	0.3329
Heating Oil	\$/ M3			0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882	0.4882
Propane	\$/ M3			0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053	0.4053
Electricity	\$/ M3			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trigger to Apply Carbon Cost	1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Fuel Prices Applied																							
Natural Gas				0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346	0.5346
Heating Oil				2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248	2.1248
Propane				1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418	1.5418
Electricity				1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084

YoY change Incremental Growth Residential	10^3M^3/Yr			15,143																			
YoY change Incremental Growth Small Commercial	10^3M^3/Yr			5,708																			
YoY change Incremental Growth Large Commercial	10^3M^3/Yr			3,358																			
YoY change Incremental Growth Small Industrial	10^3M^3/Yr			44																			
Total YoY Gen Serv Incremental Growth	10^3M^3/Yr			24,253	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cumulative Growth Residential	10^3M^3/Yr		863,155	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143
Cumulative Growth Small Commercial	10^3M^3/Yr		325,377	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708
Cumulative Growth Large Commercial	10^3M^3/Yr		191,397	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358
Cumulative Growth Small Industrial	10^3M^3/Yr		2,513	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Total Cumulative Gen Serv Incremental Growth	10^3M^3/Yr		1,382,442	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253
Assumed Fuel Mix																							
	\$/ M3																						
Heating Oil	\$1.64			24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%
Propane	\$1.11			10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Electricity	\$1.14			67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%
Weighted Cost of Alt Fuels	\$/ M^3			\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39	\$1.39
Cost of Gas	\$/ M^3			\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53	\$0.53
Difference	\$/ M^3			\$0.86	\$0.86	\$0.86	\$0.86	\$0.86	\$0.86	\$0.86	\$0.86	\$0.86	\$0.86	\$0.86	\$0.86	\$0.86	\$0.86	\$0.86	\$0.86	\$0.86	\$0.86	\$0.86	\$0.86
Cumulative Gen Serv & Contract	10^3M^3/Yr			24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253
Alt Fuel Saving	\$/ M^3			0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Res & Comm Fuel Savings with Gas	\$ 000's			20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787	20,787
Discount Factor (Mid Period)				0.448	0.430	0.414	0.398	0.383	0.368	0.354	0.340	0.327	0.314	0.302	0.291	0.280	0.269	0.258	0.248	0.239	0.230	0.221	0.212
Fuel Savings Discounted				9,303	8,945	8,601	8,270	7,952	7,646	7,352	7,069	6,798	6,536	6,285	6,043	5,811	5,587	5,372	5,166	4,967	4,776	4,592	4,416
Cumulative Fuel Savings: Discounted	\$ 000's			243,579	252,524	261,125	269,396	277,348	284,994	292,346	299,416	306,213	312,749	319,034	325,077	330,887	336,474	341,847	347,012	351,979	356,755	361,347	365,763

NPV Term (yrs)
NPV of Fuel Savings \$millions

Stage 2 (Customer Fuel Savings) Data for Panhandle Regional Expansion Project

Line	Assumptions				Fuel Mix in the Event Gas is Not Available		
	(a)	(b)	(c)	(d)=(b)-(c)	(e)	(f)=(d)*(e)	
			Gas		General Service		
	Fuel Prices	\$/m ³	\$/m ³	Diff \$/m ³		Fuel Mix	Wt Ave Diff \$/ M ³
1	Heating Oil	1.64	0.20	1.43	Heating Oil	24%	0.342
2	Propane	1.14	0.20	0.93	Propane	10%	0.089
3	Electricity	1.11	0.20	0.91	Electricity	67%	0.604
4					Total %	100%	
5					Weighted Savings \$/m ³		1.035

Gas and alternative fuel prices are the average posted prices for the 12 month period ending August 2022
 Prices in the table are before the added cost of Carbon.

Carbon Prices The cost of carbon is added to the price of each fuel excluding electricity.

	<u>2023</u>	<u>2024</u>	<u>2025</u>	<u>2026</u>	<u>2027</u>	<u>2028</u>	<u>2029</u>	<u>2030</u>
Cost per tonne	\$65	\$80	\$95	\$110	\$125	\$140	\$155	\$170
	<u>2031</u>	<u>2032</u>	<u>2033</u>	<u>2034</u>	<u>2035</u>	Future Yrs 2036 and beyond		
Cost per tonne	\$185	\$200	\$215	\$230	\$245	increases annually by 2% inflation		

Calculation for Stage 2 Incremental Energy Demand

Estimated Energy Demand with Pipeline Built
 Equals Potential annual energy demand (for Stage 2 calculations)
 Times Weighted Average Savings per M3 plus Cost of Carbon
 Equals Annual Fuel Savings: Natural Gas Vs Alt Fuels

Discount Rate for Net Present Values 4.0%

Length of Term for Fuel Savings

Stage 2 estimated based on 20 years and 40 years

Present Value of Customer Fuel Savings

For conservatism, the NPV is assessed over 20 years with sensitivity at 40 years

Figures in \$ Millions	20 Years	40 Years
General Service Fuel Savings	222	326

NPV Fuel Savings Range from \$222 Mil over 20 yrs to \$326 Mil over 40 yrs

	Constant	Units	Total	2023 1	2024 2	2025 3	2026 4	2027 5	2028 6	2029 7	2030 8	2031 9	2032 10	2033 11	2034 12	2035 13	2036 14	2037 15	2038 16	2039 17	2040 18	2041 19	2042 20
Incremental Growth																							
Discount Rate	4.00%																						
Discount Factor (Mid Period)	0.5000			0.9806	0.9429	0.9066	0.8717	0.8382	0.8060	0.7750	0.7452	0.7165	0.6889	0.6624	0.6370	0.6125	0.5889	0.5663	0.5445	0.5235	0.5034	0.4840	0.4654

Assumed Mix of Alt Fuel Market Share if Gas Not Available
Residential & Commercial

Heating Oil	%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%
Propane	%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Electricity	%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%
Total		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Energy Prices	\$/m ³	Gas \$/m ³	Diff \$/m ³	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Natural Gas	0.202			0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017
Heating Oil	1.637	0.20	1.4349	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366
Propane	1.136	0.20	0.9348	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365
Electricity	1.108	0.20	0.9067	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084

Factors for Carbon Calc		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042		
Natural Gas	0.001958																						
Heating Oil	0.002872																						
Propane	0.002384																						
Electricity	-																						

Carbon Cost Estimate (ICF)	\$/ ton	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	
Carbon Cost Estimate (ICF)		65	80	95	110	125	140	155	170	185	200	215	230	245	250	255	260	265	270	276	281	
Cost of Carbon Applied to Fuel Price Forecast		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	
Natural Gas	\$/ M3	0.1273	0.1566	0.1860	0.2154	0.2448	0.2741	0.3035	0.3329	0.3622	0.3916	0.4210	0.4503	0.4797	0.4893	0.4991	0.5091	0.5193	0.5296	0.5402	0.5510	
Heating Oil	\$/ M3	0.1867	0.2298	0.2728	0.3159	0.3590	0.4021	0.4451	0.4882	0.5313	0.5744	0.6175	0.6605	0.7036	0.7177	0.7320	0.7467	0.7616	0.7768	0.7924	0.8082	
Propane	\$/ M3	0.1550	0.1907	0.2265	0.2623	0.2980	0.3338	0.3695	0.4053	0.4411	0.4768	0.5126	0.5484	0.5841	0.5958	0.6077	0.6199	0.6323	0.6449	0.6578	0.6710	
Electricity	\$/ M3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trigger to Apply Carbon Cost	1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Fuel Prices Applied		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	
Natural Gas		0.3290	0.3583	0.3877	0.4171	0.4464	0.4758	0.5052	0.5346	0.5639	0.5933	0.6227	0.6520	0.6814	0.6910	0.7008	0.7108	0.7209	0.7313	0.7419	0.7527	
Heating Oil		1.8233	1.8663	1.9094	1.9525	1.9956	2.0387	2.0817	2.1248	2.1679	2.2110	2.2540	2.2971	2.3402	2.3543	2.3686	2.3833	2.3982	2.4134	2.4290	2.4448	
Propane		1.2914	1.3272	1.3630	1.3987	1.4345	1.4703	1.5060	1.5418	1.5775	1.6133	1.6491	1.6848	1.7206	1.7323	1.7442	1.7563	1.7687	1.7814	1.7943	1.8074	
Electricity		1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084

	10^3M^3/Yr	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	
YoY change Incremental Growth Residential		15,143	1,264	2,525	2,523	2,523	2,523	2,523	1,262													
YoY change Incremental Growth Small Commercial		5,708	476	951	951	951	951	951	476													
YoY change Incremental Growth Large Commercial		3,358	280	560	560	560	560	560	280													
YoY change Incremental Growth Small Industrial		44	7	7	7	7	7	7	-													
Total YoY Gen Serv Incremental Growth		24,253	2,026	4,044	4,041	4,041	4,041	4,041	2,017	-	-	-	-	-	-	-	-	-	-	-	-	-
Cumulative Growth Residential		863,155	1,264	3,789	6,312	8,835	11,358	13,881	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143
Cumulative Growth Small Commercial		325,377	476	1,427	2,378	3,330	4,281	5,233	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708
Cumulative Growth Large Commercial		191,397	280	839	1,399	1,959	2,518	3,078	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358
Cumulative Growth Small Industrial		2,513	7	15	22	29	36	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Total Cumulative Gen Serv Incremental Growth		1,382,442	2,026	6,070	10,111	14,153	18,194	22,236	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253

Assumed Fuel Mix	\$/ M3	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	
Heating Oil	\$1.64	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%
Propane	\$1.11	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Electricity	\$1.14	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%

Weighted Cost of Alt Fuels	\$/ M^3	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Weighted Cost of Alt Fuels		\$1.30	\$1.31	\$1.32	\$1.34	\$1.35	\$1.36	\$1.38	\$1.39	\$1.41	\$1.42	\$1.43	\$1.45	\$1.46	\$1.46	\$1.47	\$1.47	\$1.48	\$1.48	\$1.49	\$1.49
Cost of Gas	\$/ M^3	\$0.33	\$0.36	\$0.39	\$0.42	\$0.45	\$0.48	\$0.51	\$0.53	\$0.56	\$0.59	\$0.62	\$0.65	\$0.68	\$0.69	\$0.70	\$0.71	\$0.72	\$0.73	\$0.74	\$0.75
Difference	\$/ M^3	\$0.97	\$0.95	\$0.94	\$0.92	\$0.90	\$0.89	\$0.87	\$0.86	\$0.84	\$0.83	\$0.81	\$0.79	\$0.78	\$0.77	\$0.77	\$0.76	\$0.76	\$0.75	\$0.75	\$0.74

Cumulative Gen Serv & Contract	10^3M^3/Yr	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Cumulative Gen Serv & Contract		2,026	6,070	10,111	14,153	18,194	22,236	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253
Alt Fuel Saving	\$/ M^3	0.97	0.95	0.94	0.92	0.90	0.89	0.87	0.86	0.84	0.83	0.81	0.79	0.78	0.77	0.77	0.76	0.76	0.75	0.75	0.74
Res & Comm Fuel Savings with Gas	\$ 000's	1,960	5,775	9,461	13,020	16,452	19,757	21,168	20,787	20,406	20,026	19,645	19,264	18,883	18,758	18,631	18,502	18,370	18,235	18,098	17,958
Discount Factor (Mid Period)		0.981	0.943	0.907	0.872	0.838	0.806	0.775	0.745	0.717	0.689	0.662	0.637	0.612	0.589	0.566	0.544	0.524	0.503	0.484	0.465
Fuel Savings Discounted		1,922	5,445	8,577	11,350	13,790	15,924	16,405	15,490	14,621	13,796	13,013	12,270	11,565	11,047	10,550	10,074	9,617	9,180	8,760	8,358
Cumulative Fuel Savings: Discounted	\$ 000's	1,922	7,367	15,944	27,294	41,084	57,007	73,412	88,902	1											

				2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	
Incremental Growth	Constant	Units	Total	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
Discount Rate	4.00%																							
Discount Factor (Mid Period)	0.5000			0.4475	0.4303	0.4138	0.3978	0.3825	0.3678	0.3537	0.3401	0.3270	0.3144	0.3023	0.2907	0.2795	0.2688	0.2584	0.2485	0.2389	0.2297	0.2209	0.2124	
Assumed Mix of Alt Fuel Market Share if Gas Not Available																								
Residential & Commercial																								
Heating Oil	%			24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	
Propane	%			10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	
Electricity	%			67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	
Total				100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Energy Prices																								
		\$/m^3	Gas \$/m^3	Diff \$/m^3																				
Natural Gas		0.202			0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	0.2017	
Heating Oil		1.637	0.20	1.4349	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	1.6366	
Propane		1.136	0.20	0.9348	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	1.1365	
Electricity		1.108	0.20	0.9067	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	
Factors for Carbon Calc																								
Natural Gas		0.001958																						
Heating Oil		0.002872																						
Propane		0.002384																						
Electricity		-																						
Carbon Cost Estimate (ICF)	\$/ ton				287	293	299	305	311	317	323	330	336	343	350	357	364	371	379	386	394	402	410	418
Cost of Carbon Applied to Fuel Price Forecast																								
Natural Gas	\$/ M3				0.5621	0.5733	0.5848	0.5965	0.6084	0.6206	0.6330	0.6456	0.6585	0.6717	0.6851	0.6988	0.7128	0.7271	0.7416	0.7565	0.7716	0.7870	0.8028	0.8188
Heating Oil	\$/ M3				0.8244	0.8409	0.8577	0.8749	0.8924	0.9102	0.9284	0.9470	0.9659	0.9852	1.0049	1.0250	1.0455	1.0664	1.0878	1.1095	1.1317	1.1544	1.1774	1.2010
Propane	\$/ M3				0.6844	0.6981	0.7120	0.7263	0.7408	0.7556	0.7707	0.7861	0.8019	0.8179	0.8343	0.8509	0.8680	0.8853	0.9030	0.9211	0.9395	0.9583	0.9775	0.9970
Electricity	\$/ M3				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trigger to Apply Carbon Cost		1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Fuel Prices Applied																								
Natural Gas					0.7638	0.7750	0.7865	0.7982	0.8101	0.8223	0.8347	0.8473	0.8602	0.8734	0.8868	0.9005	0.9145	0.9288	0.9433	0.9582	0.9733	0.9887	1.0045	1.0205
Heating Oil					2.4610	2.4775	2.4943	2.5114	2.5289	2.5468	2.5650	2.5836	2.6025	2.6218	2.6415	2.6616	2.6821	2.7030	2.7244	2.7461	2.7683	2.7909	2.8140	2.8376
Propane					1.8209	1.8346	1.8485	1.8628	1.8773	1.8921	1.9072	1.9226	1.9383	1.9544	1.9707	1.9874	2.0044	2.0218	2.0395	2.0576	2.0760	2.0948	2.1140	2.1335
Electricity					1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084	1.1084

YoY change Incremental Growth Residential	10^3M^3/Yr	15,143																						
YoY change Incremental Growth Small Commercial	10^3M^3/Yr	5,708																						
YoY change Incremental Growth Large Commercial	10^3M^3/Yr	3,358																						
YoY change Incremental Growth Small Industrial	10^3M^3/Yr	44																						
Total YoY Gen Serv Incremental Growth	10^3M^3/Yr	24,253	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cumulative Growth Residential	10^3M^3/Yr	863,155	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143	15,143
Cumulative Growth Small Commercial	10^3M^3/Yr	325,377	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708	5,708
Cumulative Growth Large Commercial	10^3M^3/Yr	191,397	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358	3,358
Cumulative Growth Small Industrial	10^3M^3/Yr	2,513	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Total Cumulative Gen Serv Incremental Growth	10^3M^3/Yr	1,382,442	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253	24,253

Assumed Fuel Mix																								
		\$/ M3																						
Heating Oil		\$1.64			24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	
Propane		\$1.11			10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	
Electricity		\$1.14			67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	
Weighted Cost of Alt Fuels																								
		\$/ M^3			\$1.50	\$1.50	\$1.51	\$1.51	\$1.52	\$1.53	\$1.53	\$1.54	\$1.54	\$1.55	\$1.56	\$1.56	\$1.57	\$1.58	\$1.58	\$1.59	\$1.60	\$1.60	\$1.61	\$1.62
Cost of Gas		\$/ M^3			\$0.76	\$0.77	\$0.79	\$0.80	\$0.81	\$0.82	\$0.83	\$0.85	\$0.86	\$0.87	\$0.89	\$0.90	\$0.91	\$0.93	\$0.94	\$0.96	\$0.97	\$0.99	\$1.00	\$1.02
Difference		\$/ M^3			\$0.73	\$0.73	\$0.72	\$0.72	\$0.71	\$0.70	\$0.70	\$0.69	\$0.68	\$0.68	\$0.67	\$0.66	\$0.65	\$0.65	\$0.64	\$0.63	\$0.62	\$0.61	\$0.61	\$0.60
Cumulative Gen Serv & Contract																								
Alt Fuel Saving		\$/ M^3			0.73	0.73	0.72	0.72	0.71	0.70	0.70	0.69	0.68	0.68	0.67	0.66	0.65	0.65	0.64	0.63	0.62	0.61	0.61	0.60
Res & Comm Fuel Savings with Gas		\$ 000's			17,815	17,669	17,520	17,368	17,214	17,056	16,895	16,731	16,563	16,392	16,218	16,040	15,859	15,674	15,486	15,293	15,097	14,897	14,693	14,484
Discount Factor (Mid Period)					0.448	0.430	0.414	0.398	0.383	0.368	0.354	0.340	0.327	0.314	0.302	0.291	0.280	0.269	0.258	0.248	0.239	0.230	0.221	0.212
Fuel Savings Discounted					7,972	7,603	7,249	6,910	6,585	6,274	5,975	5,690	5,416	5,154	4,903	4,663	4,433	4,213	4,002	3,800	3,607	3,422	3,246	3,077
Cumulative Fuel Savings: Discounted		\$ 000's			229,727	237,330	244,579	251,489	258,074	264,348	270,323	276,013	281,429	286,583	291,486	296,149	300,582	304,795	308,797	312,597	316,205	319,627	322,873	325,950

NPV Term (yrs)
NPV of Fuel Savings \$millions

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (“ED”)

INTERROGATORY

Reference:

Exhibit E, Tab 1, Schedule 1

Question:

(a) Please provide an estimate of the percent of the growth in demand from greenhouses attributable to vegetable growing versus marijuana growing.

Response

Enbridge Gas understands that almost all (i.e., 95% to 100%) of the Panhandle System demand growth in the greenhouse market is attributable to vegetable growing.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

INTERROGATORY

Reference:

Exhibit A, Tab 3, Schedule 1, Page 5, paragraph 13

Preamble:

"If the Project meets the criteria for rate recovery through the ICM mechanism, then an ICM request for the costs of the Project may form part of the Company's 2023 Rates (Phase 2) application."

Question:

Please confirm that Enbridge will not be requesting rate recovery through the ICM mechanism for this project.

Response

Confirmed.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

INTERROGATORY

Reference:

Exhibit B, Tab 1, Schedule 1, page 10, paragraph 29

Preamble:

"Enbridge Gas is aware of, has reviewed, and is working in conjunction with the municipalities within the Panhandle Market to determine whether the expansion of the Panhandle System impacts their ability to achieve the greenhouse gas emissions (GHG) reduction goals outlined within their respective Community Energy Plans ("CEPs")."

Question:

Please file copies of CEPs of the municipalities within the Panhandle market.

Response

- City of Windsor Community Energy Plan¹
- County of Essex Regional Energy Plan Executive Summary²
- Municipality of Chatham-Kent Climate Change Action Plan (currently under development)³

¹ <https://www.citywindsor.ca/residents/environment/climate-change-mitigation/community-energy-plan/Documents/Windsor%20Community%20Energy%20Plan%20FINAL%20-%20July%2017-2017.pdf>

² https://www.countyofessex.ca/en/discover-the-county/resources/Documents/ECREP-Executive-Summary---May-2021_UA.pdf

³ <https://pub-chatham-kent.escribemeetings.com/filestream.ashx?DocumentId=6875>

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

INTERROGATORY

Reference:

Exhibit B, Tab 1, page 11, paragraph 31, Table 1

Question:

What percentage of the increase in the demand day forecast is due to contract firm customers?

Response

Please see Table 1.

Table 1

	FORECAST (TJ/d)									
	Winter 21/22	Winter 22/23	Winter 23/24	Winter 24/25	Winter 25/26	Winter 26/27	Winter 27/28	Winter 28/29	Winter 29/30	Winter 30/31
General Service Firm (Total Incremental Demand)	2	1	1	1	1	1	1	1	1	1
Contract Firm (Total Incremental Demand)	14	21	49	83	25	25	25	25	25	25
Total Incremental Demand Forecast	16	22	50	84	26	26	26	26	26	26
Percent Contract of Incremental Demand (%)	89.5%	94.8%	97.7%	98.8%	95.6%	95.6%	96.1%	96.1%	95.7%	96.0%

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

INTERROGATORY

Reference:

Exhibit B, Tab 1, page 11, paragraph 39

Preamble:

"As indicated by the letters of support received by Enbridge Gas (see Attachment 3 to this Exhibit), the Project has broad support from various parties, including regional municipalities and chambers of commerce"

Question:

Please confirm that Enbridge asked various parties for letters of support.

Response

In discussion with Ontario Greenhouse Vegetable Growers ("OGVG") related to the Project prior to the filing of the application, OGVG expressed support for the project. OGVG later provided a letter of support.

In other circumstances, Enbridge Gas informed various parties of the Project and provided them an opportunity to submit a letter of support.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

INTERROGATORY

Reference:

Exhibit B, Tab 2, Schedule 1, page 4

Preamble:

"Ex-franchise easterly C1 Rate transportation and Interruptible in-franchise contract rate demands are not included in the Design Day demand as they are not controlled by Enbridge Gas and are not guaranteed to arrive on Design Day."

Question:

- a) Please explain what is ex-franchise easterly C1 Rate transportation contract rate demand?
- b) Is there in-franchise easterly C1 Rate transportation contract rate demand? If the answer is yes, what is the amount, and has it been included in the Design Day demand?
- c) Who controls easterly C1 Rate transportation contract demand?

Response

- a) The Enbridge Gas C1 Transportation service provides a reliable, cost-effective means to move gas from any one point on the Enbridge Gas transmission system to another. C1 Transportation service also allows the movement of gas to and from interconnecting pipelines.

The Enbridge Gas Panhandle System interconnects with the Panhandle Eastern Pipeline Company ("PEPL") system at Ojibway. Therefore, the Enbridge Gas Panhandle System provides C1 Transportation service between Dawn and Ojibway.

There is currently one C1 Rate ex-franchise customer of Enbridge Gas, with a firm transportation contract of up to 37 TJ/d, to transport natural gas easterly from Ojibway to Dawn on a year-round basis. There are currently no C1 ex-franchise customers with C1 service westerly from Dawn to Ojibway.

- b) No, C1 Transportation is a service designed for use by ex-franchise customers. In-franchise customers pay for their use of the Panhandle System within in-franchise service rates.
- c) Ex-franchise C1 transportation service customers control easterly C1 rate transportation contract demand. C1 transportation is a non-obligated service meaning customers have the exclusive option to nominate quantities under the contract when needed. As a result, Enbridge Gas cannot rely on natural gas transported under C1 rate contracts to be delivered to Ojibway on a daily basis. Ex-franchise C1 transportation from Ojibway to Dawn can be limited by three factors: i) the quantity of capacity held by Enbridge Gas; ii) the capacity of the upstream pipeline system connected to Ojibway; and iii) the physical Panhandle System assets and the minimum Panhandle Market available to consume gas between Ojibway and Dawn as discussed at Exhibit B, Tab 2, Schedule 1, Pages 7-8.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

INTERROGATORY

Reference:

Exhibit B, Tab 2, Schedule 1, page 6, paragraph 12

Preamble:

"The BBGS is located at the extreme western end of the Panhandle System just east of Ojibway. The pressure constraint for the entire Panhandle System is located at the outlet of the BBGS customer station, where the contracted minimum delivery pressure must be maintained at or above 1,724 kPag;"

Question:

- a) Please confirm that BBGS can be supplied by easterly flow from Ojibway.
- b) Please file a copy of the contract between Enbridge and BBGS which specifies the minimum delivery pressure.
- c) What is the term of the contract between Enbridge and BBGS and when does it expire?
- d) Has Enbridge discussed with BBGS a revised contract for a lower minimum delivery pressure?

Response

- a) Confirmed.
- b) Please see Figure 1 below, which is an excerpt from the contract between Enbridge Gas and BBGS which specifies the minimum delivery pressure:

Figure 1

5. DISTRIBUTION PARAMETERS

Delivery Pressures and Volumes

BBP		
Station #	Meter Number	Minimum Delivery Pressure (kPa)
06A-625I	2548275	1,724
	2548276	

- c) The current contract between Enbridge Gas and BBGS has a term of April 2003 to December 2023. The new contract will be effective for a period of 5 years and will continue to renew thereafter on a year-to-year basis.

- d) Enbridge Gas confirmed with BBGS that the existing delivery pressure will continue to be required going forward.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

INTERROGATORY

Reference:

Exhibit C, Tab 1, Schedule 1, page 5, paragraph 12

Question:

- a) Did Enbridge consider an alternative that would use a compressor close to BBGS to maintain the delivery pressure to BBGS? Please discuss.
- b) Did Enbridge consider an alternative of having BBGS replace its fuel gas compressor with a compressor that would accept a lower delivery pressure? Please discuss.

Response

a) and b)

No. The use of a compressor station to meet the required delivery pressure to BBGS located in an area around BBGS is not practical.

For a compressor station to operate, there must be a pressure differential between the discharge pressure (at BBGS required pressure) and the suction pressure of the compressor station. This suction pressure must be lower than the discharge pressure.

The suction pressure, which would have to be lower than BBGS delivery pressure, would require the entire Panhandle System pressure in the 3450 kPag MOP system to be lowered. This would subsequently impact all of the inlet pressures in the other customer and distribution stations located between Sandwich Compressor and Grand Marais station. These stations have minimum inlet pressures in a similar range to BBGS (between 1724 and 2070 kPag). For example, West Windsor Power Generator, which is located adjacent to BBGS has the same delivery pressure requirement as BBGS.

This scenario would require additional compression at other power generators and multiple distribution station rebuilds and system reinforcement between Sandwich, Grand Marais and Ojibway.

Please also see the response to Exhibit I.FRPO.13, for more discussion on why the approach of moving constraints/issues elsewhere on the system does not resolve system-wide issues, and the response to Exhibit I.EP.6 part d) regarding the customers' confirmed pressure requirements.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

INTERROGATORY

Reference:

Exhibit C, Tab 1, Schedule 1, page 11, Table 3, Pipeline Loop, and Lateral Interconnect Economic Assessment

Question:

- a) Please confirm that the alternative with the least negative NPV would require the least subsidy from ratepayers over its life.
- b) Please confirm that the NPS 30 line with the NPS 16 lateral has the least negative NPV and would require a lower subsidy than the preferred alternative.

Response

a) & b)

The differences in NPV between the NPS 36 and NPS 30 alternatives are primarily attributable to total capital and annual property taxes. However, in Enbridge Gas's experience NPV results alone should not be the sole contributing factor in selecting a preferred alternative.

In this instance in particular, there are at least three other critically important factors that the OEB must consider in selecting between the NPS 36 and NPS 30 pipelines:

- i. **Future System Capacity Benefit** - As discussed in Exhibit B, Tab 1, Schedule 1, the Panhandle System has experienced significant demand growth in recent history, in part due to the rapid expansion of the greenhouse market, increasing in size from approximately 1,500 acres in 2007 to over 3,500 acres in 2022.¹ To serve such growth, the Panhandle system has expanded in 2013, 2016, 2017, and 2019. This growth trend is anticipated to

¹ <https://www.ogvg.com/post/ogvg-applauds-the-province-for-supporting-economic-development-in-southwestern-ontario>

continue based on the results of the EOI and planned expansion of the Automotive Sector in the region in order to meet growing demands for electric vehicles.

The proposed Project provides current and future system capacity benefits and thus positions the Panhandle System to provide cost-effective capacity to meet the long-term needs summarized above. More specifically, the NPS 36 Panhandle Loop provides the best long-term solution to alleviate the NPS 20 bottleneck between Dover Transmission and Comber Transmission stations as the NPS 36 loop is extended to Comber Transmission. The NPS 36 provides an additional 8 TJ/d of capacity in the short-term (limited by the downstream bottleneck) and an additional 38 TJ/d once the loop is completed, when compared to the NPS 30 alternative.

By contrast, if the NPS 30 is selected and constructed instead of the NPS 36 and incremental capacity is required to serve greenhouse, automotive or other demand in the future, additional facilities would be required in Leamington-Kingsville area or beyond Comber Transmission to provide this capacity. Enbridge Gas can say with certainty that constructing the NPS 30, and subsequently these additional facilities, will not be economic in comparison to the proposed Project in terms of NPV or cost per unit of capacity.

- ii. **Cost Per Unit of Capacity** - The proposed Project is more cost effective than the NPS 30 alternative because it creates an additional 8 TJ/d of capacity in comparison (203 TJ/d vs 195 TJ/d)² and results in a lower cost per unit of capacity (\$1.55/TJ vs \$1.57/TJ).³ This additional capacity is critical when considering how best to serve the long-term demands discussed in part i. above.

If the NPS 30 alternative was constructed, Enbridge Gas expects that customer demand would surpass Panhandle System capacity by Winter 2027/2028. By contrast, if the proposed Project is constructed, Enbridge Gas expects that customer demand would surpass Panhandle System capacity by Winter 2028/2029. In other words, the Proposed project is expected to defer the need for additional Panhandle System facilities by one year.

- iii. **Operational Benefits** - The NPS 36 Panhandle Loop is a natural extension of the existing NPS 36 Panhandle Pipeline constructed as part of the 2017

² Exhibit I.STAFF.7 Attachment 1

³ Exhibit I.STAFF.7 Attachment 1

Panhandle Reinforcement Project (EB-2016-0186). This continuity of pipeline diameter ensures that the Company can complete consistent in-line inspections throughout the length of the system using a single tool which reduces:

- (i) high-risk gas handling activities associated with pipeline cleaning and integrity assessments;
- (ii) the station facilities and footprint that would otherwise be required if the pipeline diameter was reduced to NPS 30; and
- (iii) the cost of the integrity program itself.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Energy Probe ("EP")

INTERROGATORY

Reference:

Exhibit E, Tab 1, Schedule 1. Page 6, paragraph 9

Preamble:

This schedule indicates that the Project has a NPV of negative \$95 million and a PI of 0.63.

Question:

Considering the large negative NPV and a low PI of the proposed project did Enbridge consider asking contract customers with increased demand to pay a contribution or a surcharge? Please discuss.

Response

No, the economic analysis of the Project was completed in accordance with E.B.O. 134 Report of the Board ("E.B.O. 134"), as the Project consists entirely of transmission pipeline infrastructure to which distribution customers do not directly connect. Asking customers to pay a contribution or a surcharge is not applicable to the Project.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

INTERROGATORY

Reference:

Exhibit B, Tab 1, Schedule 1, p. 2-3, 7, 11, 13 including Table 1 & Attachments 1 & 2

Preamble:

EGL evidence states: Enbridge Gas's current Design Day demand forecast, discussed in detail below, indicates that the Panhandle System demand will increase by 22 TJ/d to 694 TJ/d by Winter 2022/2023, and by an additional 50 TJ/d to 744 TJ/d in Winter 2023/2024.

....

Contract rate customer demand makes up approximately 98% of the capacity of the proposed Project. At the time of filing, approximately 80% of the contract rate customer demand is subject to a customer commitment. Enbridge Gas has secured approximately 159 TJ/d of binding commitments with customers, including approximately 62 TJ/d of executed firm distribution contracts. Moreover, 100% of the 2023/2024 forecasted incremental demand on Panhandle System is currently secured with binding customer commitments.

Question:

We would like to understand better the forecasted growth and the amount of growth for which EGL has a binding commitment.

Please expand Table 1 with the amount of demand for which EGL has received a binding commitment and the amount that is requesting a move from interruptible to firm demand.

- a) Further please describe any monetary contractual commitments associated with these commitments such as aid-to-construct, minimum annual volume, term, consequences associated with not ultimately contracting for the future demand, etc.

Response

All existing contract rate demand for the Panhandle System is currently under binding commitment.

Of the incremental contract rate demand in Table 1 at Exhibit B, Tab 1, Schedule 1, Page 11, 167 TJ/d is under binding commitment. 58.6 TJ/d of the 167 TJ/d is for interruptible to firm service conversion.

Distribution contracts on annual renewals are evergreen unless notice to terminate has been provided by either party.

a) Please see Table 1 below for the breakdown of incremental contract rate demand currently under binding commitment.

Table 1

	TJ/d	
	As at Jun 10, 2022 (LTC filing)	As at Sep 22, 2022 (IR Responses)
PREP Capacity Commitments		
Executed Distribution Contracts	62	63
Executed Letters of Indemnity / Commitment Letters	97	104
Total PREP Capacity Commitments	159	167

After a customer has executed a distribution contract, they are responsible for the contract parameters and charges per the applicable rate schedule for the term of their contract. If a customer requests to terminate a contract prior to the end of the contract term, they will still be responsible for the remaining financial commitments of the contract. If a customer executes a Letter of Indemnity (“LOI”), and does not proceed to execute a distribution contract (i.e., cancels their plans), the customer will be liable for costs incurred by Enbridge Gas up to the amount covered by the Indemnification agreement. There are no monetary penalties for termination of a Commitment Letter (“CL”). However, terminating a CL may result in a customer not having access to the natural gas service they requested, if/when they need it in the future.

For distribution contract, Letter of Indemnity and Commitment Letter templates please see the response to Exhibit I.PP.5, Attachment 1.

Each customer that requests incremental contract rate service may require an individual service line, main extension, station(s), and/or local distribution

reinforcement to bring sufficient natural gas from the Panhandle System to their site. These costs will be the responsibility of the customer and will be assessed in accordance with E.B.O. 188 guidelines, which may result in the need for the customer to pay a contribution in aid of construction.

Capacity will be allocated on a first-come, first-served basis. Customers can request and contract for future capacity requirements at any time subject to the availability of such capacity. Enbridge Gas will reserve the contracted capacity for future demands provided that the customer agrees to pay the Demand Charges per the applicable rate schedule.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

INTERROGATORY

Reference:

Exhibit B, Tab 1, Schedule 1, p. 2-3, 7, 11, 13 including Table 1 & Attachments 1 & 2

Preamble:

EGL evidence states: Enbridge Gas's current Design Day demand forecast, discussed in detail below, indicates that the Panhandle System demand will increase by 22 TJ/d to 694 TJ/d by Winter 2022/2023, and by an additional 50 TJ/d to 744 TJ/d in Winter 2023/2024.

....

Contract rate customer demand makes up approximately 98% of the capacity of the proposed Project. At the time of filing, approximately 80% of the contract rate customer demand is subject to a customer commitment. Enbridge Gas has secured approximately 159 TJ/d of binding commitments with customers, including approximately 62 TJ/d of executed firm distribution contracts. Moreover, 100% of the 2023/2024 forecasted incremental demand on Panhandle System is currently secured with binding customer commitments.

Question:

Did EGL explore and discuss with customers what level of rate reduction that firm customers would need to move to interruptible?

a) If not, why not?

Response

No. Enbridge Gas did not specifically explore and discuss with existing customers in the Project area of study, what level of rate reduction would be required to incent customers currently contracted for firm service to move to interruptible service.

No such mechanism exists today to incent customers to convert existing firm service to interruptible service. The intent of the EOI process was to provide new and existing customers the opportunity to formally communicate their energy requirements to be met by natural gas under the current approved rates and services.

Most of the customers who submitted bids for new/incremental firm service, or to convert existing interruptible service to firm, are existing Enbridge Gas customers who are familiar with each type of service offering and the level of reliability/certainty of each service type. This was reflected in the bids received through the EOI process, with 99.7% of the total interest received being for new/incremental firm service or the conversion of existing interruptible service to firm. Please also see the response at Exhibit I.STAFF.4 part a) for the results of the EOI.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

INTERROGATORY

Reference:

Exhibit B, Tab 1, Schedule 1, p. 2-3, 7, 11, 13 including Table 1 & Attachments 1 & 2

Preamble:

EGL evidence states: Natural gas is uniquely suited to the greenhouse sector. It is used to heat greenhouses and to supply the carbon dioxide requirements ("CO₂") of the growing plants. A common practice within the greenhouse sector is to capture the CO₂ that would normally be emitted into the atmosphere upon combustion of natural gas and use it within the greenhouse where it is consumed by the growing plants, resulting in faster growth and increased production.

Question:

Has EGL considered a different rate for greenhouses that reflects the benefits to greenhouse owners as higher than customers who simply use natural gas for energy?

a) If not, why not?

Response

No, Enbridge Gas has not considered a rate design that is specific to any one industry, including the greenhouse sector.

a) Costs are allocated to rate classes based on the cost to serve customers in the rate class. The distribution cost to serve one unit of demand of a customer in the greenhouse sector is no different than the distribution cost to serve one unit of demand of a customer in another industry.

Eligible commercial greenhouse customers are provided specific relief from the Federal Carbon Charge under the Greenhouse Gas Pollution Pricing Act as a result of the nature of the greenhouse sector operations.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

INTERROGATORY

Reference:

Exhibit B, Tab 1, Schedule 1, p. 2-3, 7, 11, 13 including Table 1 & Attachments 1 & 2

Preamble:

EGI evidence states: Natural gas is uniquely suited to the greenhouse sector. It is used to heat greenhouses and to supply the carbon dioxide requirements ("CO₂") of the growing plants. A common practice within the greenhouse sector is to capture the CO₂ that would normally be emitted into the atmosphere upon combustion of natural gas and use it within the greenhouse where it is consumed by the growing plants, resulting in faster growth and increased production.

Question:

For the schematic structure provided in Attachment 1, in tabular format, please provide the throughput and direction through:

- a) Dover Transmission to the NPS 16 & separately to the NPS 20
- b) Leamington North Gate (please add pressure also)
- c) Grand Marais Station
- d) Sandwich Station
- e) Ojibway Measurement (table shows demand of 30TJ – seeking clarification)
- f) Detroit River Crossing

Response

The Company is interpreting FRPO's reference to "Attachment 1" to be Exhibit B, Tab 2, Schedule 1, Attachment 1.

Please see Table 1 below for Winter 2023/2024 throughput and gas flow direction, without the proposed Project. In response to the clarification requested for item e), there are several distribution stations in the vicinity of Ojibway Measurement that were assigned to the Ojibway Measurement node within the schematics. Exhibit B, Tab 2,

Schedule 1, Attachment 1, shows that on design day there is 30,723 GJ/d of demand being served to customers from that general location. Thus the 60,138 GJ/d of Ojibway supply coming into the Panhandle System at the River Crossing passes through the Ojibway Measurement Station, serves the demand associated with the distribution stations near to the Ojibway Measurement Station, and the remaining 29,415 GJ/d flows easterly into the NPS 16 Panhandle System to serve other customer demands.

Table 1: Throughput and Direction at Existing Facilities Without the Project

W23/24 Existing Facilities (without Proposed Project)	Throughput	Direction	Requested Pressure
Location	GJ/d	Flow	kPag
Dawn Supply	683,931	Westerly	
Dover Transmission Station to NPS 16	172,544	Westerly	
Dover Transmission Station to NPS 20	404,010	Westerly	
Leamington North Gate Station	20,372	South	1,781
Grand Marais Station	19,879	Westerly	
Sandwich Station	95,632	Westerly	
Ojibway Measurement to Windsor	60,138	North/South	
Detroit River Crossing (Ojibway Supply)	60,138	Easterly	

ENBRIDGE GAS INC.

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

INTERROGATORY

Reference:

Exhibit B, Tab 1, Schedule 1, p. 2-3, 7, 11, 13 including Table 1 & Attachments 1 & 2

Preamble:

EGI evidence states: Natural gas is uniquely suited to the greenhouse sector. It is used to heat greenhouses and to supply the carbon dioxide requirements ("CO₂") of the growing plants. A common practice within the greenhouse sector is to capture the CO₂ that would normally be emitted into the atmosphere upon combustion of natural gas and use it within the greenhouse where it is consumed by the growing plants, resulting in faster growth and increased production.

Question:

Please provide the information in Attachment 1, including the flows requested in IR#4 above, with the addition of:

- a) The proposed 19 km of NPS 36 with demands for:
 - i) Winter 2023/24
 - ii) Winter 2030/31 (using Table 1 demands)
- b) The proposed 12 km of NPS 16 with demands for:
 - i) Winter 2023/24
 - ii) Winter 2030/31 (using Table 1 demands)
- c) Both the proposed 19 km of NPS 36 and the 12km of NPS 16 with demands for:
 - i) Winter 2023/24
 - ii) Winter 2030/31 (using Table 1 demands)

Response

The Company is interpreting FRPO's reference to "Attachment 1" to be Exhibit B, Tab 2, Schedule 1, Attachment 1. Please note that while Attachments 1-4 discussed below are marked as confidential in nature, that is solely for internal document control purposes and thus can be disregarded for the purposes of this response.

- a)
 - i. Please see Attachment 1 to this response for the proposed 19 km of NPS 36 with demand for Winter 2023/2024.
 - ii. The proposed 19 km of NPS 36 with demand for Winter 2030/2031 cannot be provided as requested as the Company's hydraulic model returned an infeasible result due to extremely low system pressures, and the model would not balance. In this scenario, there is a growing shortfall from Winter 2023/2024 to Winter 2029/2030 of 244 TJ/day. When the 19 km of NPS 36 is added in Winter 2030/2031 as suggested, the shortfall drops to 67 TJ/d.

- b)
 - i. Please see Attachment 2 to this response for the proposed 12 km of NPS 16 with demand for Winter 2023/2024.
 - ii. The proposed 12 km of NPS 16 with demands for Winter 2030/2031 cannot be provided as requested as the Company's hydraulic model returned an infeasible result due to extremely low system pressures, and the model would not balance. In this scenario, similar to a) ii. above, there is a growing shortfall from Winter 2023/2024 to Winter 2029/2030 of 244 TJ/day. When this 12 km of NPS 16 is added in Winter 2030/2031 as proposed, the shortfall drops to 226 TJ/d.

- c)
 - i. Please see Attachment 3 to this response for the proposed 19 km of NPS 36 and the proposed 12 km of NPS 16 with demand for Winter 2023/2024.
 - ii. Please see Attachment 4 to this response for the proposed 19 km of NPS 36 and the proposed 12 km of NPS 16 with demands for Winter 2030/2031.

W2023/2024 Proposed 19 km of NPS 36 Schematic and Summary Table

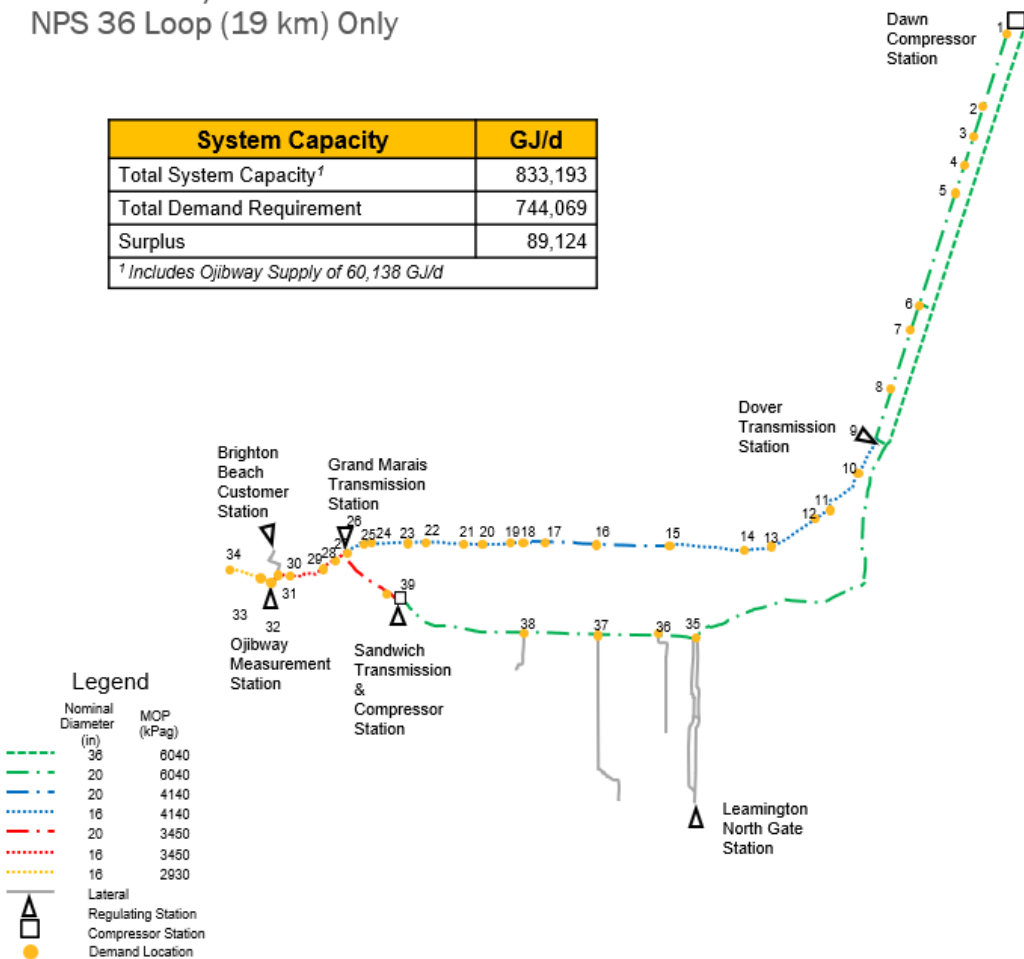
Panhandle Transmission System

Winter Design Day Schematic
 Winter 2023/2024
 NPS 36 Loop (19 km) Only



System Capacity	GJ/d
Total System Capacity ¹	833,193
Total Demand Requirement	744,069
Surplus	89,124

¹ Includes Ojibway Supply of 60,138 GJ/d



Legend

Nominal Diameter (in)	MOP (kPag)
36	6040
20	6040
20	4140
16	4140
20	3450
16	3450
16	2930

Lateral
 Regulating Station
 Compressor Station
 Demand Location

W23/24	Station Name	Kilometre Post (km)	Demand (GJ/d)	Pressure (kPag)
	1 Dawn / Dawn West Lines	0	17742	5999
	2 Tolloch & Mandaumin	4.3	0	5980
	3 Chatham Gore Conc 4	10	0	5956
	4 Lindsay Tile Yard	12.9	37	5944
	5 Tupperville	15.2	3694	5935
	6 Dover Centre	27	83976	5877
	7 Cartier	29.4	0	5868
	8 Bechard	34.9	1927	5848
	9 Dover Transmission	40	0	5828
	10 Bradley	44.1	0	3918
	11 T. N. Lighthouse	48.9	187	3712
	12 Tilbury North TO	50.7	3995	3632
	13 Tilbury Conc 2	55.8	0	3384
	14 Stoney Point	58.7	1223	3238
	15 St Joachim	65.4	494	2892
	16 Belle River	72.6	3731	2764
	17 Puce	77.8	2336	2673
	18 Wallace	79.4	32	2640
	19 Patillo	80.9	5139	2614
	20 Elmstead	83	1537	2469
	21 Manning	85.2	7523	2313
	22 Lauzon TO	88.9	50000	2051
	23 Ford Marentette TO	90.7	3253	2012
	24 TransAlta / East Windsor TO	94.2	36242	1942
	25 Walker	94.9	36971	1939
	26 Grand Marais	97.1	26671	1937
	27 NPS 16/20 Interconnect	108.1	0	1940
	28 Bruce	109.4	3797	1930
	29 California	111.4	14812	1891
	30 Titcombe	114.9	13451	1850
	31 Brighton Beach and WWP	116.2	72314	1829
	32 Ojibway Measurement	116.6	30723	1842
	33 Ojibway Valve	117.9	0	1867
	34 River Crossing	118.6	0	1910
	35 Comber	71.2	181251	4980
	36 Mersea	75	43029	4909
	37 Kingville	80	78083	4840
	38 Essex	88.1	6014	4797
	39 Sandwich Transmission	101.1	13881	2013
Total			744069	

CONFIDENTIAL

W23/24 NPS 36 Loop Only	Throughput	Direction	Requested Pressure
Location	GJ/d	Flow	kPag
Dawn Supply	683931	Westerly	
Dover Transmission to NPS 16	172544	Westerly	
Dover Transmission to NPS 20	404010	Westerly	
Leamington North Gate Station	20372	South	3783
Grand Marais Station	19879	Westerly	
Sandwich Station	95632	Westerly	
Ojibway Measurement to Windsor	60138	North/South	
Detroit River Crossing (Ojibway Supply)	60138	Easterly	

W2023/2024 Proposed 12 km of NPS 16 Schematic and Summary Table

Panhandle Transmission System

Winter Design Day Schematic

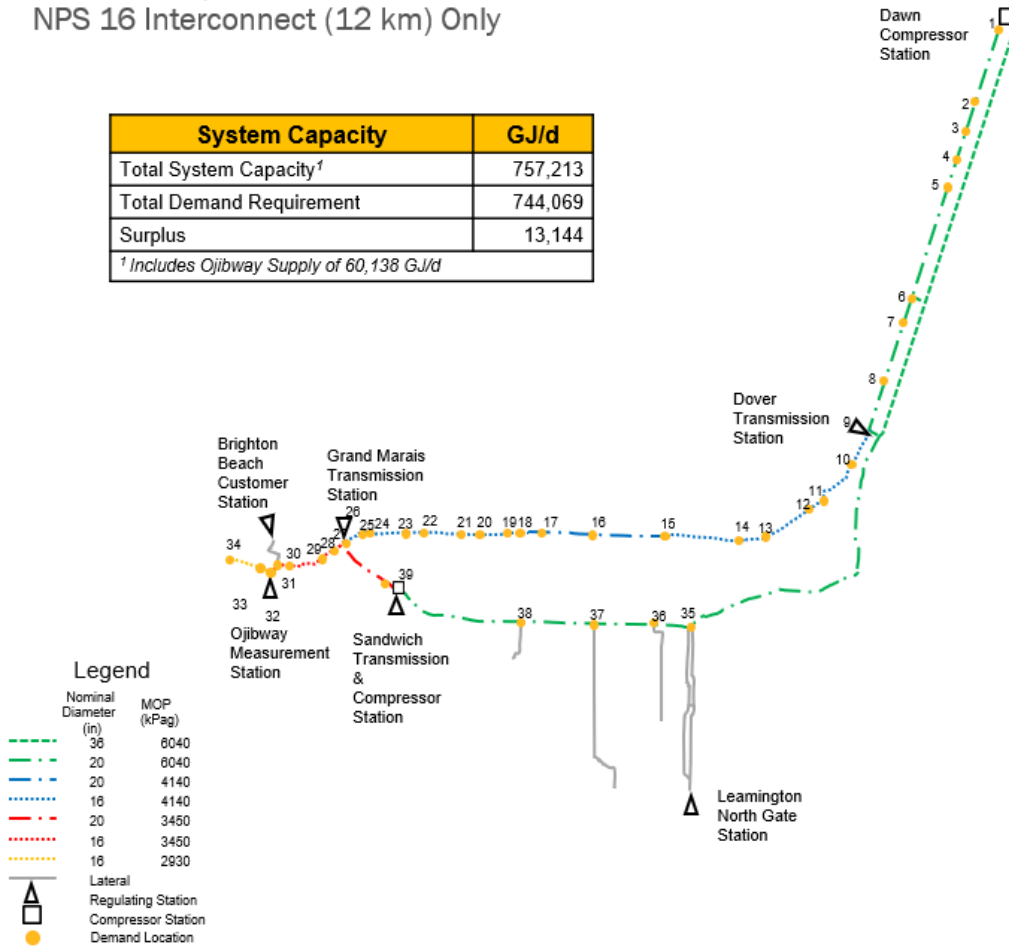
Winter 2023/2024

NPS 16 Interconnect (12 km) Only



System Capacity	GJ/d
Total System Capacity ¹	757,213
Total Demand Requirement	744,069
Surplus	13,144

¹ Includes Ojibway Supply of 60,138 GJ/d



CONFIDENTIAL

W23/24	Station Name	Kilometre Post (km)	Demand (GJ/d)	Pressure (kPag)
1	Dawn / Dawn West Lines	0	17742	5999
2	Tolloch & Mandaumin	4.3	0	5981
3	Chatham Gore Conc 4	10	0	5959
4	Lindsay Tile Yard	12.9	37	5947
5	Tupperville	15.2	3694	5939
6	Dover Centre	27	83976	5884
7	Cartier	29.4	0	5875
8	Bechard	34.9	1927	5856
9	Dover Transmission	40	0	5837
10	Bradley	44.1	0	3918
11	T. N. Lighthouse	48.9	187	3712
12	Tilbury North TO	50.7	3995	3632
13	Tilbury Conc 2	55.8	0	3385
14	Stoney Point	58.7	1223	3238
15	St Joachim	65.4	494	2892
16	Belle River	72.6	3731	2765
17	Puce	77.8	2336	2673
18	Wallace	79.4	32	2641
19	Patillo	80.9	5139	2615
20	Elmstead	83	1537	2470
21	Manning	85.2	7523	2314
22	Lauzon TO	88.9	50000	2052
23	Ford Marentette TO	90.7	3253	2013
24	TransAlta / East Windsor TO	94.2	36242	1943
25	Walker	94.9	36971	1940
26	Grand Marais	97.1	26671	1938
27	NPS 16/20 Interconnect	108.1	0	1940
28	Bruce	109.4	3797	1931
29	California	111.4	14812	1891
30	Titcombe	114.9	13451	1851
31	Brighton Beach and WWP	116.2	72314	1830
32	Ojibway Measurement	116.6	30723	1843
33	Ojibway Valve	117.9	0	1868
34	River Crossing	118.6	0	1910
35	Comber	71.2	181251	3578
36	Mersea	75	43029	3429
37	Kingsville	80	78083	3266
38	Essex	88.1	6014	3205
39	Sandwich Transmission	101.1	13881	2013
Total			744069	

W23/24 Interconnect Only	Throughput	Direction	Requested Pressure
Location	GJ/d	Flow	kPag
Dawn Supply	683931	Westerly	
Dover Transmission to NPS 16	172544	Westerly	
Dover Transmission to NPS 20	404010	Westerly	
Leamington North Gate Station	20372	South	2624
Grand Marais Station	19879	Westerly	
Sandwich Station	95604	Westerly	
Ojibway Measurement to Windsor	60138	North/South	
Detroit River Crossing (Ojibway Supply)	60138	Easterly	

W2023/2024 Proposed 19 km of NPS 36 and the 12km of NPS 16 Schematic and Summary Table

Panhandle Transmission System

Winter Design Day Schematic

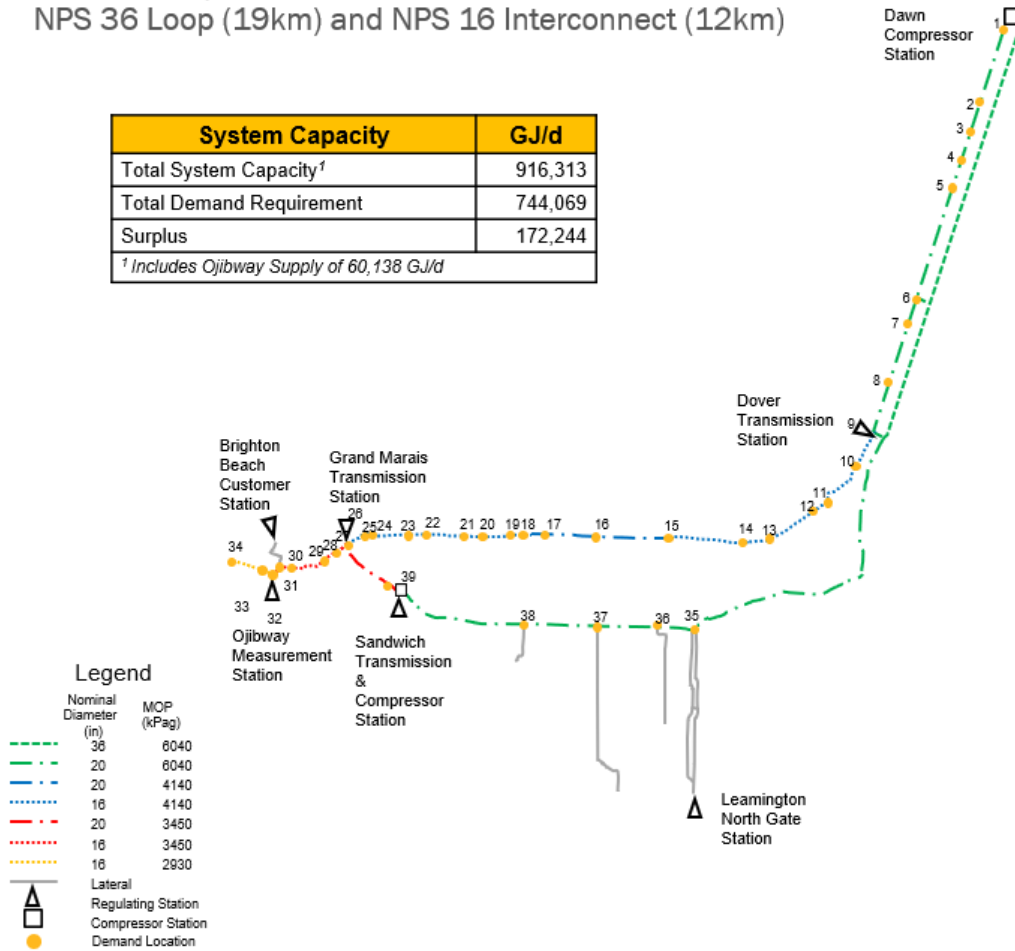
Winter 2023/2024

NPS 36 Loop (19km) and NPS 16 Interconnect (12km)



System Capacity	GJ/d
Total System Capacity ¹	916,313
Total Demand Requirement	744,069
Surplus	172,244

¹ Includes Ojibway Supply of 60,138 GJ/d



CONFIDENTIAL

W23/24	Station Name	Kilometre Post (km)	Demand (GJ/d)	Pressure (kPag)
	1 Dawn / Dawn West Lines	0	17742	5999
	2 Tolloch & Mandaumin	4.3	0	5980
	3 Chatham Gore Conc 4	10	0	5956
	4 Lindsay Tile Yard	12.9	37	5944
	5 Tupperville	15.2	3694	5935
	6 Dover Centre	27	83976	5877
	7 Cartier	29.4	0	5868
	8 Bechard	34.9	1927	5848
	9 Dover Transmission	40	0	5828
	10 Bradley	44.1	0	3918
	11 T. N. Lighthouse	48.9	187	3712
	12 Tilbury North TO	50.7	3995	3632
	13 Tilbury Conc 2	55.8	0	3384
	14 Stoney Point	58.7	1223	3238
	15 St Joachim	65.4	494	2892
	16 Belle River	72.6	3731	2764
	17 Puce	77.8	2336	2673
	18 Wallace	79.4	32	2640
	19 Patillo	80.9	5139	2614
	20 Elmstead	83	1537	2469
	21 Manning	85.2	7523	2314
	22 Lauzon TO	88.9	50000	2052
	23 Ford Marentette TO	90.7	3253	2012
	24 TransAlta / East Windsor TO	94.2	36242	1943
	25 Walker	94.9	36971	1939
	26 Grand Marais	97.1	26671	1938
	27 NPS 16/20 Interconnect	108.1	0	1940
	28 Bruce	109.4	3797	1930
	29 California	111.4	14812	1891
	30 Titcombe	114.9	13451	1850
	31 Brighton Beach and WWP	116.2	72314	1829
	32 Ojibway Measurement	116.6	30723	1842
	33 Ojibway Valve	117.9	0	1867
	34 River Crossing	118.6	0	1910
	35 Comber	71.2	181251	4983
	36 Mersea	75	43029	4874
	37 Kingsville	80	78083	4757
	38 Essex	88.1	6014	4713
	39 Sandwich Transmission	101.1	13881	2013
Total			74 4069	

W23/24 NPS 36 Panhandle Loop and Leamington Interconnect	Throughput	Direction	Requested Pressure
Location	GJ/d	Flow	kPag
Dawn Supply	683931	Westerly	
Dover Transmission to NPS 16	172556	Westerly	
Dover Transmission to NPS 20 and 36	403999	Westerly	
Leamington North Gate Station	20376	South	4331
Grand Marais Station	19907	Westerly	
Sandwich Station	95632	Westerly	
Ojibway Measurement to Windsor	60138	North/South	
Detroit River Crossing (Ojibway Supply)	60138	Easterly	

W2030/2031 Proposed 19 km of NPS 36 and the 12km of NPS 16 Schematic and Summary Table

Panhandle Transmission System

Winter Design Day Schematic

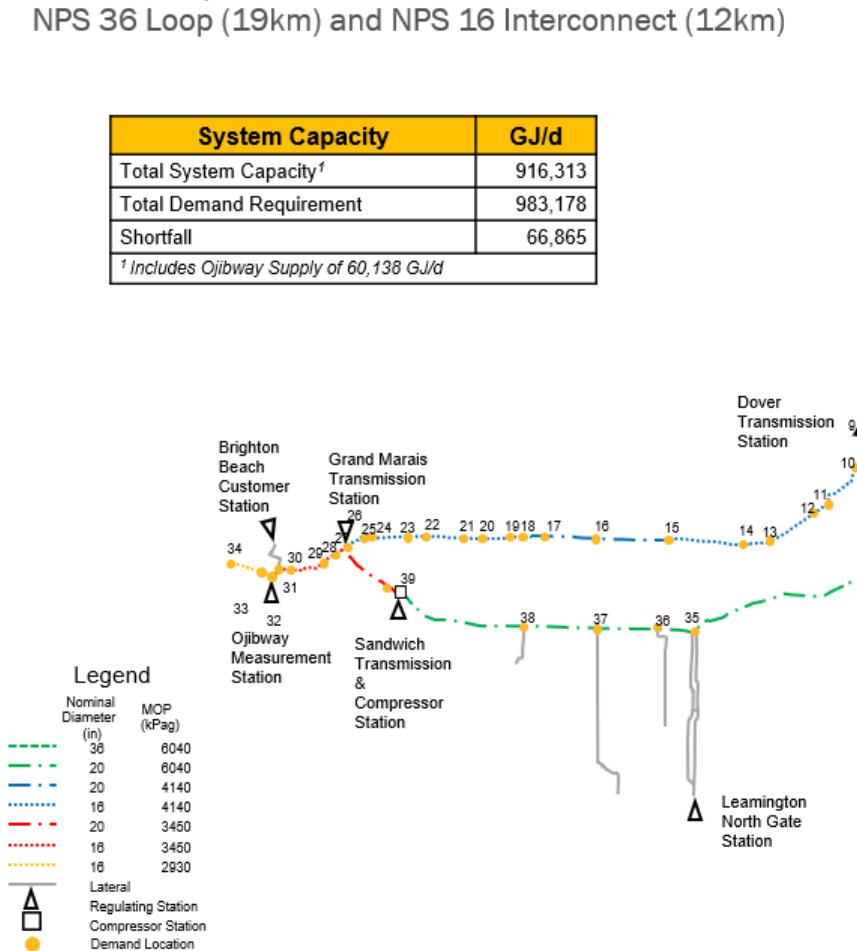
Winter 2030/2031

NPS 36 Loop (19km) and NPS 16 Interconnect (12km)



System Capacity	GJ/d
Total System Capacity ¹	916,313
Total Demand Requirement	983,178
Shortfall	66,865

¹ Includes Ojibway Supply of 60,138 GJ/d



CONFIDENTIAL

W30/31	Station Name	Kilometre Post (km)	Demand (GJ/d)	Pressure (kPag)
1	Dawn / Dawn West Lines	0	17854	5999
2	Tolloch & Mandaumin	4.3	0	5966
3	Chatham Gore Conc 4	10	0	5923
4	Lindsay Tile Yard	12.9	37	5901
5	Tupperville	15.2	3716	5886
6	Dover Centre	27	84228	5785
7	Cartier	29.4	0	5768
8	Bechard	34.9	1936	5730
9	Dover Transmission	40	0	5692
10	Bradley	44.1	0	3917
11	T. N. Lighthouse	48.9	194	3709
12	Tilbury North TO	50.7	4113	3628
13	Tilbury Conc 2	55.8	0	3378
14	Stoney Point	58.7	1263	3230
15	St Joachim	65.4	510	2880
16	Belle River	72.6	3854	2752
17	Puce	77.8	2413	2659
18	Wallace	79.4	33	2626
19	Patillo	80.9	5283	2599
20	Elmstead	83	1588	2450
21	Manning	85.2	7771	2290
22	Lauzon TO	88.9	51016	2017
23	Ford Marentette TO	90.7	3361	1974
24	TransAlta / East Windsor TO	94.2	36242	1898
25	Walker	94.9	37666	1894
26	Grand Marais	97.1	27506	1887
27	NPS 16/20 Interconnect	108.1	0	1889
28	Bruce	109.4	3909	1864
29	California	111.4	15259	1759
30	Titcombe	114.9	13789	1612
31	Brighton Beach and WWP	116.2	129996	1511
32	Ojibway Measurement	116.6	31364	1573
33	Ojibway Valve	117.9	0	1601
34	River Crossing	118.6	0	1651
35	Comber	71.2	290430	3422
36	Mersea	75	90681	3063
37	Kingsville	80	96710	2643
38	Essex	88.1	6139	2497
39	Sandwich Transmission	101.1	14318	2310
Total			983178	

W30/31 NPS 36 Panhandle Loop and Leamington Interconnect	Throughput	Direction	Requested Pressure
Location	GJ/d	Flow	kPag
Dawn Supply	923040	Westerly	
Dover Transmission to NPS 16	167465	Westerly	
Dover Transmission to NPS 20 and 36	647805	Westerly	
Leamington North Gate Station	20874	South	1496
Grand Marais Station	12158	Westerly	
Sandwich Station	163845	Westerly	
Ojibway Measurement to Windsor	60138	North/South	
Detroit River Crossing (Ojibway Supply)	60138	Easterly	

ENBRIDGE GAS INC.

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

INTERROGATORY

Reference:

Exhibit B, Tab 2, Schedule 1, p. 3, 5, 6, 7 and
EB-2016-0186 including Exhibit K2.1 Union_Further Correspondence_20161122

Preamble:

EGI evidence states: Two NPS 12 pipelines ("Detroit River Crossing" or "the crossings") connect the NPS 16 Panhandle Line at Ojibway to the Panhandle Eastern Pipeline System ("Panhandle Eastern") at the International Border. This interconnection was established in 1947 and is commercially known as Ojibway. The Detroit River Crossing MOP is 2930 kPag.

We would like to understand more about EGI's review of the potential for increasing supply at Ojibway. During the last major Panhandle Reinforcement proceeding, EB-2016-0186, there was significant evidence regarding Energy Transfer's desire to increase deliveries to Dawn including the potential to obligate at Ojibway. We understand that EGI held discussions with Rover, of which Energy Transfer holds an ownership position, but we are interested in discussions with Energy Transfer who owns the Panhandle Eastern Pipeline.

Question:

Please summarize the contractual agreements that Union Gas/Enbridge Gas Inc. had/have with Energy Transfer as it relates to Panhandle Eastern deliveries to and through Ojibway to the EGI's Panhandle system:

- a) Prior to November 1, 2016
- b) After November 1, 2016, as the agreements relate to negotiations occurring during the proceeding.
- c) Currently

Response

Enbridge Gas does not accept FRPO's interpretation of the Panhandle Reinforcement Project proceeding (EB-2016-0186) in the preamble, specifically the statement that "there was significant evidence regarding Energy Transfer Partners' desire to increase deliveries to Dawn including the potential to obligate at Ojibway". Energy Transfer did not express interest in increasing deliveries at Dawn as part of the Panhandle Reinforcement Project proceeding.¹ Rather, Rover LLC executed contracts for Ojibway to Dawn C1 service that were presented in that same proceeding and has not requested incremental capacity since.

- a) Table 1 below includes contracts held by Union Gas Limited with Energy Transfer for capacity on the Panhandle Eastern Pipeline to Ojibway prior to November 1, 2016. All contracts listed in Table 1 are for firm transportation capacity.

Table 1: Contracts held by Union Gas with Energy Transfer for capacity on the Panhandle Eastern Pipeline to Ojibway prior to November 1, 2016.

Contract	Path	Volume (TJ/d)	Expiry
19605	PEPL FZ to Ojibway	26	October 2017
43059	PEPL FZ to Ojibway	11	October 2017
36203	PEPL FZ to Ojibway	2	October 2017
21273 (Trunkline)	Gulf to Ojibway	21	October 2017

- b) and c)

Table 2 below includes contracts held by Union Gas Limited (now Enbridge Gas) with Energy Transfer for capacity on the Panhandle Eastern Pipeline to Ojibway after November 1, 2016. There have been no changes to the contracts since this time.

¹ EB-2016-0186, Technical Conference Transcript, Day 2, Page 30, MR. REDFORD: Well, again, so an obligated flow at Ojibway, somebody has to control that into Ojibway. And in our discussions with Rover, they're not willing to do that. In fact, they don't have title to the gas. So ultimately we would have to nominate -- or we would have to buy supply from one of the Rover shippers at Dawn, and then once that was -- that was done, then they would route that supply through Ojibway. They're not -- when you look at -- and we have confirmed this with Rover. Ojibway is not a delivery point on the Rover system. It's not included in their tariff which was filed, and it is confidentially filed with FERC. But they have told us that it is not -- it is not a primary delivery point and it's not -- they did not include it in their secondary delivery points.

Table 2: Contracts held by Union Gas (now Enbridge Gas) with Energy Transfer for capacity on the Panhandle Eastern Pipeline to Ojibway after November 1, 2016.

Contract	Path	Volume (TJ/d)	Expiry
43059	PEPL FZ to Ojibway	23	October 2027
19605	PEPL FZ to Ojibway	37	October 2025

ENBRIDGE GAS INC.

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

INTERROGATORY

Reference:

Exhibit B, Tab 2, Schedule 1, p. 3, 5, 6, 7 and
EB-2016-0186 including Exhibit K2.1 Union_Further Correspondence_20161122

Preamble:

EGI evidence states: Two NPS 12 pipelines ("Detroit River Crossing" or "the crossings") connect the NPS 16 Panhandle Line at Ojibway to the Panhandle Eastern Pipeline System ("Panhandle Eastern")² at the International Border. This interconnection was established in 1947 and is commercially known as Ojibway. The Detroit River Crossing MOP is 2930 kPag.

² Panhandle Eastern Pipe Line Company, LP is owned by Energy Transfer Equity L.P.

We would like to understand more about EGI's review of the potential for increasing supply at Ojibway. During the last major Panhandle Reinforcement proceeding, EB-2016-0186, there was significant evidence regarding Energy Transfer's desire to increase deliveries to Dawn including the potential to obligate at Ojibway. We understand that EGI held discussions with Rover, of which Energy Transfer holds an ownership position, but we are interested in discussions with Energy Transfer who owns the Panhandle Eastern Pipeline.

Question:

Please file EB-2016-0186 Exhibit K2.1

- a) Please file all correspondence (letters, emails, other electronic communication, etc.) between Energy Transfer and Union Gas/Enbridge Gas Inc. since Dec. 1, 2016, that relates to capacity on Panhandle Eastern to and potentially through Ojibway to EGI's Panhandle system.
- b) Did EGI approach Energy Transfer regarding:
 - i) Obligating deliveries as contemplated in Exhibit K2.1?
(1) If not, why not?
 - ii) Increasing capacity across the Detroit River?
(1) If not, why not?

Response

Enbridge Gas does not accept FRPO's interpretation of the Panhandle Reinforcement Project proceeding (EB-2016-0186) in the preamble, specifically the statement that "there was significant evidence regarding Energy Transfer Partners' desire to increase deliveries to Dawn including the potential to obligate at Ojibway". Energy Transfer did not express interest in increasing deliveries at Dawn as part of the Panhandle Reinforcement Project proceeding.¹ Rather, Rover LLC executed contracts for Ojibway to Dawn C1 service that were presented in that same proceeding and has not requested incremental capacity since.

For the reasons above, as undertaking responses from the Panhandle Reinforcement Project proceeding are already a matter of public record, and as it bears no relevance to and would not provide any value to the OEB in the current Project proceeding, Enbridge Gas respectfully declines to file the exhibit requested by FRPO.

a) Please see Attachment 1 to this response for correspondence between Enbridge Gas and Energy Transfer, regarding Energy Transfer's ability to participate in the Request for Proposal (RFP) for delivered service at Ojibway as a supply-side alternative for the proposed Project. Correspondence with Energy Transfer dealing with matters outside of the current Project are not relevant to the current proceeding.

b)

- i. Enbridge Gas has confirmed again that Energy Transfer is not able to obligate deliveries; consistent with previous discussions as contemplated in the Panhandle Reinforcement Project proceeding, as discussed above.

Enbridge Gas developed the RFP for the firm exchange service to be inclusive to ex-franchise shippers with capacity on the PEPL system, in addition to shippers holding firm C1 transportation capacity on the Enbridge Gas Ojibway to Dawn path of the Panhandle Transmission System.

¹ EB-2016-0186, Technical Conference Transcript, Day 2, Page 30, MR. REDFORD: Well, again, so an obligated flow at Ojibway, somebody has to control that into Ojibway. And in our discussions with Rover, they're not willing to do that. In fact, they don't have title to the gas. So ultimately we would have to nominate -- or we would have to buy supply from one of the Rover shippers at Dawn, and then once that was -- that was done, then they would route that supply through Ojibway. They're not -- when you look at -- and we have confirmed this with Rover. Ojibway is not a delivery point on the Rover system. It's not included in their tariff which was filed, and it is confidentially filed with FERC. But they have told us that it is not -- it is not a primary delivery point and it's not -- they did not include it in their secondary delivery points.

Enbridge Gas launched its firm exchange service RFP on September 16, 2021. On September 19, 2021, Enbridge Gas held a virtual meeting with members of Energy Transfer to determine whether they were interested in participating in the RFP, which would provide firm deliveries at Ojibway. Energy Transfer indicated that as a transmission pipeline operator, they transport gas for others and therefore are unable to offer a firm exchange and would not bid on the RFP.

- ii. Please see the response to Exhibit I.FRPO.8 for explanation as to why increasing capacity via the Detroit River Crossings is not a cost-effective alternative.

As discussed in Enbridge Gas's most recent Asset Management Plan, Enbridge Gas is planning to replace the existing NPS 12 Detroit River crossings to provide equivalent capacity, and is currently in discussion with Energy Transfer on a joint project to that effect.

Matt Thomas

Subject: Enbridge RFP
Location: WebEx

Start: Mon 9/20/2021 12:30 PM
End: Mon 9/20/2021 1:30 PM

Recurrence: (none)

Meeting Status: Accepted

Organizer: Reid, John

-----Original Appointment-----

From: Reid, John <John.Reid@energytransfer.com>

Sent: September 17, 2021 2:18 PM

To: Reid, John; Hilary Thompson

Cc: Hill, Bryan D.; Colton, Joey

Subject: Enbridge RFP

When: September 20, 2021 11:30 AM-12:30 PM (UTC-06:00) Central Time (US & Canada).

Where: WebEx

EXTERNAL: PLEASE PROCEED WITH CAUTION.

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Meeting Name	: EGI & ETP Call re: Ojibway RFP	Meeting Date	: 2021-09-21
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Location	: Remote via Webex	Next Meeting Date	: N/A
Time	: 12:30 – 1 pm Eastern	Location	: Chatham
Recorded By	: Matt Thomas	Date Issued	: 2020-09-20

Attendees			
<input checked="" type="checkbox"/> Hilary Thompson	<input checked="" type="checkbox"/> Jeff Cadotte	<input checked="" type="checkbox"/> Paul Dhaen	<input checked="" type="checkbox"/> Matt Thomas
<input checked="" type="checkbox"/> John Reid	<input checked="" type="checkbox"/> Bryan Hill	<input checked="" type="checkbox"/> Joey Colton	<input type="checkbox"/>

Description of Item
<p>Purpose of Call: Respond to questions from Energy Transfer Partners re: RFP for Ojibway deliveries launched on Sept 16th</p> <p>ETP inquired about the background of the Ojibway RFP and the capacities outlined in the RFP. EGI clarified that the RFP is being contemplated as an Integrated Resource Planning alternative to provide incremental Panhandle Transmission System capacity.</p> <p>EGI has customers providing gas at Dawn and the firm exchange between Ojibway & Dawn, facilitated via capacity on Panhandle Eastern Pipeline may be as an alternative to constructing facilities between Dawn and Ojibway to provide the equivalent capacity and system benefits.</p> <p>EGI clarified the amounts included in the RFP includes the 37 TJ/d currently contracted by ETP and are not above and beyond the existing contracts consistent with Table 1. ETP indicated that as a transmission pipeline operator they transport gas for others and therefore are unable to offer a firm exchange and will not bid in the RFP.</p>

Table 1 – Ojibway Import Capability

<u>Capacity</u>	<u>Long Term (Annual) [TJ/d]</u>	<u>Short-Term (Winter-Only) [TJ/d]</u>
Total Ojibway Import Capability	115	140
Gas Supply (Included in Design Day)	60	60
C1 (Rover LLC)	37	37
Available for Exchange	18	43
RFP Offering	55	80

ENBRIDGE GAS INC.

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

INTERROGATORY

Reference:

Exhibit B, Tab 2, Schedule 1, p. 3, 5, 6, 7 and
EB-2016-0186 including Exhibit K2.1 Union_Further Correspondence_20161122

Preamble:

EGI evidence states: Two NPS 12 pipelines ("Detroit River Crossing" or "the crossings") connect the NPS 16 Panhandle Line at Ojibway to the Panhandle Eastern Pipeline System ("Panhandle Eastern")² at the International Border. This interconnection was established in 1947 and is commercially known as Ojibway. The Detroit River Crossing MOP is 2930 kPag.

² Panhandle Eastern Pipe Line Company, LP is owned by Energy Transfer Equity L.P.

We would like to understand more about EGI's review of the potential for increasing supply at Ojibway. During the last major Panhandle Reinforcement proceeding, EB-2016-0186, there was significant evidence regarding Energy Transfer's desire to increase deliveries to Dawn including the potential to obligate at Ojibway. We understand that EGI held discussions with Rover, of which Energy Transfer holds an ownership position, but we are interested in discussions with Energy Transfer who owns the Panhandle Eastern Pipeline.

Question:

Please provide the most recent determination of cost estimate for increasing capacity across the Detroit River.

Response

Enbridge Gas does not accept FRPO's interpretation of the Panhandle Reinforcement Project proceeding (EB-2016-0186) in the preamble, specifically the statement that "there was significant evidence regarding Energy Transfer Partners' desire to increase deliveries to Dawn including the potential to obligate at Ojibway". Energy Transfer did not express interest in increasing deliveries at Dawn as part of the Panhandle Reinforcement Project proceeding. Rather, Rover LLC executed contracts for Ojibway to Dawn C1 service that were presented in that same proceeding and has not requested incremental capacity since.

Please refer to Exhibit C, Tab 1, Schedule 1 for Enbridge Gas' assessment of incremental firm supply availability through the PEPL facilities at Ojibway.

Currently, the capacity of the Detroit River Crossings is 195 mmscfd (~217 TJ/d) based on the Presidential Permit. However, Enbridge Gas's ability to import this volume is limited by the Windsor Market and facilities available to transport the imported gas from Ojibway to Dawn throughout all months of the year. In the summer, additional facilities are required at the west end of the Panhandle system to transport gas incremental to the available market to Dawn. In the winter, facilities are still required from Dawn to meet peak day demands that cannot be entirely served from Ojibway. Also, the ability to import supply at Ojibway is limited by the Panhandle Eastern Pipeline's ("PEPL") ability to deliver gas to the Detroit River Crossing.¹

Enbridge Gas is currently unable to import the 217 TJ/d, as the existing system is limited by the current Windsor Market and the current Sandwich Compressor (please see the response to Exhibit I.FRPO.10).

¹ In the previous Panhandle Reinforcement project (EB-2016-0186) Enbridge Gas evaluated increased capacity across the Detroit River which included additional Enbridge Gas facilities, PEPL facilities in Michigan, and the cost for incremental firm Ojibway deliveries. As noted in EB-2016-0186, Exhibit B.IGUA.9 d), Enbridge Gas (formerly Union Gas) stated: "Union did contemplate increased capacity by replacing the existing NPS 12 Detroit River Crossing pipelines with a single NPS 20 pipeline. This alternative is complex requiring significant new facilities on the PEPL system upstream of the Detroit River Crossing to provide a minimum of 3,450 kPag (500 Psig) at Ojibway and new facilities on Union's Panhandle System between Ojibway and consuming markets. Without new upstream facilities, a new river crossing would still only be able to deliver 2,930 kPag (425 Psig), the MOP of the upstream PEPL pipeline facilities. Union explored this alternative with PEPL however the large amount of facilities required made this alternative cost prohibitive. PEPL would also require significant compressor and pipeline investment to increase the delivery pressure to Union. Even if the capital costs were reasonable for such an alternative, Union would be required to contract for long term upstream transportation (at least 10 years) from Panhandle Field Zone to Ojibway to support the additional facilities required on the PEPL system."

To be able to import the 217 TJ/d, additional facilities are required within the Panhandle System including: replacement of the Detroit River Crossings at a 3450 kPa MOP, an NPS 20 pipeline looping the current NPS 16 from the Detroit River Crossing to Sandwich Compressor Station, and two compressor units at Sandwich Compressor Station (one for incremental volumes, and a “loss of critical unit” compressor).

Table 1 below summarizes the cost of these facilities, but does not include the cost of any incremental firm Ojibway deliveries, or costs associated to PEPL facilities.¹

With this additional infrastructure and incremental supply, 16 km of NPS 36 pipeline would still be required (in addition to Dawn Yard facilities) to provide the equivalent 203 TJ/d of system capacity provided by the proposed Project, which is also shown in Table 1. Therefore, the facility costs alone to increase the supply of gas from Ojibway is not a cost-effective alternative to the proposed Project.

Table 1

Cost Summary	Estimated Cost (\$ millions)
<u>Facility Requirements Only</u>	
Replace Detroit River Crossing (NPS 20) ¹ and increase MOP ²	\$30
17 km NPS 20 pipeline from Detroit River Crossing to Sandwich Compressor Station, and two compressor units at Sandwich Compressor	\$195
16 km of NPS 36 Panhandle looping pipeline, station facilities and Dawn Facilities	\$184
In-direct Overheads	\$85
Total Facility Cost including in-direct overheads (Excluding Non-facility Supply costs)	\$494

NOTES:

- 1 - Assumes 60% of total River Crossing Costs, based on current Enbridge Gas ownership.
- 2 - Assuming PEPL has upgraded facilities to provide up to 3,450 kPag (500 Psig)

ENBRIDGE GAS INC.

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

INTERROGATORY

Reference:

Exhibit B, Tab 2, Schedule 1, p. 3, 5, 6, 7 and
EB-2016-0186 including Exhibit K2.1 Union_Further Correspondence_20161122

Preamble:

EGL evidence states: The Panhandle System's ability to accept supply at Ojibway is limited to 115 TJ/d in the summer and 140 TJ/d in the winter.

Question:

Please confirm that these values are exactly the same as those provided in the Panhandle Reinforcement Project.

- a) In an Excel spreadsheet, please provide the data from which the summer and winter values in this proceeding were derived (ideally with working formulae showing the resulting values).

Response

Confirmed.

Please note, the Ojibway to Dawn path capability is typically calculated when a new long-term firm transportation contract is requested, or during contract renewals. There have been no long-term firm transport requests on Ojibway to Dawn since the 2016 Panhandle Reinforcement Project, therefore Enbridge Gas has not re-calculated these capacities since then.

Upon receipt of FRPO's interrogatory request Enbridge Gas undertook to review these values using the most recent information from the previous 5 years. The results of that review indicate that the Panhandle System's ability to accept supply at Ojibway has declined to:

- Summer: 108 TJ/d,
- Winter: 126 TJ/d

Importantly, although the historical observed minimum market has declined, design day requirements have not.

For the Excel spreadsheet relied upon to complete this review please see Attachment 1 to this response. A summary is set out in Table 1 below:

Table 1

	Winter (GJ/d)	Summer (GJ/d)
Lowest Market [Month]	46,000 [November]	20,000 [August]
Compression	<u>80,000</u>	<u>88,000</u>
Total:	126,000	108,000

Sum of Integrated Average							
Year	Month	Day	Windsor Balance Flow Rate	Year	Month	Day	
2017	01-January	1	2,449	2017	1	1	
2017	01-January	2	2,464	2017	1	2	
2017	01-January	3	2,528	2017	1	3	
2017	01-January	4	3,397	2017	1	4	
2017	01-January	5	3,079	2017	1	5	
2017	01-January	6	1,714	2017	1	6	
2017	01-January	7	1,938	2017	1	7	
2017	01-January	8	1,699	2017	1	8	
2017	01-January	9	1,255	2017	1	9	
2017	01-January	10	773	2017	1	10	
2017	01-January	11	1,704	2017	1	11	
2017	01-January	12	2,001	2017	1	12	
2017	01-January	13	1,729	2017	1	13	
2017	01-January	14	1,668	2017	1	14	
2017	01-January	15	1,642	2017	1	15	
2017	01-January	16	1,508	2017	1	16	
2017	01-January	17	1,218	2017	1	17	
2017	01-January	18	1,313	2017	1	18	
2017	01-January	19	1,349	2017	1	19	
2017	01-January	20	1,190	2017	1	20	
2017	01-January	21	832	2017	1	21	
2017	01-January	22	983	2017	1	22	
2017	01-January	23	1,138	2017	1	23	
2017	01-January	24	1,240	2017	1	24	
2017	01-January	25	1,191	2017	1	25	
2017	01-January	26	1,391	2017	1	26	
2017	01-January	27	1,612	2017	1	27	
2017	01-January	28	1,588	2017	1	28	
2017	01-January	29	1,634	2017	1	29	
2017	01-January	30	1,697	2017	1	30	
2017	01-January	31	1,515	2017	1	31	
2017	02-February	1	1,448	2017	2	1	
2017	02-February	2	1,892	2017	2	2	
2017	02-February	3	1,953	2017	2	3	
2017	02-February	4	1,577	2017	2	4	
2017	02-February	5	1,488	2017	2	5	
2017	02-February	6	1,259	2017	2	6	
2017	02-February	7	1,179	2017	2	7	
2017	02-February	8	1,608	2017	2	8	
2017	02-February	9	1,982	2017	2	9	
2017	02-February	10	1,696	2017	2	10	
2017	02-February	11	1,221	2017	2	11	
2017	02-February	12	1,439	2017	2	12	
2017	02-February	13	1,292	2017	2	13	
2017	02-February	14	1,202	2017	2	14	
2017	02-February	15	1,700	2017	2	15	
2017	02-February	16	1,476	2017	2	16	
2017	02-February	17	1,107	2017	2	17	
2017	02-February	18	852	2017	2	18	
2017	02-February	19	814	2017	2	19	
2017	02-February	20	976	2017	2	20	
2017	02-February	21	871	2017	2	21	
2017	02-February	22	751	2017	2	22	
2017	02-February	23	734	2017	2	23	
2017	02-February	24	798	2017	2	24	
2017	02-February	25	1,445	2017	2	25	
2017	02-February	26	1,252	2017	2	26	
2017	02-February	27	1,014	2017	2	27	
2017	02-February	28	857	2017	2	28	
2017	03-March	1	1,229	2017	3	1	
2017	03-March	2	1,583	2017	3	2	
2017	03-March	3	1,951	2017	3	3	
2017	03-March	4	1,693	2017	3	4	
2017	03-March	5	1,363	2017	3	5	

Sum of Integrated Average

2017 03-March	6	929	2017	3	6
2017 03-March	7	1,025	2017	3	7
2017 03-March	8	1,087	2017	3	8
2017 03-March	9	1,090	2017	3	9
2017 03-March	10	1,530	2017	3	10
2017 03-March	11	1,466	2017	3	11
2017 03-March	12	1,384	2017	3	12
2017 03-March	13	1,956	2017	3	13
2017 03-March	14	1,969	2017	3	14
2017 03-March	15	1,811	2017	3	15
2017 03-March	16	1,585	2017	3	16
2017 03-March	17	1,515	2017	3	17
2017 03-March	18	1,299	2017	3	18
2017 03-March	19	1,262	2017	3	19
2017 03-March	20	1,259	2017	3	20
2017 03-March	21	1,319	2017	3	21
2017 03-March	22	1,663	2017	3	22
2017 03-March	23	1,348	2017	3	23
2017 03-March	24	666	2017	3	24
2017 03-March	25	1,070	2017	3	25
2017 03-March	26	880	2017	3	26
2017 03-March	27	831	2017	3	27
2017 03-March	28	1,080	2017	3	28
2017 03-March	29	1,018	2017	3	29
2017 03-March	30	1,365	2017	3	30
2017 03-March	31	1,287	2017	3	31
2017 04-April	1	877	2017	4	1
2017 04-April	2	844	2017	4	2
2017 04-April	3	857	2017	4	3
2017 04-April	4	966	2017	4	4
2017 04-April	5	1,104	2017	4	5
2017 04-April	6	1,443	2017	4	6
2017 04-April	7	1,115	2017	4	7
2017 04-April	8	767	2017	4	8
2017 04-April	9	503	2017	4	9
2017 04-April	10	480	2017	4	10
2017 04-April	11	601	2017	4	11
2017 04-April	12	727	2017	4	12
2017 04-April	13	883	2017	4	13
2017 04-April	14	658	2017	4	14
2017 04-April	15	637	2017	4	15
2017 04-April	16	687	2017	4	16
2017 04-April	17	721	2017	4	17
2017 04-April	18	558	2017	4	18
2017 04-April	19	529	2017	4	19
2017 04-April	20	592	2017	4	20
2017 04-April	21	831	2017	4	21
2017 04-April	22	693	2017	4	22
2017 04-April	23	618	2017	4	23
2017 04-April	24	587	2017	4	24
2017 04-April	25	526	2017	4	25
2017 04-April	26	442	2017	4	26
2017 04-April	27	514	2017	4	27
2017 04-April	28	531	2017	4	28
2017 04-April	29	798	2017	4	29
2017 04-April	30	650	2017	4	30
2017 05-May	1	651	2017	5	1
2017 05-May	2	873	2017	5	2
2017 05-May	3	648	2017	5	3
2017 05-May	4	985	2017	5	4
2017 05-May	5	1,020	2017	5	5
2017 05-May	6	736	2017	5	6
2017 05-May	7	779	2017	5	7
2017 05-May	8	739	2017	5	8
2017 05-May	9	633	2017	5	9
2017 05-May	10	570	2017	5	10
2017 05-May	11	589	2017	5	11

Sum of Integrated Average

2017 05-May	12	492	2017	5	12
2017 05-May	13	495	2017	5	13
2017 05-May	14	528	2017	5	14
2017 05-May	15	688	2017	5	15
2017 05-May	16	715	2017	5	16
2017 05-May	17	719	2017	5	17
2017 05-May	18	698	2017	5	18
2017 05-May	19	652	2017	5	19
2017 05-May	20	566	2017	5	20
2017 05-May	21	520	2017	5	21
2017 05-May	22	672	2017	5	22
2017 05-May	23	758	2017	5	23
2017 05-May	24	823	2017	5	24
2017 05-May	25	856	2017	5	25
2017 05-May	26	761	2017	5	26
2017 05-May	27	679	2017	5	27
2017 05-May	28	738	2017	5	28
2017 05-May	29	745	2017	5	29
2017 05-May	30	751	2017	5	30
2017 05-May	31	763	2017	5	31
2017 06-June	1	488	2017	6	1
2017 06-June	2	652	2017	6	2
2017 06-June	3	629	2017	6	3
2017 06-June	4	629	2017	6	4
2017 06-June	5	542	2017	6	5
2017 06-June	6	552	2017	6	6
2017 06-June	7	564	2017	6	7
2017 06-June	8	514	2017	6	8
2017 06-June	9	535	2017	6	9
2017 06-June	10	501	2017	6	10
2017 06-June	11	517	2017	6	11
2017 06-June	12	469	2017	6	12
2017 06-June	13	499	2017	6	13
2017 06-June	14	489	2017	6	14
2017 06-June	15	526	2017	6	15
2017 06-June	16	537	2017	6	16
2017 06-June	17	547	2017	6	17
2017 06-June	18	584	2017	6	18
2017 06-June	19	538	2017	6	19
2017 06-June	20	562	2017	6	20
2017 06-June	21	524	2017	6	21
2017 06-June	22	529	2017	6	22
2017 06-June	23	546	2017	6	23
2017 06-June	24	550	2017	6	24
2017 06-June	25	565	2017	6	25
2017 06-June	26	465	2017	6	26
2017 06-June	27	490	2017	6	27
2017 06-June	28	490	2017	6	28
2017 06-June	29	491	2017	6	29
2017 06-June	30	563	2017	6	30
2017 07-July	1	553	2017	7	1
2017 07-July	2	567	2017	7	2
2017 07-July	3	648	2017	7	3
2017 07-July	4	448	2017	7	4
2017 07-July	5	567	2017	7	5
2017 07-July	6	643	2017	7	6
2017 07-July	7	632	2017	7	7
2017 07-July	8	586	2017	7	8
2017 07-July	9	636	2017	7	9
2017 07-July	10	695	2017	7	10
2017 07-July	11	567	2017	7	11
2017 07-July	12	595	2017	7	12
2017 07-July	13	678	2017	7	13
2017 07-July	14	568	2017	7	14
2017 07-July	15	574	2017	7	15
2017 07-July	16	636	2017	7	16
2017 07-July	17	727	2017	7	17

Sum of Integrated Average						
2017 07-July	18	727	2017	7	18	
2017 07-July	19	534	2017	7	19	
2017 07-July	20	566	2017	7	20	
2017 07-July	21	577	2017	7	21	
2017 07-July	22	176	2017	7	22	
2017 07-July	23	268	2017	7	23	
2017 07-July	24	371	2017	7	24	
2017 07-July	25	378	2017	7	25	
2017 07-July	26	445	2017	7	26	
2017 07-July	27	408	2017	7	27	
2017 07-July	28	442	2017	7	28	
2017 07-July	29	432	2017	7	29	
2017 07-July	30	376	2017	7	30	
2017 07-July	31	416	2017	7	31	
2017 08-August	1	442	2017	8	1	
2017 08-August	2	437	2017	8	2	
2017 08-August	3	441	2017	8	3	
2017 08-August	4	470	2017	8	4	
2017 08-August	5	445	2017	8	5	
2017 08-August	6	444	2017	8	6	
2017 08-August	7	451	2017	8	7	
2017 08-August	8	389	2017	8	8	
2017 08-August	9	572	2017	8	9	
2017 08-August	10	698	2017	8	10	
2017 08-August	11	647	2017	8	11	
2017 08-August	12	621	2017	8	12	
2017 08-August	13	526	2017	8	13	
2017 08-August	14	502	2017	8	14	
2017 08-August	15	518	2017	8	15	
2017 08-August	16	539	2017	8	16	
2017 08-August	17	565	2017	8	17	
2017 08-August	18	596	2017	8	18	
2017 08-August	19	640	2017	8	19	
2017 08-August	20	653	2017	8	20	
2017 08-August	21	512	2017	8	21	
2017 08-August	22	488	2017	8	22	
2017 08-August	23	517	2017	8	23	
2017 08-August	24	578	2017	8	24	
2017 08-August	25	586	2017	8	25	
2017 08-August	26	621	2017	8	26	
2017 08-August	27	596	2017	8	27	
2017 08-August	28	564	2017	8	28	
2017 08-August	29	571	2017	8	29	
2017 08-August	30	539	2017	8	30	
2017 08-August	31	572	2017	8	31	
2017 09-September	1	694	2017	9	1	
2017 09-September	2	686	2017	9	2	
2017 09-September	3	690	2017	9	3	
2017 09-September	4	686	2017	9	4	
2017 09-September	5	558	2017	9	5	
2017 09-September	6	578	2017	9	6	
2017 09-September	7	566	2017	9	7	
2017 09-September	8	582	2017	9	8	
2017 09-September	9	627	2017	9	9	
2017 09-September	10	585	2017	9	10	
2017 09-September	11	534	2017	9	11	
2017 09-September	12	550	2017	9	12	
2017 09-September	13	546	2017	9	13	
2017 09-September	14	532	2017	9	14	
2017 09-September	15	589	2017	9	15	
2017 09-September	16	698	2017	9	16	
2017 09-September	17	697	2017	9	17	
2017 09-September	18	607	2017	9	18	
2017 09-September	19	566	2017	9	19	
2017 09-September	20	599	2017	9	20	
2017 09-September	21	630	2017	9	21	
2017 09-September	22	741	2017	9	22	

Sum of Integrated Average						
2017 09-September	23	706	2017	9	23	
2017 09-September	24	696	2017	9	24	
2017 09-September	25	629	2017	9	25	
2017 09-September	26	513	2017	9	26	
2017 09-September	27	486	2017	9	27	
2017 09-September	28	552	2017	9	28	
2017 09-September	29	636	2017	9	29	
2017 09-September	30	750	2017	9	30	
2017 10-October	1	717	2017	10	1	
2017 10-October	2	601	2017	10	2	
2017 10-October	3	610	2017	10	3	
2017 10-October	4	565	2017	10	4	
2017 10-October	5	625	2017	10	5	
2017 10-October	6	663	2017	10	6	
2017 10-October	7	630	2017	10	7	
2017 10-October	8	622	2017	10	8	
2017 10-October	9	648	2017	10	9	
2017 10-October	10	-247	2017	10	10	
2017 10-October	11	682	2017	10	11	
2017 10-October	12	76	2017	10	12	
2017 10-October	13	651	2017	10	13	
2017 10-October	14	686	2017	10	14	
2017 10-October	15	726	2017	10	15	
2017 10-October	16	686	2017	10	16	
2017 10-October	17	643	2017	10	17	
2017 10-October	18	660	2017	10	18	
2017 10-October	19	673	2017	10	19	
2017 10-October	20	754	2017	10	20	
2017 10-October	21	766	2017	10	21	
2017 10-October	22	683	2017	10	22	
2017 10-October	23	628	2017	10	23	
2017 10-October	24	753	2017	10	24	
2017 10-October	25	864	2017	10	25	
2017 10-October	26	774	2017	10	26	
2017 10-October	27	828	2017	10	27	
2017 10-October	28	937	2017	10	28	
2017 10-October	29	968	2017	10	29	
2017 10-October	30	1,138	2017	10	30	
2017 10-October	31	1,184	2017	10	31	
2017 11-November	1	1,024	2017	11	1	
2017 11-November	2	780	2017	11	2	
2017 11-November	3	882	2017	11	3	
2017 11-November	4	741	2017	11	4	
2017 11-November	5	737	2017	11	5	
2017 11-November	6	955	2017	11	6	
2017 11-November	7	999	2017	11	7	
2017 11-November	8	1,023	2017	11	8	
2017 11-November	9	1,434	2017	11	9	
2017 11-November	10	1,615	2017	11	10	
2017 11-November	11	1,249	2017	11	11	
2017 11-November	12	1,190	2017	11	12	
2017 11-November	13	1,141	2017	11	13	
2017 11-November	14	1,074	2017	11	14	
2017 11-November	15	1,166	2017	11	15	
2017 11-November	16	1,239	2017	11	16	
2017 11-November	17	1,080	2017	11	17	
2017 11-November	18	1,103	2017	11	18	
2017 11-November	19	1,427	2017	11	19	
2017 11-November	20	1,181	2017	11	20	
2017 11-November	21	1,150	2017	11	21	
2017 11-November	22	1,406	2017	11	22	
2017 11-November	23	1,308	2017	11	23	
2017 11-November	24	930	2017	11	24	
2017 11-November	25	1,077	2017	11	25	
2017 11-November	26	1,146	2017	11	26	
2017 11-November	27	1,052	2017	11	27	
2017 11-November	28	845	2017	11	28	

Sum of Integrated Average

2017 11-November	29	1,081	2017	11	29
2017 11-November	30	1,169	2017	11	30
2017 12-December	1	1,119	2017	12	1
2017 12-December	2	1,083	2017	12	2
2017 12-December	3	1,045	2017	12	3
2017 12-December	4	941	2017	12	4
2017 12-December	5	1,450	2017	12	5
2017 12-December	6	1,461	2017	12	6
2017 12-December	7	1,654	2017	12	7
2017 12-December	8	1,462	2017	12	8
2017 12-December	9	1,494	2017	12	9
2017 12-December	10	1,559	2017	12	10
2017 12-December	11	1,627	2017	12	11
2017 12-December	12	2,074	2017	12	12
2017 12-December	13	1,925	2017	12	13
2017 12-December	14	1,904	2017	12	14
2017 12-December	15	1,753	2017	12	15
2017 12-December	16	1,578	2017	12	16
2017 12-December	17	1,468	2017	12	17
2017 12-December	18	1,337	2017	12	18
2017 12-December	19	1,287	2017	12	19
2017 12-December	20	1,502	2017	12	20
2017 12-December	21	1,477	2017	12	21
2017 12-December	22	1,336	2017	12	22
2017 12-December	23	1,401	2017	12	23
2017 12-December	24	1,624	2017	12	24
2017 12-December	25	1,892	2017	12	25
2017 12-December	26	2,138	2017	12	26
2017 12-December	27	2,300	2017	12	27
2017 12-December	28	2,149	2017	12	28
2017 12-December	29	1,989	2017	12	29
2017 12-December	30	2,173	2017	12	30
2017 12-December	31	2,255	2017	12	31
2018 01-January	1	2,302	2018	1	1
2018 01-January	2	2,587	2018	1	2
2018 01-January	3	2,187	2018	1	3
2018 01-January	4	2,522	2018	1	4
2018 01-January	5	2,486	2018	1	5
2018 01-January	6	2,351	2018	1	6
2018 01-January	7	2,030	2018	1	7
2018 01-January	8	1,642	2018	1	8
2018 01-January	9	1,542	2018	1	9
2018 01-January	10	1,363	2018	1	10
2018 01-January	11	974	2018	1	11
2018 01-January	12	1,989	2018	1	12
2018 01-January	13	2,232	2018	1	13
2018 01-January	14	2,314	2018	1	14
2018 01-January	15	2,088	2018	1	15
2018 01-January	16	2,252	2018	1	16
2018 01-January	17	2,231	2018	1	17
2018 01-January	18	1,986	2018	1	18
2018 01-January	19	1,560	2018	1	19
2018 01-January	20	1,277	2018	1	20
2018 01-January	21	1,298	2018	1	21
2018 01-January	22	1,131	2018	1	22
2018 01-January	23	1,612	2018	1	23
2018 01-January	24	1,758	2018	1	24
2018 01-January	25	1,661	2018	1	25
2018 01-January	26	1,134	2018	1	26
2018 01-January	27	1,242	2018	1	27
2018 01-January	28	1,363	2018	1	28
2018 01-January	29	2,020	2018	1	29
2018 01-January	30	2,008	2018	1	30
2018 01-January	31	1,476	2018	1	31
2018 02-February	1	1,962	2018	2	1
2018 02-February	2	2,242	2018	2	2
2018 02-February	3	1,821	2018	2	3

Sum of Integrated Average						
2018 02-February	4	1,964	2018	2	4	
2018 02-February	5	2,136	2018	2	5	
2018 02-February	6	1,924	2018	2	6	
2018 02-February	7	1,909	2018	2	7	
2018 02-February	8	2,008	2018	2	8	
2018 02-February	9	1,862	2018	2	9	
2018 02-February	10	1,859	2018	2	10	
2018 02-February	11	1,801	2018	2	11	
2018 02-February	12	1,894	2018	2	12	
2018 02-February	13	1,813	2018	2	13	
2018 02-February	14	1,328	2018	2	14	
2018 02-February	15	1,221	2018	2	15	
2018 02-February	16	1,667	2018	2	16	
2018 02-February	17	1,621	2018	2	17	
2018 02-February	18	1,398	2018	2	18	
2018 02-February	19	1,106	2018	2	19	
2018 02-February	20	839	2018	2	20	
2018 02-February	21	1,453	2018	2	21	
2018 02-February	22	1,487	2018	2	22	
2018 02-February	23	1,212	2018	2	23	
2018 02-February	24	1,267	2018	2	24	
2018 02-February	25	1,277	2018	2	25	
2018 02-February	26	1,140	2018	2	26	
2018 02-February	27	916	2018	2	27	
2018 02-February	28	944	2018	2	28	
2018 03-March	1	1,581	2018	3	1	
2018 03-March	2	1,587	2018	3	2	
2018 03-March	3	1,668	2018	3	3	
2018 03-March	4	1,662	2018	3	4	
2018 03-March	5	1,687	2018	3	5	
2018 03-March	6	1,554	2018	3	6	
2018 03-March	7	1,882	2018	3	7	
2018 03-March	8	1,919	2018	3	8	
2018 03-March	9	1,861	2018	3	9	
2018 03-March	10	1,740	2018	3	10	
2018 03-March	11	1,663	2018	3	11	
2018 03-March	12	1,740	2018	3	12	
2018 03-March	13	1,838	2018	3	13	
2018 03-March	14	1,684	2018	3	14	
2018 03-March	15	1,815	2018	3	15	
2018 03-March	16	1,702	2018	3	16	
2018 03-March	17	1,463	2018	3	17	
2018 03-March	18	1,244	2018	3	18	
2018 03-March	19	1,626	2018	3	19	
2018 03-March	20	1,624	2018	3	20	
2018 03-March	21	1,597	2018	3	21	
2018 03-March	22	1,549	2018	3	22	
2018 03-March	23	1,616	2018	3	23	
2018 03-March	24	1,745	2018	3	24	
2018 03-March	25	1,657	2018	3	25	
2018 03-March	26	1,334	2018	3	26	
2018 03-March	27	1,178	2018	3	27	
2018 03-March	28	1,372	2018	3	28	
2018 03-March	29	1,521	2018	3	29	
2018 03-March	30	1,427	2018	3	30	
2018 03-March	31	1,471	2018	3	31	
2018 04-April	1	1,550	2018	4	1	
2018 04-April	2	1,497	2018	4	2	
2018 04-April	3	1,615	2018	4	3	
2018 04-April	4	1,808	2018	4	4	
2018 04-April	5	1,311	2018	4	5	
2018 04-April	6	1,670	2018	4	6	
2018 04-April	7	1,574	2018	4	7	
2018 04-April	8	1,493	2018	4	8	
2018 04-April	9	1,520	2018	4	9	
2018 04-April	10	1,357	2018	4	10	
2018 04-April	11	1,116	2018	4	11	

Sum of Integrated Average						
2018 04-April	12	748	2018	4	12	
2018 04-April	13	867	2018	4	13	
2018 04-April	14	1,743	2018	4	14	
2018 04-April	15	1,528	2018	4	15	
2018 04-April	16	1,608	2018	4	16	
2018 04-April	17	1,630	2018	4	17	
2018 04-April	18	1,262	2018	4	18	
2018 04-April	19	1,219	2018	4	19	
2018 04-April	20	976	2018	4	20	
2018 04-April	21	938	2018	4	21	
2018 04-April	22	795	2018	4	22	
2018 04-April	23	770	2018	4	23	
2018 04-April	24	522	2018	4	24	
2018 04-April	25	923	2018	4	25	
2018 04-April	26	849	2018	4	26	
2018 04-April	27	863	2018	4	27	
2018 04-April	28	1,257	2018	4	28	
2018 04-April	29	949	2018	4	29	
2018 04-April	30	716	2018	4	30	
2018 05-May	1	731	2018	5	1	
2018 05-May	2	661	2018	5	2	
2018 05-May	3	663	2018	5	3	
2018 05-May	4	588	2018	5	4	
2018 05-May	5	572	2018	5	5	
2018 05-May	6	730	2018	5	6	
2018 05-May	7	734	2018	5	7	
2018 05-May	8	654	2018	5	8	
2018 05-May	9	637	2018	5	9	
2018 05-May	10	762	2018	5	10	
2018 05-May	11	1,129	2018	5	11	
2018 05-May	12	1,066	2018	5	12	
2018 05-May	13	813	2018	5	13	
2018 05-May	14	666	2018	5	14	
2018 05-May	15	715	2018	5	15	
2018 05-May	16	669	2018	5	16	
2018 05-May	17	698	2018	5	17	
2018 05-May	18	534	2018	5	18	
2018 05-May	19	487	2018	5	19	
2018 05-May	20	599	2018	5	20	
2018 05-May	21	682	2018	5	21	
2018 05-May	22	674	2018	5	22	
2018 05-May	23	570	2018	5	23	
2018 05-May	24	573	2018	5	24	
2018 05-May	25	524	2018	5	25	
2018 05-May	26	509	2018	5	26	
2018 05-May	27	527	2018	5	27	
2018 05-May	28	618	2018	5	28	
2018 05-May	29	552	2018	5	29	
2018 05-May	30	495	2018	5	30	
2018 05-May	31	787	2018	5	31	
2018 06-June	1	769	2018	6	1	
2018 06-June	2	747	2018	6	2	
2018 06-June	3	797	2018	6	3	
2018 06-June	4	800	2018	6	4	
2018 06-June	5	848	2018	6	5	
2018 06-June	6	831	2018	6	6	
2018 06-June	7	806	2018	6	7	
2018 06-June	8	659	2018	6	8	
2018 06-June	9	647	2018	6	9	
2018 06-June	10	754	2018	6	10	
2018 06-June	11	738	2018	6	11	
2018 06-June	12	692	2018	6	12	
2018 06-June	13	773	2018	6	13	
2018 06-June	14	737	2018	6	14	
2018 06-June	15	700	2018	6	15	
2018 06-June	16	782	2018	6	16	
2018 06-June	17	764	2018	6	17	

Sum of Integrated Average

2018 06-June	18	607	2018	6	18
2018 06-June	19	761	2018	6	19
2018 06-June	20	729	2018	6	20
2018 06-June	21	723	2018	6	21
2018 06-June	22	769	2018	6	22
2018 06-June	23	696	2018	6	23
2018 06-June	24	677	2018	6	24
2018 06-June	25	692	2018	6	25
2018 06-June	26	664	2018	6	26
2018 06-June	27	672	2018	6	27
2018 06-June	28	570	2018	6	28
2018 06-June	29	400	2018	6	29
2018 06-June	30	321	2018	6	30
2018 07-July	1	321	2018	7	1
2018 07-July	2	335	2018	7	2
2018 07-July	3	465	2018	7	3
2018 07-July	4	339	2018	7	4
2018 07-July	5	357	2018	7	5
2018 07-July	6	457	2018	7	6
2018 07-July	7	405	2018	7	7
2018 07-July	8	431	2018	7	8
2018 07-July	9	503	2018	7	9
2018 07-July	10	558	2018	7	10
2018 07-July	11	504	2018	7	11
2018 07-July	12	482	2018	7	12
2018 07-July	13	529	2018	7	13
2018 07-July	14	395	2018	7	14
2018 07-July	15	414	2018	7	15
2018 07-July	16	442	2018	7	16
2018 07-July	17	536	2018	7	17
2018 07-July	18	476	2018	7	18
2018 07-July	19	423	2018	7	19
2018 07-July	20	395	2018	7	20
2018 07-July	21	344	2018	7	21
2018 07-July	22	415	2018	7	22
2018 07-July	23	476	2018	7	23
2018 07-July	24	466	2018	7	24
2018 07-July	25	470	2018	7	25
2018 07-July	26	511	2018	7	26
2018 07-July	27	494	2018	7	27
2018 07-July	28	403	2018	7	28
2018 07-July	29	437	2018	7	29
2018 07-July	30	615	2018	7	30
2018 07-July	31	595	2018	7	31
2018 08-August	1	469	2018	8	1
2018 08-August	2	401	2018	8	2
2018 08-August	3	326	2018	8	3
2018 08-August	4	359	2018	8	4
2018 08-August	5	270	2018	8	5
2018 08-August	6	368	2018	8	6
2018 08-August	7	289	2018	8	7
2018 08-August	8	679	2018	8	8
2018 08-August	9	800	2018	8	9
2018 08-August	10	671	2018	8	10
2018 08-August	11	771	2018	8	11
2018 08-August	12	592	2018	8	12
2018 08-August	13	363	2018	8	13
2018 08-August	14	383	2018	8	14
2018 08-August	15	392	2018	8	15
2018 08-August	16	432	2018	8	16
2018 08-August	17	404	2018	8	17
2018 08-August	18	428	2018	8	18
2018 08-August	19	431	2018	8	19
2018 08-August	20	360	2018	8	20
2018 08-August	21	354	2018	8	21
2018 08-August	22	357	2018	8	22
2018 08-August	23	340	2018	8	23

Sum of Integrated Average

2018 08-August	24	345	2018	8	24
2018 08-August	25	397	2018	8	25
2018 08-August	26	384	2018	8	26
2018 08-August	27	331	2018	8	27
2018 08-August	28	87	2018	8	28
2018 08-August	29	429	2018	8	29
2018 08-August	30	479	2018	8	30
2018 08-August	31	455	2018	8	31
2018 09-September	1	402	2018	9	1
2018 09-September	2	146	2018	9	2
2018 09-September	3	302	2018	9	3
2018 09-September	4	279	2018	9	4
2018 09-September	5	-23	2018	9	5
2018 09-September	6	620	2018	9	6
2018 09-September	7	665	2018	9	7
2018 09-September	8	756	2018	9	8
2018 09-September	9	707	2018	9	9
2018 09-September	10	686	2018	9	10
2018 09-September	11	649	2018	9	11
2018 09-September	12	682	2018	9	12
2018 09-September	13	654	2018	9	13
2018 09-September	14	697	2018	9	14
2018 09-September	15	718	2018	9	15
2018 09-September	16	759	2018	9	16
2018 09-September	17	616	2018	9	17
2018 09-September	18	653	2018	9	18
2018 09-September	19	625	2018	9	19
2018 09-September	20	630	2018	9	20
2018 09-September	21	692	2018	9	21
2018 09-September	22	787	2018	9	22
2018 09-September	23	756	2018	9	23
2018 09-September	24	623	2018	9	24
2018 09-September	25	652	2018	9	25
2018 09-September	26	725	2018	9	26
2018 09-September	27	675	2018	9	27
2018 09-September	28	646	2018	9	28
2018 09-September	29	708	2018	9	29
2018 09-September	30	677	2018	9	30
2018 10-October	1	683	2018	10	1
2018 10-October	2	668	2018	10	2
2018 10-October	3	652	2018	10	3
2018 10-October	4	665	2018	10	4
2018 10-October	5	760	2018	10	5
2018 10-October	6	755	2018	10	6
2018 10-October	7	780	2018	10	7
2018 10-October	8	730	2018	10	8
2018 10-October	9	618	2018	10	9
2018 10-October	10	652	2018	10	10
2018 10-October	11	713	2018	10	11
2018 10-October	12	891	2018	10	12
2018 10-October	13	834	2018	10	13
2018 10-October	14	732	2018	10	14
2018 10-October	15	969	2018	10	15
2018 10-October	16	904	2018	10	16
2018 10-October	17	1,088	2018	10	17
2018 10-October	18	990	2018	10	18
2018 10-October	19	844	2018	10	19
2018 10-October	20	1,034	2018	10	20
2018 10-October	21	1,092	2018	10	21
2018 10-October	22	864	2018	10	22
2018 10-October	23	1,079	2018	10	23
2018 10-October	24	1,139	2018	10	24
2018 10-October	25	1,087	2018	10	25
2018 10-October	26	987	2018	10	26
2018 10-October	27	1,046	2018	10	27
2018 10-October	28	1,052	2018	10	28
2018 10-October	29	1,084	2018	10	29

Sum of Integrated Average						
2018 10-October	30	918	2018	10	30	
2018 10-October	31	893	2018	10	31	
2018 11-November	1	1,138	2018	11	1	
2018 11-November	2	1,097	2018	11	2	
2018 11-November	3	1,115	2018	11	3	
2018 11-November	4	963	2018	11	4	
2018 11-November	5	889	2018	11	5	
2018 11-November	6	1,082	2018	11	6	
2018 11-November	7	1,271	2018	11	7	
2018 11-November	8	1,340	2018	11	8	
2018 11-November	9	1,559	2018	11	9	
2018 11-November	10	1,429	2018	11	10	
2018 11-November	11	1,271	2018	11	11	
2018 11-November	12	1,249	2018	11	12	
2018 11-November	13	1,541	2018	11	13	
2018 11-November	14	1,516	2018	11	14	
2018 11-November	15	1,447	2018	11	15	
2018 11-November	16	1,372	2018	11	16	
2018 11-November	17	1,248	2018	11	17	
2018 11-November	18	1,350	2018	11	18	
2018 11-November	19	1,311	2018	11	19	
2018 11-November	20	1,364	2018	11	20	
2018 11-November	21	1,586	2018	11	21	
2018 11-November	22	1,640	2018	11	22	
2018 11-November	23	1,069	2018	11	23	
2018 11-November	24	961	2018	11	24	
2018 11-November	25	1,088	2018	11	25	
2018 11-November	26	1,504	2018	11	26	
2018 11-November	27	1,547	2018	11	27	
2018 11-November	28	1,600	2018	11	28	
2018 11-November	29	1,441	2018	11	29	
2018 11-November	30	1,252	2018	11	30	
2018 12-December	1	1,121	2018	12	1	
2018 12-December	2	956	2018	12	2	
2018 12-December	3	1,366	2018	12	3	
2018 12-December	4	1,458	2018	12	4	
2018 12-December	5	1,515	2018	12	5	
2018 12-December	6	1,517	2018	12	6	
2018 12-December	7	1,601	2018	12	7	
2018 12-December	8	1,582	2018	12	8	
2018 12-December	9	1,490	2018	12	9	
2018 12-December	10	1,692	2018	12	10	
2018 12-December	11	1,580	2018	12	11	
2018 12-December	12	1,337	2018	12	12	
2018 12-December	13	1,170	2018	12	13	
2018 12-December	14	1,008	2018	12	14	
2018 12-December	15	1,171	2018	12	15	
2018 12-December	16	1,095	2018	12	16	
2018 12-December	17	1,282	2018	12	17	
2018 12-December	18	1,276	2018	12	18	
2018 12-December	19	1,184	2018	12	19	
2018 12-December	20	1,108	2018	12	20	
2018 12-December	21	1,201	2018	12	21	
2018 12-December	22	1,283	2018	12	22	
2018 12-December	23	1,182	2018	12	23	
2018 12-December	24	1,220	2018	12	24	
2018 12-December	25	1,106	2018	12	25	
2018 12-December	26	1,008	2018	12	26	
2018 12-December	27	989	2018	12	27	
2018 12-December	28	995	2018	12	28	
2018 12-December	29	1,253	2018	12	29	
2018 12-December	30	1,188	2018	12	30	
2018 12-December	31	1,074	2018	12	31	
2019 01-January	1	1,345	2019	1	1	
2019 01-January	2	1,407	2019	1	2	
2019 01-January	3	1,323	2019	1	3	
2019 01-January	4	1,130	2019	1	4	

Sum of Integrated Average

2019 01-January	5	1,037	2019	1	5
2019 01-January	6	1,228	2019	1	6
2019 01-January	7	1,134	2019	1	7
2019 01-January	8	1,159	2019	1	8
2019 01-January	9	1,755	2019	1	9
2019 01-January	10	1,755	2019	1	10
2019 01-January	11	1,474	2019	1	11
2019 01-January	12	1,586	2019	1	12
2019 01-January	13	1,657	2019	1	13
2019 01-January	14	1,554	2019	1	14
2019 01-January	15	1,696	2019	1	15
2019 01-January	16	1,694	2019	1	16
2019 01-January	17	1,509	2019	1	17
2019 01-January	18	1,549	2019	1	18
2019 01-January	19	2,008	2019	1	19
2019 01-January	20	2,275	2019	1	20
2019 01-January	21	2,196	2019	1	21
2019 01-January	22	1,548	2019	1	22
2019 01-January	23	1,477	2019	1	23
2019 01-January	24	1,873	2019	1	24
2019 01-January	25	2,236	2019	1	25
2019 01-January	26	2,040	2019	1	26
2019 01-January	27	2,241	2019	1	27
2019 01-January	28	2,026	2019	1	28
2019 01-January	29	2,579	2019	1	29
2019 01-January	30	2,813	2019	1	30
2019 01-January	31	2,683	2019	1	31
2019 02-February	1	2,173	2019	2	1
2019 02-February	2	1,456	2019	2	2
2019 02-February	3	1,098	2019	2	3
2019 02-February	4	1,037	2019	2	4
2019 02-February	5	1,464	2019	2	5
2019 02-February	6	1,436	2019	2	6
2019 02-February	7	1,487	2019	2	7
2019 02-February	8	2,208	2019	2	8
2019 02-February	9	1,838	2019	2	9
2019 02-February	10	1,780	2019	2	10
2019 02-February	11	1,689	2019	2	11
2019 02-February	12	1,648	2019	2	12
2019 02-February	13	1,812	2019	2	13
2019 02-February	14	1,304	2019	2	14
2019 02-February	15	1,626	2019	2	15
2019 02-February	16	1,668	2019	2	16
2019 02-February	17	1,723	2019	2	17
2019 02-February	18	1,761	2019	2	18
2019 02-February	19	1,667	2019	2	19
2019 02-February	20	1,539	2019	2	20
2019 02-February	21	1,385	2019	2	21
2019 02-February	22	1,411	2019	2	22
2019 02-February	23	1,294	2019	2	23
2019 02-February	24	1,865	2019	2	24
2019 02-February	25	1,945	2019	2	25
2019 02-February	26	2,091	2019	2	26
2019 02-February	27	2,052	2019	2	27
2019 02-February	28	1,895	2019	2	28
2019 03-March	1	1,530	2019	3	1
2019 03-March	2	1,515	2019	3	2
2019 03-March	3	1,946	2019	3	3
2019 03-March	4	2,336	2019	3	4
2019 03-March	5	2,144	2019	3	5
2019 03-March	6	1,802	2019	3	6
2019 03-March	7	1,881	2019	3	7
2019 03-March	8	1,367	2019	3	8
2019 03-March	9	1,357	2019	3	9
2019 03-March	10	1,518	2019	3	10
2019 03-March	11	1,467	2019	3	11
2019 03-March	12	1,312	2019	3	12

Sum of Integrated Average						
2019 03-March	13	1,092	2019	3	13	
2019 03-March	14	1,025	2019	3	14	
2019 03-March	15	1,384	2019	3	15	
2019 03-March	16	1,476	2019	3	16	
2019 03-March	17	1,401	2019	3	17	
2019 03-March	18	1,350	2019	3	18	
2019 03-March	19	1,217	2019	3	19	
2019 03-March	20	1,183	2019	3	20	
2019 03-March	21	1,248	2019	3	21	
2019 03-March	22	1,392	2019	3	22	
2019 03-March	23	1,154	2019	3	23	
2019 03-March	24	1,193	2019	3	24	
2019 03-March	25	1,347	2019	3	25	
2019 03-March	26	1,206	2019	3	26	
2019 03-March	27	1,035	2019	3	27	
2019 03-March	28	885	2019	3	28	
2019 03-March	29	955	2019	3	29	
2019 03-March	30	1,326	2019	3	30	
2019 03-March	31	1,626	2019	3	31	
2019 04-April	1	1,312	2019	4	1	
2019 04-April	2	1,066	2019	4	2	
2019 04-April	3	1,032	2019	4	3	
2019 04-April	4	1,355	2019	4	4	
2019 04-April	5	916	2019	4	5	
2019 04-April	6	904	2019	4	6	
2019 04-April	7	843	2019	4	7	
2019 04-April	8	816	2019	4	8	
2019 04-April	9	820	2019	4	9	
2019 04-April	10	1,226	2019	4	10	
2019 04-April	11	1,108	2019	4	11	
2019 04-April	12	823	2019	4	12	
2019 04-April	13	917	2019	4	13	
2019 04-April	14	1,396	2019	4	14	
2019 04-April	15	1,093	2019	4	15	
2019 04-April	16	960	2019	4	16	
2019 04-April	17	846	2019	4	17	
2019 04-April	18	861	2019	4	18	
2019 04-April	19	1,180	2019	4	19	
2019 04-April	20	1,253	2019	4	20	
2019 04-April	21	961	2019	4	21	
2019 04-April	22	881	2019	4	22	
2019 04-April	23	864	2019	4	23	
2019 04-April	24	920	2019	4	24	
2019 04-April	25	993	2019	4	25	
2019 04-April	26	1,111	2019	4	26	
2019 04-April	27	1,107	2019	4	27	
2019 04-April	28	1,118	2019	4	28	
2019 04-April	29	1,380	2019	4	29	
2019 04-April	30	1,266	2019	4	30	
2019 05-May	1	909	2019	5	1	
2019 05-May	2	957	2019	5	2	
2019 05-May	3	1,120	2019	5	3	
2019 05-May	4	879	2019	5	4	
2019 05-May	5	745	2019	5	5	
2019 05-May	6	830	2019	5	6	
2019 05-May	7	1,208	2019	5	7	
2019 05-May	8	946	2019	5	8	
2019 05-May	9	735	2019	5	9	
2019 05-May	10	833	2019	5	10	
2019 05-May	11	876	2019	5	11	
2019 05-May	12	929	2019	5	12	
2019 05-May	13	1,039	2019	5	13	
2019 05-May	14	680	2019	5	14	
2019 05-May	15	632	2019	5	15	
2019 05-May	16	567	2019	5	16	
2019 05-May	17	616	2019	5	17	
2019 05-May	18	551	2019	5	18	

Sum of Integrated Average						
2019 05-May	19	581	2019	5	19	
2019 05-May	20	646	2019	5	20	
2019 05-May	21	655	2019	5	21	
2019 05-May	22	617	2019	5	22	
2019 05-May	23	714	2019	5	23	
2019 05-May	24	752	2019	5	24	
2019 05-May	25	720	2019	5	25	
2019 05-May	26	799	2019	5	26	
2019 05-May	27	751	2019	5	27	
2019 05-May	28	736	2019	5	28	
2019 05-May	29	777	2019	5	29	
2019 05-May	30	763	2019	5	30	
2019 05-May	31	666	2019	5	31	
2019 06-June	1	658	2019	6	1	
2019 06-June	2	756	2019	6	2	
2019 06-June	3	797	2019	6	3	
2019 06-June	4	755	2019	6	4	
2019 06-June	5	650	2019	6	5	
2019 06-June	6	619	2019	6	6	
2019 06-June	7	588	2019	6	7	
2019 06-June	8	615	2019	6	8	
2019 06-June	9	607	2019	6	9	
2019 06-June	10	574	2019	6	10	
2019 06-June	11	610	2019	6	11	
2019 06-June	12	617	2019	6	12	
2019 06-June	13	673	2019	6	13	
2019 06-June	14	744	2019	6	14	
2019 06-June	15	750	2019	6	15	
2019 06-June	16	774	2019	6	16	
2019 06-June	17	633	2019	6	17	
2019 06-June	18	667	2019	6	18	
2019 06-June	19	609	2019	6	19	
2019 06-June	20	597	2019	6	20	
2019 06-June	21	674	2019	6	21	
2019 06-June	22	731	2019	6	22	
2019 06-June	23	714	2019	6	23	
2019 06-June	24	631	2019	6	24	
2019 06-June	25	589	2019	6	25	
2019 06-June	26	767	2019	6	26	
2019 06-June	27	664	2019	6	27	
2019 06-June	28	651	2019	6	28	
2019 06-June	29	563	2019	6	29	
2019 06-June	30	566	2019	6	30	
2019 07-July	1	603	2019	7	1	
2019 07-July	2	646	2019	7	2	
2019 07-July	3	421	2019	7	3	
2019 07-July	4	391	2019	7	4	
2019 07-July	5	582	2019	7	5	
2019 07-July	6	629	2019	7	6	
2019 07-July	7	625	2019	7	7	
2019 07-July	8	406	2019	7	8	
2019 07-July	9	385	2019	7	9	
2019 07-July	10	382	2019	7	10	
2019 07-July	11	426	2019	7	11	
2019 07-July	12	458	2019	7	12	
2019 07-July	13	534	2019	7	13	
2019 07-July	14	658	2019	7	14	
2019 07-July	15	638	2019	7	15	
2019 07-July	16	528	2019	7	16	
2019 07-July	17	482	2019	7	17	
2019 07-July	18	458	2019	7	18	
2019 07-July	19	459	2019	7	19	
2019 07-July	20	415	2019	7	20	
2019 07-July	21	526	2019	7	21	
2019 07-July	22	691	2019	7	22	
2019 07-July	23	821	2019	7	23	
2019 07-July	24	802	2019	7	24	

Sum of Integrated Average						
2019 07-July	25	798	2019	7	25	
2019 07-July	26	702	2019	7	26	
2019 07-July	27	632	2019	7	27	
2019 07-July	28	722	2019	7	28	
2019 07-July	29	692	2019	7	29	
2019 07-July	30	636	2019	7	30	
2019 07-July	31	802	2019	7	31	
2019 08-August	1	800	2019	8	1	
2019 08-August	2	630	2019	8	2	
2019 08-August	3	674	2019	8	3	
2019 08-August	4	664	2019	8	4	
2019 08-August	5	701	2019	8	5	
2019 08-August	6	713	2019	8	6	
2019 08-August	7	760	2019	8	7	
2019 08-August	8	857	2019	8	8	
2019 08-August	9	839	2019	8	9	
2019 08-August	10	642	2019	8	10	
2019 08-August	11	559	2019	8	11	
2019 08-August	12	564	2019	8	12	
2019 08-August	13	546	2019	8	13	
2019 08-August	14	504	2019	8	14	
2019 08-August	15	485	2019	8	15	
2019 08-August	16	582	2019	8	16	
2019 08-August	17	651	2019	8	17	
2019 08-August	18	576	2019	8	18	
2019 08-August	19	572	2019	8	19	
2019 08-August	20	567	2019	8	20	
2019 08-August	21	586	2019	8	21	
2019 08-August	22	619	2019	8	22	
2019 08-August	23	619	2019	8	23	
2019 08-August	24	615	2019	8	24	
2019 08-August	25	607	2019	8	25	
2019 08-August	26	773	2019	8	26	
2019 08-August	27	790	2019	8	27	
2019 08-August	28	727	2019	8	28	
2019 08-August	29	717	2019	8	29	
2019 08-August	30	763	2019	8	30	
2019 08-August	31	718	2019	8	31	
2019 09-September	1	675	2019	9	1	
2019 09-September	2	571	2019	9	2	
2019 09-September	3	544	2019	9	3	
2019 09-September	4	613	2019	9	4	
2019 09-September	5	610	2019	9	5	
2019 09-September	6	675	2019	9	6	
2019 09-September	7	705	2019	9	7	
2019 09-September	8	780	2019	9	8	
2019 09-September	9	739	2019	9	9	
2019 09-September	10	662	2019	9	10	
2019 09-September	11	712	2019	9	11	
2019 09-September	12	700	2019	9	12	
2019 09-September	13	756	2019	9	13	
2019 09-September	14	811	2019	9	14	
2019 09-September	15	765	2019	9	15	
2019 09-September	16	767	2019	9	16	
2019 09-September	17	789	2019	9	17	
2019 09-September	18	707	2019	9	18	
2019 09-September	19	717	2019	9	19	
2019 09-September	20	688	2019	9	20	
2019 09-September	21	754	2019	9	21	
2019 09-September	22	795	2019	9	22	
2019 09-September	23	743	2019	9	23	
2019 09-September	24	701	2019	9	24	
2019 09-September	25	756	2019	9	25	
2019 09-September	26	786	2019	9	26	
2019 09-September	27	784	2019	9	27	
2019 09-September	28	757	2019	9	28	
2019 09-September	29	807	2019	9	29	

Sum of Integrated Average					
2019 09-September	30	762	2019	9	30
2019 10-October	1	690	2019	10	1
2019 10-October	2	784	2019	10	2
2019 10-October	3	780	2019	10	3
2019 10-October	4	788	2019	10	4
2019 10-October	5	839	2019	10	5
2019 10-October	6	775	2019	10	6
2019 10-October	7	751	2019	10	7
2019 10-October	8	810	2019	10	8
2019 10-October	9	750	2019	10	9
2019 10-October	10	780	2019	10	10
2019 10-October	11	813	2019	10	11
2019 10-October	12	931	2019	10	12
2019 10-October	13	772	2019	10	13
2019 10-October	14	786	2019	10	14
2019 10-October	15	707	2019	10	15
2019 10-October	16	987	2019	10	16
2019 10-October	17	896	2019	10	17
2019 10-October	18	882	2019	10	18
2019 10-October	19	818	2019	10	19
2019 10-October	20	774	2019	10	20
2019 10-October	21	756	2019	10	21
2019 10-October	22	861	2019	10	22
2019 10-October	23	786	2019	10	23
2019 10-October	24	820	2019	10	24
2019 10-October	25	1,051	2019	10	25
2019 10-October	26	974	2019	10	26
2019 10-October	27	927	2019	10	27
2019 10-October	28	790	2019	10	28
2019 10-October	29	816	2019	10	29
2019 10-October	30	1,020	2019	10	30
2019 10-October	31	1,192	2019	10	31
2019 11-November	1	1,179	2019	11	1
2019 11-November	2	1,116	2019	11	2
2019 11-November	3	1,040	2019	11	3
2019 11-November	4	1,021	2019	11	4
2019 11-November	5	1,220	2019	11	5
2019 11-November	6	1,326	2019	11	6
2019 11-November	7	1,538	2019	11	7
2019 11-November	8	1,409	2019	11	8
2019 11-November	9	1,322	2019	11	9
2019 11-November	10	1,218	2019	11	10
2019 11-November	11	1,547	2019	11	11
2019 11-November	12	1,791	2019	11	12
2019 11-November	13	1,805	2019	11	13
2019 11-November	14	1,639	2019	11	14
2019 11-November	15	1,636	2019	11	15
2019 11-November	16	1,638	2019	11	16
2019 11-November	17	1,414	2019	11	17
2019 11-November	18	1,291	2019	11	18
2019 11-November	19	1,349	2019	11	19
2019 11-November	20	1,319	2019	11	20
2019 11-November	21	1,191	2019	11	21
2019 11-November	22	1,465	2019	11	22
2019 11-November	23	1,363	2019	11	23
2019 11-November	24	1,210	2019	11	24
2019 11-November	25	1,153	2019	11	25
2019 11-November	26	1,026	2019	11	26
2019 11-November	27	1,311	2019	11	27
2019 11-November	28	1,365	2019	11	28
2019 11-November	29	1,386	2019	11	29
2019 11-November	30	1,368	2019	11	30
2019 12-December	1	1,279	2019	12	1
2019 12-December	2	1,535	2019	12	2
2019 12-December	3	1,522	2019	12	3
2019 12-December	4	1,530	2019	12	4
2019 12-December	5	1,393	2019	12	5

Sum of Integrated Average						
2019 12-December	6	1,512	2019	12	6	
2019 12-December	7	1,513	2019	12	7	
2019 12-December	8	1,258	2019	12	8	
2019 12-December	9	1,190	2019	12	9	
2019 12-December	10	1,769	2019	12	10	
2019 12-December	11	2,027	2019	12	11	
2019 12-December	12	1,736	2019	12	12	
2019 12-December	13	1,436	2019	12	13	
2019 12-December	14	1,416	2019	12	14	
2019 12-December	15	1,590	2019	12	15	
2019 12-December	16	1,546	2019	12	16	
2019 12-December	17	1,684	2019	12	17	
2019 12-December	18	2,041	2019	12	18	
2019 12-December	19	2,004	2019	12	19	
2019 12-December	20	1,798	2019	12	20	
2019 12-December	21	1,562	2019	12	21	
2019 12-December	22	1,490	2019	12	22	
2019 12-December	23	1,381	2019	12	23	
2019 12-December	24	1,398	2019	12	24	
2019 12-December	25	1,137	2019	12	25	
2019 12-December	26	1,019	2019	12	26	
2019 12-December	27	1,221	2019	12	27	
2019 12-December	28	1,279	2019	12	28	
2019 12-December	29	1,144	2019	12	29	
2019 12-December	30	1,512	2019	12	30	
2019 12-December	31	1,642	2019	12	31	
2020 01-January	1	1,472	2020	1	1	
2020 01-January	2	1,302	2020	1	2	
2020 01-January	3	1,334	2020	1	3	
2020 01-January	4	1,563	2020	1	4	
2020 01-January	5	1,625	2020	1	5	
2020 01-January	6	1,505	2020	1	6	
2020 01-January	7	1,609	2020	1	7	
2020 01-January	8	2,072	2020	1	8	
2020 01-January	9	1,574	2020	1	9	
2020 01-January	10	1,215	2020	1	10	
2020 01-January	11	1,531	2020	1	11	
2020 01-January	12	1,660	2020	1	12	
2020 01-January	13	1,588	2020	1	13	
2020 01-January	14	1,533	2020	1	14	
2020 01-January	15	1,503	2020	1	15	
2020 01-January	16	1,914	2020	1	16	
2020 01-January	17	1,857	2020	1	17	
2020 01-January	18	1,816	2020	1	18	
2020 01-January	19	2,098	2020	1	19	
2020 01-January	20	1,949	2020	1	20	
2020 01-January	21	1,882	2020	1	21	
2020 01-January	22	1,851	2020	1	22	
2020 01-January	23	1,678	2020	1	23	
2020 01-January	24	1,631	2020	1	24	
2020 01-January	25	1,678	2020	1	25	
2020 01-January	26	1,657	2020	1	26	
2020 01-January	27	1,577	2020	1	27	
2020 01-January	28	1,679	2020	1	28	
2020 01-January	29	1,784	2020	1	29	
2020 01-January	30	1,805	2020	1	30	
2020 01-January	31	1,762	2020	1	31	
2020 02-February	1	1,748	2020	2	1	
2020 02-February	2	1,443	2020	2	2	
2020 02-February	3	1,392	2020	2	3	
2020 02-February	4	1,764	2020	2	4	
2020 02-February	5	1,910	2020	2	5	
2020 02-February	6	1,950	2020	2	6	
2020 02-February	7	1,780	2020	2	7	
2020 02-February	8	1,776	2020	2	8	
2020 02-February	9	1,684	2020	2	9	
2020 02-February	10	1,663	2020	2	10	

Sum of Integrated Average						
2020 02-February	11	1,731	2020	2	11	
2020 02-February	12	1,751	2020	2	12	
2020 02-February	13	2,176	2020	2	13	
2020 02-February	14	2,009	2020	2	14	
2020 02-February	15	1,652	2020	2	15	
2020 02-February	16	1,559	2020	2	16	
2020 02-February	17	1,562	2020	2	17	
2020 02-February	18	1,671	2020	2	18	
2020 02-February	19	1,847	2020	2	19	
2020 02-February	20	1,948	2020	2	20	
2020 02-February	21	1,780	2020	2	21	
2020 02-February	22	1,531	2020	2	22	
2020 02-February	23	1,423	2020	2	23	
2020 02-February	24	1,407	2020	2	24	
2020 02-February	25	1,642	2020	2	25	
2020 02-February	26	1,875	2020	2	26	
2020 02-February	27	2,068	2020	2	27	
2020 02-February	28	1,939	2020	2	28	
2020 02-February	29	1,771	2020	3	29	
2020 03-March	1	1,508	2020	3	1	
2020 03-March	2	1,082	2020	3	2	
2020 03-March	3	1,160	2020	3	3	
2020 03-March	4	1,263	2020	3	4	
2020 03-March	5	1,247	2020	3	5	
2020 03-March	6	1,538	2020	3	6	
2020 03-March	7	1,111	2020	3	7	
2020 03-March	8	988	2020	3	8	
2020 03-March	9	1,053	2020	3	9	
2020 03-March	10	1,429	2020	3	10	
2020 03-March	11	1,451	2020	3	11	
2020 03-March	12	1,270	2020	3	12	
2020 03-March	13	1,437	2020	3	13	
2020 03-March	14	1,639	2020	3	14	
2020 03-March	15	1,558	2020	3	15	
2020 03-March	16	1,417	2020	3	16	
2020 03-March	17	1,386	2020	3	17	
2020 03-March	18	1,436	2020	3	18	
2020 03-March	19	1,195	2020	3	19	
2020 03-March	20	1,393	2020	3	20	
2020 03-March	21	1,627	2020	3	21	
2020 03-March	22	1,517	2020	3	22	
2020 03-March	23	1,478	2020	3	23	
2020 03-March	24	1,483	2020	3	24	
2020 03-March	25	1,163	2020	3	25	
2020 03-March	26	1,190	2020	3	26	
2020 03-March	27	1,333	2020	3	27	
2020 03-March	28	1,137	2020	3	28	
2020 03-March	29	1,149	2020	3	29	
2020 03-March	30	1,233	2020	3	30	
2020 03-March	31	1,328	2020	3	31	
2020 04-April	1	1,232	2020	4	1	
2020 04-April	2	1,078	2020	4	2	
2020 04-April	3	1,072	2020	4	3	
2020 04-April	4	1,023	2020	4	4	
2020 04-April	5	1,152	2020	4	5	
2020 04-April	6	944	2020	4	6	
2020 04-April	7	846	2020	4	7	
2020 04-April	8	850	2020	4	8	
2020 04-April	9	1,252	2020	4	9	
2020 04-April	10	1,226	2020	4	10	
2020 04-April	11	863	2020	4	11	
2020 04-April	12	894	2020	4	12	
2020 04-April	13	1,211	2020	4	13	
2020 04-April	14	1,362	2020	4	14	
2020 04-April	15	1,500	2020	4	15	
2020 04-April	16	1,346	2020	4	16	
2020 04-April	17	1,442	2020	4	17	

Sum of Integrated Average

2020 04-April	18	1,099	2020	4	18
2020 04-April	19	1,150	2020	4	19
2020 04-April	20	1,064	2020	4	20
2020 04-April	21	1,435	2020	4	21
2020 04-April	22	1,459	2020	4	22
2020 04-April	23	1,281	2020	4	23
2020 04-April	24	979	2020	4	24
2020 04-April	25	978	2020	4	25
2020 04-April	26	987	2020	4	26
2020 04-April	27	908	2020	4	27
2020 04-April	28	880	2020	4	28
2020 04-April	29	887	2020	4	29
2020 04-April	30	951	2020	4	30
2020 05-May	1	835	2020	5	1
2020 05-May	2	764	2020	5	2
2020 05-May	3	860	2020	5	3
2020 05-May	4	952	2020	5	4
2020 05-May	5	1,087	2020	5	5
2020 05-May	6	942	2020	5	6
2020 05-May	7	991	2020	5	7
2020 05-May	8	1,160	2020	5	8
2020 05-May	9	1,014	2020	5	9
2020 05-May	10	1,065	2020	5	10
2020 05-May	11	1,137	2020	5	11
2020 05-May	12	996	2020	5	12
2020 05-May	13	956	2020	5	13
2020 05-May	14	910	2020	5	14
2020 05-May	15	854	2020	5	15
2020 05-May	16	841	2020	5	16
2020 05-May	17	914	2020	5	17
2020 05-May	18	939	2020	5	18
2020 05-May	19	899	2020	5	19
2020 05-May	20	839	2020	5	20
2020 05-May	21	909	2020	5	21
2020 05-May	22	866	2020	5	22
2020 05-May	23	469	2020	5	23
2020 05-May	24	597	2020	5	24
2020 05-May	25	688	2020	5	25
2020 05-May	26	643	2020	5	26
2020 05-May	27	777	2020	5	27
2020 05-May	28	731	2020	5	28
2020 05-May	29	721	2020	5	29
2020 05-May	30	793	2020	5	30
2020 05-May	31	859	2020	5	31
2020 06-June	1	804	2020	6	1
2020 06-June	2	797	2020	6	2
2020 06-June	3	734	2020	6	3
2020 06-June	4	728	2020	6	4
2020 06-June	5	214	2020	6	5
2020 06-June	6	391	2020	6	6
2020 06-June	7	803	2020	6	7
2020 06-June	8	812	2020	6	8
2020 06-June	9	816	2020	6	9
2020 06-June	10	806	2020	6	10
2020 06-June	11	586	2020	6	11
2020 06-June	12	448	2020	6	12
2020 06-June	13	417	2020	6	13
2020 06-June	14	315	2020	6	14
2020 06-June	15	277	2020	6	15
2020 06-June	16	330	2020	6	16
2020 06-June	17	439	2020	6	17
2020 06-June	18	474	2020	6	18
2020 06-June	19	428	2020	6	19
2020 06-June	20	351	2020	6	20
2020 06-June	21	425	2020	6	21
2020 06-June	22	484	2020	6	22
2020 06-June	23	526	2020	6	23

Sum of Integrated Average						
2020 06-June	24	529	2020	6	24	
2020 06-June	25	508	2020	6	25	
2020 06-June	26	407	2020	6	26	
2020 06-June	27	366	2020	6	27	
2020 06-June	28	360	2020	6	28	
2020 06-June	29	405	2020	6	29	
2020 06-June	30	440	2020	6	30	
2020 07-July	1	399	2020	7	1	
2020 07-July	2	284	2020	7	2	
2020 07-July	3	308	2020	7	3	
2020 07-July	4	428	2020	7	4	
2020 07-July	5	665	2020	7	5	
2020 07-July	6	597	2020	7	6	
2020 07-July	7	542	2020	7	7	
2020 07-July	8	396	2020	7	8	
2020 07-July	9	505	2020	7	9	
2020 07-July	10	607	2020	7	10	
2020 07-July	11	652	2020	7	11	
2020 07-July	12	569	2020	7	12	
2020 07-July	13	530	2020	7	13	
2020 07-July	14	552	2020	7	14	
2020 07-July	15	518	2020	7	15	
2020 07-July	16	600	2020	7	16	
2020 07-July	17	486	2020	7	17	
2020 07-July	18	541	2020	7	18	
2020 07-July	19	568	2020	7	19	
2020 07-July	20	597	2020	7	20	
2020 07-July	21	589	2020	7	21	
2020 07-July	22	600	2020	7	22	
2020 07-July	23	593	2020	7	23	
2020 07-July	24	611	2020	7	24	
2020 07-July	25	513	2020	7	25	
2020 07-July	26	521	2020	7	26	
2020 07-July	27	534	2020	7	27	
2020 07-July	28	559	2020	7	28	
2020 07-July	29	568	2020	7	29	
2020 07-July	30	611	2020	7	30	
2020 07-July	31	617	2020	7	31	
2020 08-August	1	613	2020	8	1	
2020 08-August	2	631	2020	8	2	
2020 08-August	3	643	2020	8	3	
2020 08-August	4	687	2020	8	4	
2020 08-August	5	665	2020	8	5	
2020 08-August	6	666	2020	8	6	
2020 08-August	7	661	2020	8	7	
2020 08-August	8	603	2020	8	8	
2020 08-August	9	608	2020	8	9	
2020 08-August	10	604	2020	8	10	
2020 08-August	11	621	2020	8	11	
2020 08-August	12	586	2020	8	12	
2020 08-August	13	605	2020	8	13	
2020 08-August	14	621	2020	8	14	
2020 08-August	15	619	2020	8	15	
2020 08-August	16	611	2020	8	16	
2020 08-August	17	626	2020	8	17	
2020 08-August	18	645	2020	8	18	
2020 08-August	19	630	2020	8	19	
2020 08-August	20	577	2020	8	20	
2020 08-August	21	602	2020	8	21	
2020 08-August	22	523	2020	8	22	
2020 08-August	23	509	2020	8	23	
2020 08-August	24	448	2020	8	24	
2020 08-August	25	573	2020	8	25	
2020 08-August	26	442	2020	8	26	
2020 08-August	27	347	2020	8	27	
2020 08-August	28	390	2020	8	28	
2020 08-August	29	459	2020	8	29	

Sum of Integrated Average						
2020 08-August	30	494	2020	8	30	
2020 08-August	31	549	2020	8	31	
2020 09-September	1	493	2020	9	1	
2020 09-September	2	427	2020	9	2	
2020 09-September	3	407	2020	9	3	
2020 09-September	4	350	2020	9	4	
2020 09-September	5	292	2020	9	5	
2020 09-September	6	262	2020	9	6	
2020 09-September	7	165	2020	9	7	
2020 09-September	8	323	2020	9	8	
2020 09-September	9	354	2020	9	9	
2020 09-September	10	417	2020	9	10	
2020 09-September	11	354	2020	9	11	
2020 09-September	12	286	2020	9	12	
2020 09-September	13	340	2020	9	13	
2020 09-September	14	479	2020	9	14	
2020 09-September	15	525	2020	9	15	
2020 09-September	16	439	2020	9	16	
2020 09-September	17	516	2020	9	17	
2020 09-September	18	603	2020	9	18	
2020 09-September	19	531	2020	9	19	
2020 09-September	20	508	2020	9	20	
2020 09-September	21	511	2020	9	21	
2020 09-September	22	506	2020	9	22	
2020 09-September	23	462	2020	9	23	
2020 09-September	24	462	2020	9	24	
2020 09-September	25	436	2020	9	25	
2020 09-September	26	318	2020	9	26	
2020 09-September	27	290	2020	9	27	
2020 09-September	28	489	2020	9	28	
2020 09-September	29	472	2020	9	29	
2020 09-September	30	625	2020	9	30	
2020 10-October	1	808	2020	10	1	
2020 10-October	2	842	2020	10	2	
2020 10-October	3	774	2020	10	3	
2020 10-October	4	907	2020	10	4	
2020 10-October	5	838	2020	10	5	
2020 10-October	6	677	2020	10	6	
2020 10-October	7	716	2020	10	7	
2020 10-October	8	733	2020	10	8	
2020 10-October	9	600	2020	10	9	
2020 10-October	10	726	2020	10	10	
2020 10-October	11	798	2020	10	11	
2020 10-October	12	787	2020	10	12	
2020 10-October	13	861	2020	10	13	
2020 10-October	14	824	2020	10	14	
2020 10-October	15	1,061	2020	10	15	
2020 10-October	16	1,125	2020	10	16	
2020 10-October	17	963	2020	10	17	
2020 10-October	18	1,043	2020	10	18	
2020 10-October	19	1,249	2020	10	19	
2020 10-October	20	1,007	2020	10	20	
2020 10-October	21	1,017	2020	10	21	
2020 10-October	22	948	2020	10	22	
2020 10-October	23	903	2020	10	23	
2020 10-October	24	1,130	2020	10	24	
2020 10-October	25	1,261	2020	10	25	
2020 10-October	26	1,345	2020	10	26	
2020 10-October	27	1,404	2020	10	27	
2020 10-October	28	1,242	2020	10	28	
2020 10-October	29	1,361	2020	10	29	
2020 10-October	30	1,536	2020	10	30	
2020 10-October	31	1,319	2020	10	31	
2020 11-November	1	1,432	2020	11	1	
2020 11-November	2	1,297	2020	11	2	
2020 11-November	3	1,001	2020	11	3	
2020 11-November	4	979	2020	11	4	

Sum of Integrated Average

2020 11-November	5	1,058	2020	11	5
2020 11-November	6	1,014	2020	11	6
2020 11-November	7	989	2020	11	7
2020 11-November	8	919	2020	11	8
2020 11-November	9	891	2020	11	9
2020 11-November	10	830	2020	11	10
2020 11-November	11	1,195	2020	11	11
2020 11-November	12	1,297	2020	11	12
2020 11-November	13	1,483	2020	11	13
2020 11-November	14	1,415	2020	11	14
2020 11-November	15	1,437	2020	11	15
2020 11-November	16	1,405	2020	11	16
2020 11-November	17	1,656	2020	11	17
2020 11-November	18	1,452	2020	11	18
2020 11-November	19	1,192	2020	11	19
2020 11-November	20	1,102	2020	11	20
2020 11-November	21	1,420	2020	11	21
2020 11-November	22	1,580	2020	11	22
2020 11-November	23	1,568	2020	11	23
2020 11-November	24	1,478	2020	11	24
2020 11-November	25	1,202	2020	11	25
2020 11-November	26	1,298	2020	11	26
2020 11-November	27	1,485	2020	11	27
2020 11-November	28	1,507	2020	11	28
2020 11-November	29	1,398	2020	11	29
2020 11-November	30	1,678	2020	11	30
2020 12-December	1	1,744	2020	12	1
2020 12-December	2	1,581	2020	12	2
2020 12-December	3	1,487	2020	12	3
2020 12-December	4	1,361	2020	12	4
2020 12-December	5	1,668	2020	12	5
2020 12-December	6	1,679	2020	12	6
2020 12-December	7	1,356	2020	12	7
2020 12-December	8	1,228	2020	12	8
2020 12-December	9	1,223	2020	12	9
2020 12-December	10	1,120	2020	12	10
2020 12-December	11	1,139	2020	12	11
2020 12-December	12	1,234	2020	12	12
2020 12-December	13	1,271	2020	12	13
2020 12-December	14	1,485	2020	12	14
2020 12-December	15	1,666	2020	12	15
2020 12-December	16	1,687	2020	12	16
2020 12-December	17	1,485	2020	12	17
2020 12-December	18	1,434	2020	12	18
2020 12-December	19	1,582	2020	12	19
2020 12-December	20	1,630	2020	12	20
2020 12-December	21	1,578	2020	12	21
2020 12-December	22	1,586	2020	12	22
2020 12-December	23	1,332	2020	12	23
2020 12-December	24	1,759	2020	12	24
2020 12-December	25	1,941	2020	12	25
2020 12-December	26	1,778	2020	12	26
2020 12-December	27	1,528	2020	12	27
2020 12-December	28	1,738	2020	12	28
2020 12-December	29	1,633	2020	12	29
2020 12-December	30	1,672	2020	12	30
2020 12-December	31	1,755	2020	12	31
2021 01-January	1	1,670	2021	1	1
2021 01-January	2	1,684	2021	1	2
2021 01-January	3	1,721	2021	1	3
2021 01-January	4	1,740	2021	1	4
2021 01-January	5	1,682	2021	1	5
2021 01-January	6	1,676	2021	1	6
2021 01-January	7	1,767	2021	1	7
2021 01-January	8	1,876	2021	1	8
2021 01-January	9	1,735	2021	1	9
2021 01-January	10	1,735	2021	1	10

Sum of Integrated Average						
2021 01-January	11	1,931	2021	1	11	
2021 01-January	12	1,853	2021	1	12	
2021 01-January	13	1,548	2021	1	13	
2021 01-January	14	1,547	2021	1	14	
2021 01-January	15	1,774	2021	1	15	
2021 01-January	16	1,818	2021	1	16	
2021 01-January	17	1,767	2021	1	17	
2021 01-January	18	1,510	2021	1	18	
2021 01-January	19	1,575	2021	1	19	
2021 01-January	20	1,654	2021	1	20	
2021 01-January	21	1,345	2021	1	21	
2021 01-January	22	1,740	2021	1	22	
2021 01-January	23	1,525	2021	1	23	
2021 01-January	24	1,525	2021	1	24	
2021 01-January	25	1,514	2021	1	25	
2021 01-January	26	1,621	2021	1	26	
2021 01-January	27	1,734	2021	1	27	
2021 01-January	28	1,839	2021	1	28	
2021 01-January	29	1,676	2021	1	29	
2021 01-January	30	1,728	2021	1	30	
2021 01-January	31	1,745	2021	1	31	
2021 02-February	1	1,690	2021	2	1	
2021 02-February	2	1,670	2021	2	2	
2021 02-February	3	1,617	2021	2	3	
2021 02-February	4	1,709	2021	2	4	
2021 02-February	5	2,052	2021	2	5	
2021 02-February	6	1,952	2021	2	6	
2021 02-February	7	2,001	2021	2	7	
2021 02-February	8	1,908	2021	2	8	
2021 02-February	9	1,942	2021	2	9	
2021 02-February	10	1,961	2021	2	10	
2021 02-February	11	1,814	2021	2	11	
2021 02-February	12	1,865	2021	2	12	
2021 02-February	13	1,907	2021	2	13	
2021 02-February	14	1,801	2021	2	14	
2021 02-February	15	2,034	2021	2	15	
2021 02-February	16	2,005	2021	2	16	
2021 02-February	17	1,922	2021	2	17	
2021 02-February	18	1,868	2021	2	18	
2021 02-February	19	1,782	2021	2	19	
2021 02-February	20	1,777	2021	2	20	
2021 02-February	21	1,683	2021	2	21	
2021 02-February	22	1,646	2021	2	22	
2021 02-February	23	1,449	2021	2	23	
2021 02-February	24	1,420	2021	2	24	
2021 02-February	25	1,498	2021	2	25	
2021 02-February	26	1,415	2021	2	26	
2021 02-February	27	1,376	2021	2	27	
2021 02-February	28	1,327	2021	2	28	
2021 03-March	1	1,582	2021	3	1	
2021 03-March	2	1,385	2021	3	2	
2021 03-March	3	1,343	2021	3	3	
2021 03-March	4	1,619	2021	3	4	
2021 03-March	5	1,519	2021	3	5	
2021 03-March	6	1,491	2021	3	6	
2021 03-March	7	1,480	2021	3	7	
2021 03-March	8	1,229	2021	3	8	
2021 03-March	9	1,225	2021	3	9	
2021 03-March	10	996	2021	3	10	
2021 03-March	11	1,074	2021	3	11	
2021 03-March	12	1,301	2021	3	12	
2021 03-March	13	1,286	2021	3	13	
2021 03-March	14	1,472	2021	3	14	
2021 03-March	15	1,552	2021	3	15	
2021 03-March	16	1,232	2021	3	16	
2021 03-March	17	1,160	2021	3	17	
2021 03-March	18	1,565	2021	3	18	

Sum of Integrated Average							
2021 03-March	19	1,425	2021	3	19		
2021 03-March	20	1,223	2021	3	20		
2021 03-March	21	1,140	2021	3	21		
2021 03-March	22	943	2021	3	22		
2021 03-March	23	861	2021	3	23		
2021 03-March	24	779	2021	3	24		
2021 03-March	25	1,010	2021	3	25		
2021 03-March	26	1,102	2021	3	26		
2021 03-March	27	954	2021	3	27		
2021 03-March	28	1,401	2021	3	28		
2021 03-March	29	1,271	2021	3	29		
2021 03-March	30	899	2021	3	30		
2021 03-March	31	1,324	2021	3	31		
2021 04-April	1	1,526	2021	4	1		
2021 04-April	2	1,446	2021	4	2		
2021 04-April	3	1,228	2021	4	3		
2021 04-April	4	1,094	2021	4	4		
2021 04-April	5	1,106	2021	4	5		
2021 04-April	6	884	2021	4	6		
2021 04-April	7	889	2021	4	7		
2021 04-April	8	925	2021	4	8		
2021 04-April	9	868	2021	4	9		
2021 04-April	10	870	2021	4	10		
2021 04-April	11	1,064	2021	4	11		
2021 04-April	12	1,043	2021	4	12		
2021 04-April	13	1,057	2021	4	13		
2021 04-April	14	1,213	2021	4	14		
2021 04-April	15	1,368	2021	4	15		
2021 04-April	16	1,226	2021	4	16		
2021 04-April	17	1,126	2021	4	17		
2021 04-April	18	1,074	2021	4	18		
2021 04-April	19	1,183	2021	4	19		
2021 04-April	20	1,554	2021	4	20		
2021 04-April	21	1,533	2021	4	21		
2021 04-April	22	1,427	2021	4	22		
2021 04-April	23	1,067	2021	4	23		
2021 04-April	24	1,126	2021	4	24		
2021 04-April	25	1,223	2021	4	25		
2021 04-April	26	1,099	2021	4	26		
2021 04-April	27	875	2021	4	27		
2021 04-April	28	941	2021	4	28		
2021 04-April	29	1,090	2021	4	29		
2021 04-April	30	1,142	2021	4	30		
2021 05-May	1	1,035	2021	5	1		
2021 05-May	2	854	2021	5	2		
2021 05-May	3	866	2021	5	3		
2021 05-May	4	933	2021	5	4		
2021 05-May	5	1,037	2021	5	5		
2021 05-May	6	965	2021	5	6		
2021 05-May	7	1,042	2021	5	7		
2021 05-May	8	1,041	2021	5	8		
2021 05-May	9	1,174	2021	5	9		
2021 05-May	10	1,043	2021	5	10		
2021 05-May	11	1,036	2021	5	11		
2021 05-May	12	983	2021	5	12		
2021 05-May	13	957	2021	5	13		
2021 05-May	14	936	2021	5	14		
2021 05-May	15	902	2021	5	15		
2021 05-May	16	902	2021	5	16		
2021 05-May	17	862	2021	5	17		
2021 05-May	18	789	2021	5	18		
2021 05-May	19	786	2021	5	19		
2021 05-May	20	845	2021	5	20		
2021 05-May	21	735	2021	5	21		
2021 05-May	22	760	2021	5	22		
2021 05-May	23	790	2021	5	23		
2021 05-May	24	802	2021	5	24		

Sum of Integrated Average						
2021 05-May	25	773	2021	5	25	
2021 05-May	26	855	2021	5	26	
2021 05-May	27	943	2021	5	27	
2021 05-May	28	1,173	2021	5	28	
2021 05-May	29	1,045	2021	5	29	
2021 05-May	30	942	2021	5	30	
2021 05-May	31	824	2021	5	31	
2021 06-June	1	785	2021	6	1	
2021 06-June	2	877	2021	6	2	
2021 06-June	3	846	2021	6	3	
2021 06-June	4	857	2021	6	4	
2021 06-June	5	788	2021	6	5	
2021 06-June	6	643	2021	6	6	
2021 06-June	7	569	2021	6	7	
2021 06-June	8	653	2021	6	8	
2021 06-June	9	671	2021	6	9	
2021 06-June	10	815	2021	6	10	
2021 06-June	11	805	2021	6	11	
2021 06-June	12	778	2021	6	12	
2021 06-June	13	839	2021	6	13	
2021 06-June	14	882	2021	6	14	
2021 06-June	15	797	2021	6	15	
2021 06-June	16	904	2021	6	16	
2021 06-June	17	904	2021	6	17	
2021 06-June	18	827	2021	6	18	
2021 06-June	19	825	2021	6	19	
2021 06-June	20	809	2021	6	20	
2021 06-June	21	932	2021	6	21	
2021 06-June	22	956	2021	6	22	
2021 06-June	23	895	2021	6	23	
2021 06-June	24	824	2021	6	24	
2021 06-June	25	846	2021	6	25	
2021 06-June	26	799	2021	6	26	
2021 06-June	27	761	2021	6	27	
2021 06-June	28	556	2021	6	28	
2021 06-June	29	670	2021	6	29	
2021 06-June	30	806	2021	6	30	
2021 07-July	1	787	2021	7	1	
2021 07-July	2	732	2021	7	2	
2021 07-July	3	706	2021	7	3	
2021 07-July	4	762	2021	7	4	
2021 07-July	5	825	2021	7	5	
2021 07-July	6	781	2021	7	6	
2021 07-July	7	815	2021	7	7	
2021 07-July	8	856	2021	7	8	
2021 07-July	9	868	2021	7	9	
2021 07-July	10	846	2021	7	10	
2021 07-July	11	843	2021	7	11	
2021 07-July	12	877	2021	7	12	
2021 07-July	13	865	2021	7	13	
2021 07-July	14	831	2021	7	14	
2021 07-July	15	866	2021	7	15	
2021 07-July	16	768	2021	7	16	
2021 07-July	17	721	2021	7	17	
2021 07-July	18	789	2021	7	18	
2021 07-July	19	781	2021	7	19	
2021 07-July	20	839	2021	7	20	
2021 07-July	21	872	2021	7	21	
2021 07-July	22	816	2021	7	22	
2021 07-July	23	721	2021	7	23	
2021 07-July	24	684	2021	7	24	
2021 07-July	25	745	2021	7	25	
2021 07-July	26	833	2021	7	26	
2021 07-July	27	830	2021	7	27	
2021 07-July	28	794	2021	7	28	
2021 07-July	29	709	2021	7	29	
2021 07-July	30	785	2021	7	30	

Sum of Integrated Average					
2021 07-July	31	801	2021	7	31
2021 08-August	1	887	2021	8	1
2021 08-August	2	849	2021	8	2
2021 08-August	3	783	2021	8	3
2021 08-August	4	694	2021	8	4
2021 08-August	5	695	2021	8	5
2021 08-August	6	710	2021	8	6
2021 08-August	7	681	2021	8	7
2021 08-August	8	771	2021	8	8
2021 08-August	9	798	2021	8	9
2021 08-August	10	571	2021	8	10
2021 08-August	11	579	2021	8	11
2021 08-August	12	597	2021	8	12
2021 08-August	13	520	2021	8	13
2021 08-August	14	593	2021	8	14
2021 08-August	15	612	2021	8	15
2021 08-August	16	616	2021	8	16
2021 08-August	17	613	2021	8	17
2021 08-August	18	803	2021	8	18
2021 08-August	19	569	2021	8	19
2021 08-August	20	612	2021	8	20
2021 08-August	21	530	2021	8	21
2021 08-August	22	565	2021	8	22
2022 08-August	23	728	2021	8	23
2021 08-August	24	27	2021	8	24
2021 08-August	25	509	2021	8	25
2021 08-August	26	538	2021	8	26
2021 08-August	27	196	2021	8	27
2021 08-August	28	665	2021	8	28
2021 08-August	29	631	2021	8	29
2021 08-August	30	601	2021	8	30
2021 08-August	31	604	2021	8	31
2021 09-September	1	58	2021	9	1
2021 09-September	2	639	2021	9	2
2021 09-September	3	619	2021	9	3
2021 09-September	4	550	2021	9	4
2021 09-September	5	509	2021	9	5
2021 09-September	6	561	2021	9	6
2021 09-September	7	555	2021	9	7
2021 09-September	8	585	2021	9	8
2021 09-September	9	594	2021	9	9
2021 09-September	10	1,377	2021	9	10
2021 09-September	11	1,247	2021	9	11
2021 09-September	12	1,251	2021	9	12
2021 09-September	13	1,401	2021	9	13
2021 09-September	14	663	2021	9	14
2021 09-September	15	863	2021	9	15
2021 09-September	16	713	2021	9	16
2021 09-September	17	672	2021	9	17
2021 09-September	18	712	2021	9	18
2021 09-September	19	684	2021	9	19
2021 09-September	20	675	2021	9	20
2021 09-September	21	693	2021	9	21
2021 09-September	22	742	2021	9	22
2021 09-September	23	813	2021	9	23
2021 09-September	24	728	2021	9	24
2021 09-September	25	778	2021	9	25
2021 09-September	26	719	2021	9	26
2021 09-September	27	714	2021	9	27
2021 09-September	28	757	2021	9	28
2021 09-September	29	755	2021	9	29
2021 09-September	30	758	2021	9	30
2021 10-October	1	699	2021	10	1
2021 10-October	2	687	2021	10	2
2021 10-October	3	689	2021	10	3
2021 10-October	4	697	2021	10	4
2021 10-October	5	695	2021	10	5

Sum of Integrated Average						
2021 10-October	6	693	2021	10	6	
2021 10-October	7	696	2021	10	7	
2021 10-October	8	699	2021	10	8	
2021 10-October	9	682	2021	10	9	
2021 10-October	10	589	2021	10	10	
2021 10-October	11	407	2021	10	11	
2021 10-October	12	723	2021	10	12	
2021 10-October	13	676	2021	10	13	
2021 10-October	14	771	2021	10	14	
2021 10-October	15	745	2021	10	15	
2021 10-October	16	800	2021	10	16	
2021 10-October	17	836	2021	10	17	
2021 10-October	18	845	2021	10	18	
2021 10-October	19	739	2021	10	19	
2021 10-October	20	709	2021	10	20	
2021 10-October	21	927	2021	10	21	
2021 10-October	22	960	2021	10	22	
2021 10-October	23	1077	2021	10	23	
2021 10-October	24	1048	2021	10	24	
2021 10-October	25	1091	2021	10	25	
2021 10-October	26	1080	2021	10	26	
2021 10-October	27	175	2021	10	27	
2021 10-October	28	955	2021	10	28	
2021 10-October	29	966	2021	10	29	
2021 10-October	30	1046	2021	10	30	
2021 10-October	31	1158	2021	10	31	
2021 11-November	1	1326	2021	11	1	
2021 11-November	2	1512	2021	11	2	
2021 11-November	3	1477	2021	11	3	
2021 11-November	4	1564	2021	11	4	
2021 11-November	5	1455	2021	11	5	
2021 11-November	6	1266	2021	11	6	
2021 11-November	7	1144	2021	11	7	
2021 11-November	8	1005	2021	11	8	
2021 11-November	9	1114	2021	11	9	
2021 11-November	10	1103	2021	11	10	
2021 11-November	11	1042	2021	11	11	
2021 11-November	12	1295	2021	11	12	
2021 11-November	13	1496	2021	11	13	
2021 11-November	14	1597	2021	11	14	
2021 11-November	15	1446	2021	11	15	
2021 11-November	16	1396	2021	11	16	
2021 11-November	17	990	2021	11	17	
2021 11-November	18	1374	2021	11	18	
2021 11-November	19	1326	2021	11	19	
2021 11-November	20	1510	2021	11	20	
2021 11-November	21	1570	2021	11	21	
2021 11-November	22	1542	2021	11	22	
2021 11-November	23	1472	2021	11	23	
2021 11-November	24	1431	2021	11	24	
2021 11-November	25	1361	2021	11	25	
2021 11-November	26	1625	2021	11	26	
2021 11-November	27	1506	2021	11	27	
2021 11-November	28	1464	2021	11	28	
2021 11-November	29	1400	2021	11	29	
2021 11-November	30	1368	2021	11	30	
2021 12-December	1	1320	2021	12	1	
2021 12-December	2	1224	2021	12	2	
2021 12-December	3	1458	2021	12	3	
2021 12-December	4	1519	2021	12	4	
2021 12-December	5	1397	2021	12	5	
2021 12-December	6	1630	2021	12	6	
2021 12-December	7	1723	2021	12	7	
2021 12-December	8	1518	2021	12	8	
2021 12-December	9	1478	2021	12	9	
2021 12-December	10	1115	2021	12	10	
2021 12-December	11	1467	2021	12	11	

Sum of Integrated Average

2021 12-December	12	1491	2021	12	12
2021 12-December	13	1475	2021	12	13
2021 12-December	14	1305	2021	12	14
2021 12-December	15	1128	2021	12	15
2021 12-December	16	1290	2021	12	16
2021 12-December	17	1526	2021	12	17
2021 12-December	18	1794	2021	12	18
2021 12-December	19	1897	2021	12	19
2021 12-December	20	1693	2021	12	20
2021 12-December	21	1582	2021	12	21
2021 12-December	22	1645	2021	12	22
2021 12-December	23	1534	2021	12	23
2021 12-December	24	970	2021	12	24
2021 12-December	25	1090	2021	12	25
2021 12-December	26	1336	2021	12	26
2021 12-December	27	1335	2021	12	27
2021 12-December	28	1573	2021	12	28
2021 12-December	29	1498	2021	12	29
2021 12-December	30	1402	2021	12	30
2021 12-December	31	1154	2021	12	31

Average of Windsor Balance Flow Rate		Day																
Month	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	2017	2449.0815	2463.991	2528.4568	3396.6621	3079.1002	1713.726	1937.5334	1699.3297	1255.0556	773.0129	1704.2507	2000.7085	1729.2055	1667.6016	1642.1408	1507.7841	
1	2018	2301.7101	2586.5964	2187.0302	2522.1544	2485.8454	2350.7289	2029.5353	1642.3883	1541.6704	1362.6209	973.9473	1988.8105	2232.1963	2313.5431	2087.7242	2251.897	
1	2019	1345.1901	1406.7886	1322.6587	1129.9424	1037.3233	1227.8112	1134.3451	1159.3818	1755.3897	1754.5038	1473.9804	1586.134	1657.1187	1554.1148	1696.3954	1694.0336	
1	2020	1471.7216	1302.022	1333.5349	1563.3672	1624.9411	1505.2853	1609.1711	2072.1542	1573.5527	1214.9928	1530.7266	1659.5633	1587.8616	1532.6667	1503.3623	1914.4349	
1	2021	1669.8683	1684.0747	1721.1203	1739.6008	1681.971	1675.907	1767.3452	1876.3436	1734.6091	1735.3538	1930.9738	1853.1233	1548.3179	1546.6008	1774.3856	1817.6457	
2	2017	1447.6845	1891.6243	1952.7595	1576.8914	1488.4465	1259.0065	1179.4435	1608.2574	1981.5826	1696.3827	1221.1259	1439.274	1292.1484	1201.7054	1700.4346	1475.6223	
2	2018	1961.823	2241.5149	1821.1927	1964.2807	2136.1571	1923.6474	1908.8817	2007.7343	1862.4735	1859.2791	1800.93	1893.5222	1812.8005	1327.8926	1220.5861	1667.4355	
2	2019	2173.3894	1455.7356	1098.0322	1037.2951	1464.3432	1435.5205	1486.7657	2208.3053	1837.8583	1780.0655	1689.3903	1648.4836	1812.3629	1303.9073	1625.553	1668.2709	
2	2020	1747.8469	1443.3748	1391.657	1764.2984	1909.5873	1949.8191	1779.6474	1776.2894	1683.9036	1663.1391	1730.9933	1750.7166	2176.2485	2008.7307	1651.5603	1558.5784	
2	2021	1689.7524	1670.1436	1617.2419	1709.1146	2051.5594	1951.6189	2001.3056	1907.616	1942.2936	1960.9811	1813.5872	1864.6301	1907.1568	1801.3975	2033.7118	2004.7169	
3	2017	1228.789	1582.7642	1951.4159	1693.0731	1362.8121	928.8737	1025.1988	1087.2993	1090.4742	1530.0044	1466.0629	1383.8958	1955.85	1968.8386	1811.0827	1584.6303	
3	2018	1581.3757	1586.8726	1667.9845	1661.7925	1686.6118	1553.832	1881.596	1919.0673	1860.7146	1740.4644	1663.2576	1739.8252	1838.0337	1683.806	1815.1425	1702.1529	
3	2019	1529.6868	1515.3936	1946.3834	2335.6952	2143.5072	1801.712	1881.4685	1366.5263	1356.8994	1517.8278	1467.2291	1312.029	1092.4142	1025.3778	1383.5532	1475.7122	
3	2020	1507.5579	1082.1445	1159.8399	1262.5281	1246.7275	1537.6762	1111.1247	988.4785	1052.9623	1428.5019	1450.6051	1270.3484	1436.6998	1638.7637	1557.5344	1417.1654	
3	2021	1581.5677	1384.9344	1342.9118	1618.8372	1518.6116	1490.7335	1479.5991	1229.4306	1224.981	995.7816	1073.9508	1301.333	1285.7274	1471.6113	1552.4557	1231.5998	
4	2017	876.7385	843.5041	856.9058	965.6892	1103.9024	1442.7411	1114.9974	766.5896	503.219	479.771	600.9016	726.6912	882.7079	658.3722	637.1356	687.2926	
4	2018	1550.1856	1497.2374	1614.7391	1808.4835	1310.771	1669.5031	1573.5723	1492.5998	1519.8696	1357.4987	1115.6905	748.38	867.0423	1742.8353	1528.1041	1608.4986	
4	2019	1312.1491	1065.5516	1031.7377	1355.3282	915.6562	904.05	843.037	815.9677	819.8819	1225.8257	1108.1706	822.7542	917.341	1396.3438	1092.6457	959.8221	
4	2020	1231.7851	1078.3993	1071.8143	1022.8254	1152.362	943.7353	845.7344	849.8896	1251.6681	1226.1157	862.6427	894.3895	1210.6207	1361.9429	1500.3262	1345.9399	
4	2021	1526.3771	1446.3933	1227.8138	1094.4204	1105.8671	884.1985	888.6094	925.1795	868.2086	870.3279	1064.1098	1042.75	1056.9813	1213.0035	1367.64	1226.0395	
5	2017	651.3631	873.3781	648.3473	985.016	1019.7091	735.7491	778.5187	738.8438	633.42	570.2761	589.3416	491.562	495.1595	527.7164	687.9696	714.9235	
5	2018	730.7134	661.3537	663.0673	588.0657	571.8643	730.0127	734.4182	654.0717	636.9594	762.4011	1128.5058	1065.6703	813.196	665.5731	715.1254	668.7508	
5	2019	908.7892	956.8124	1120.4694	879.1665	745.0459	830.0849	1207.7152	946.0964	734.6775	833.3793	875.8772	929.466	1038.9041	679.7537	631.7585	566.7579	
5	2020	834.5931	764.2533	860.1519	951.6341	1086.5602	942.3613	991.3134	1160.1298	1014.3116	1064.5254	1136.6885	995.5306	956.3828	910.2461	853.7932	840.6265	
5	2021	1035.2619	854.4316	865.9001	933.3621	1036.8012	965.0473	1042.2125	1041.014	1174.4549	1043.4635	1036.2271	983.0963	957.3626	936.2735	902.3354	901.8423	
6	2017	488.4463	652.4057	629.3125	629.1074	541.7404	551.5856	564.3769	513.5111	535.061	500.5237	516.9072	469.4998	499.231	489.3243	526.482	536.8871	
6	2018	768.5183	746.5119	796.8493	800.043	847.7808	830.8509	806.4515	659.1697	647.1749	754.0739	737.9368	691.9968	772.757	737.3679	700.4688	782.0159	
6	2019	658.0877	755.604	796.5742	755.0507	650.0225	619.0504	588.1229	614.67	607.1537	574.2502	609.7909	616.5348	673.4377	743.933	749.7096	773.5967	
6	2020	804.416	797.3589	734.0495	728.3197	213.7413	391.3487	803.0369	811.6583	815.6197	805.9913	585.7658	447.7601	417.3715	315.3301	276.8415	329.5115	
6	2021	784.7371	877.0906	846.2472	857.1847	787.5331	643.1676	568.6279	653.129	670.9279	815.1063	804.8704	778.3888	839.1573	882.123	796.5599	904.0825	
7	2017	552.6578	567.2472	648.0167	447.6681	567.2299	643.1484	631.5199	586.1299	636.3356	695.1651	567.3488	595.482	678.1436	568.3409	574.2686	636.0112	
7	2018	320.8505	334.9039	465.4002	338.5441	356.6626	456.7343	404.5684	431.2855	502.6658	557.65	503.9375	481.5161	528.9089	395.3107	413.6865	441.6666	
7	2019	603.0119	646.0816	420.8473	390.7672	581.85	628.6169	625.2294	405.6085	384.9745	381.8316	425.605	458.3304	534.0085	658.0491	638.4657	528.2893	
7	2020	399.1069	284.2613	307.9632	428.0628	665.252	597.3628	541.6998	395.7135	504.8578	607.0618	652.4708	569.3343	530.4149	552.2839	518.2712	599.5331	
7	2021	787.1228	732.409	705.7456	762.3044	824.7011	781.0752	815.3438	856.0439	868.1348	845.6113	842.5922	877.0236	865.213	830.8023	866.4015	768.2269	
8	2017	442.188	437.3882	440.9209	469.7494	445.3845	443.5218	450.7715	388.8525	571.8073	697.7861	646.5262	620.947	525.8331	502.1549	517.7507	538.5297	
8	2018	468.6349	401.0036	326.1645	359.0929	269.7113	367.9063	289.1693	678.6868	799.5772	671.2513	770.5946	591.6211	362.6771	382.9584	391.6726	431.7322	
8	2019	800.0153	629.5804	674.2974	664.036	701.3923	712.551	759.8077	857.4603	839.0286	641.6699	558.9131	564.4268	545.6321	504.1114	484.5759	582.2758	
8	2020	613.414	631.0148	643.3528	686.6345	665.3482	666.2573	660.9257	603.3049	608.1175	604.0831	620.7352	586.2081	604.6401	621.0596	618.9102	610.5705	
8	2021	887.3855	849.2503	782.8325	694.2824	694.8323	709.9604	680.9922	771.0809	798.2206	571.4968	579.0738	596.9243	520.0526	592.5619	612.2298	615.7345	
9	2017	693.7268	685.844	690.1806	686.4433	557.5844	578.2144	565.9391	582.3851	626.804	584.6721	534.1974	549.9021	546.4045	532.2886	588.9815	698.0209	
9	2018	402.0011	145.7842	301.5243	279.0379	-22.6804	619.7581	664.5225	755.75	707.1019	686.4948	649.47	681.9231	654.0877	697.065	718.1128	758.5693	
9	2019	675.1899	570.5252	544.1053	613.1427	609.8109	674.567	704.5823	779.6765	739.0505	662.1425	712.3649	699.8945	755.8	811.43	765.3344	766.7761	
9	2020	492.6028	427.0655	407.1997	350.2	291.8697	262.4031	165.1558	323.1182	353.902	417.4141	353.7109	286.2552	339.7919	479.4479	525.3605	438.9256	
9	2021	57.6229	639.2483	618.9068	550.4185	508.6022	561.0352	555.3157	585.1302	593.5542	1377.3292	1247.4557	1250.9898	1400.5874	663.4887	862.5381	713.1008	
10	2017	716.9119	600.8725	609.8626	564.7492	624.6486	662.5069	630.189	621.6292	647.8121	-247.4337	681.9728	76.3591	650.739	686.0121	725.7402	686.3398	
10	2018	682.5008	667.803	651.6604	665.2387	760.4617	754.6503	780.0494	730.325	617.6221	651.6351	712.8548	890.6686	833.682	732.221	969.3268	904.219	
10	2019	689.989	784.0849	780.0904	787.5925	839.324	775.1542	750.6747	810.1523	749.5788	780.4266	812.5242	931.1975	772.441	785.7785	706.5915	987.0307	
10	2020	808.4069	842.171	774.1014	907.2835	837.5052	677.2488	716.0005	733.3877	599.939	726.3502	798.4718	787.0053	861.1271	824.4184	1061.0093	1125.1458	
10	2021	699.22	686.8883	688.5288	697.3015	694.92495	692.5484	695.6343	698.6573	682.1659	588.9721	407.2818	723.4311	675.8186	770.6365	745.1099	799.646	
11	2017	1023.611	780.1451	882.3131	741.3111	737.0557	955.0667	999.0305	1023.1213	1434.0358	1614.591	1249.2947	1189.9395	1140.9759	1073.7267	1165.5212	1239.2244	
11	2018	1138.1031	1097.3052	1114.7548	962.7694	889.3105	1082.1518	1270.5194	1339.5623	1558.7232	1428.715	1270.6415	1249.4131	1540.7074	1516.2802	1446.9362	1371.8766</	

Heat Value 39.12

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Grand Total	Year	Month	Average	(GJ's)	Low 20	
1217.958	1312.646	1348.7189	1189.997	832.4576	982.8813	1137.6385	1240.0079	1190.9447	1391.4614	1611.7283	1587.8894	1634.1815	1696.6842	1514.8713	1659.280852	2017	2017	1	1,659	52,295	1,337
2231.4623	1985.5872	1560.2294	1276.5286	1298.4149	1130.7057	1612.002	1757.7907	1660.8269	1134.1021	1241.6143	1362.516	2019.6249	2008.4736	1475.6578	1826.255971	2018	2018	1	1,826	60,759	1,553
1509.1189	1549.3837	2008.0723	2274.5109	2195.664	1547.5706	1476.7957	1872.6186	2236.048	2039.6146	2240.5429	2026.0806	2579.3451	2812.6046	2682.5617	1741.472381	2019	2019	1	1,741	56,759	1,451
1857.4883	1816.346	2097.5904	1949.2258	1882.1775	1851.3112	1677.9605	1631.0474	1678.4728	1656.5068	1576.5351	1678.6006	1783.5853	1805.3117	1761.5834	1667.841971	2020	2020	1	1,668	60,464	1,546
1766.5982	1509.8122	1575.1315	1653.6168	1344.7643	1740.1223	1525.0942	1524.6582	1514.4312	1621.0654	1734.188	1839.1431	1675.7169	1727.7828	1745.2334	1685.632239	2021	2021	1	1,686	63,382	1,620
1106.9827	852.2571	813.6846	976.0451	870.8213	750.9182	734.3434	798.25	1445.4122	1251.6734	1014.1432	857.1927				1281.575479	2017	2017	2	1,282	43,008	1,099
1620.712	1398.0153	1105.7542	839.1444	1453.3141	1486.6543	1211.9888	1267.359	1277.2804	1140.4868	915.935	943.6399				1573.944125	2018	2018	2	1,574	54,832	1,402
1723.0366	1760.973	1666.9722	1539.1229	1385.0909	1410.9841	1293.9876	1865.2014	1944.7875	2090.7955	2051.5835	1894.9198				1655.454779	2019	2019	2	1,655	59,239	1,514
1562.3505	1671.2539	1846.7874	1947.5339	1780.4275	1530.9773	1422.5883	1407.0296	1641.7168	1874.5017	2068.3376	1938.9486				1738.530139	2020	2020	2	1,739	64,167	1,640
1922.2801	1867.7079	1782.4359	1776.7666	1683.1346	1645.5995	1448.6693	1420.1594	1497.7955	1414.6233	1375.7797	1326.8304				1753.164629	2021	2021	2	1,753	64,979	1,661
1514.8734	1299.0109	1262.1357	1258.8163	1318.8805	1662.9988	1348.3001	666.1668	1070.0892	880.4462	830.546	1080.4426	1018.045	1364.8185	1286.5045	1339.133532	2017	2017	3	1,339	44,580	1,140
1462.7774	1244.3335	1626.4657	1623.8352	1597.0935	1548.8539	1616.2598	1744.7436	1657.0999	1333.6489	1177.8038	1371.6883	1521.4979	1426.8258	1471.2143	1613.118413	2018	2018	3	1,613	59,452	1,520
1400.9574	1350.1463	1216.6778	1183.1839	1247.7454	1391.8714	1154.0085	1193.1784	1346.9904	1206.2999	1035.3369	884.7026	955.0729	1325.6773	1626.1557	1408.690984	2019	2019	3	1,409	47,782	1,221
1386.2325	1435.6823	1195.4304	1392.929	1627.4671	1516.846	1477.5286	1483.317	1162.8199	1189.7834	1332.6127	1136.8231	1460.2291	1232.6755	1327.9479	1342.725372	2020	2020	3	1,343	48,534	1,241
1160.4631	1564.8788	1425.2185	1223.1468	1140.0859	943.3123	861.2188	779.3235	1009.8878	1102.2578	954.0191	1400.6843	1270.8105	899.4228	1324.0501	1252.995052	2021	2021	3	1,253	43,724	1,118
721.495	557.5512	529.1664	592.1578	830.8478	692.5718	617.5913	586.5899	526.2088	442.2537	513.948	531.1437	798.1929	649.5812		724.5486233	2017	2017	4	725	23,512	601
1629.9488	1262.0539	1219.3802	976.0568	937.6928	795.1388	769.8998	522.3098	923.2092	848.9446	862.7704	1256.66	948.6013	715.9316		1222.45363	2018	2018	4	1,222	39,957	1,021
845.6667	860.7726	1180.2417	1253.2513	961.0936	881.3956	864.1876	920.2551	993.3468	1111.0002	1106.5684	1117.7101	1379.7061	1265.768		1044.240877	2019	2019	4	1,044	36,636	936
1442.1415	1099.4555	1150.1141	1064.3344	1435.2299	1458.923	1281.3747	978.5545	978.0987	986.5754	907.8099	880.1001	887.2723	950.914		1111.70297	2020	2020	4	1,112	38,759	991
1125.9281	1073.7855	1182.5806	1553.9913	1532.8547	1427.2243	1066.9937	1126.1838	1223.185	1099.0736	874.8217	941.1019	1090.2647	1142.134		1142.268087	2021	2021	4	1,142	40,144	1,026
719.1622	698.3998	652.337	565.6418	520.0781	671.824	757.9819	822.7375	856.0837	760.5125	678.814	737.9426	745.2084	750.5277	763.3988	704.5788355	2017	2017	5	705	24,898	636
697.616	534.0348	487.1721	598.9158	681.8276	674.0087	569.7861	573.1545	523.6601	508.5119	527.1262	617.7602	551.8128	494.8469	786.9335	665.0618097	2018	2018	5	665	23,023	589
616.0661	550.5724	581.1203	646.2047	655.4399	616.7382	713.6945	752.3312	720.346	798.5794	751.0445	735.7389	777.1309	762.8911	665.5638	781.5553548	2019	2019	5	782	26,800	685
913.8917	939.0976	898.6345	838.9624	908.5145	865.9506	469.1133	596.6071	687.6444	642.9577	777.4995	731.3182	720.9131	793.4728	859.4637	871.1981581	2020	2020	5	871	30,843	788
862.3553	788.9066	786.2768	844.5038	735.0579	760.0447	790.1715	801.8466	773.4422	855.3647	942.5483	1172.6795	1045.2858	941.981	823.6753	923.6524613	2021	2021	5	924	33,365	853
547.2735	584.2211	538.127	561.9999	524.3633	528.8867	546.0387	549.6804	564.6712	464.7807	489.6752	490.2185	490.9265	563.4529		536.2905867	2017	2017	6	536	20,025	512
763.9328	607.0646	760.7556	728.8857	722.8403	768.5829	695.9003	676.9066	692.3114	663.7199	671.5933	570.4328	400.2678	320.8582		704.1339867	2018	2018	6	704	25,792	659
632.8702	666.7163	609.2674	597.4447	674.2193	730.8475	713.9649	631.1034	589.01	767.4464	664.1914	650.8102	562.6827	566.0919		661.40851	2019	2019	6	661	24,218	619
438.9475	473.5086	428.2661	350.9379	425.1585	483.9344	525.5785	529.0321	507.595	407.1299	366.325	359.8172	404.5428	440.1872		513.9693833	2020	2020	6	514	15,655	400
903.7334	826.5231	825.4874	809.1817	932.3495	955.5373	894.8225	823.9499	845.6259	798.7733	761.2065	555.5581	669.7061	806.4354		797.26078	2021	2021	6	797	29,377	751
726.9616	726.6599	534.1281	565.7021	577.2437	176.2947	268.0216	371.0777	378.4042	444.8743	407.8338	442.0644	431.7559	376.3268	416.1396	530.2645839	2017	2017	7	530	18,063	462
535.6723	476.0624	423.0753	394.5588	343.5341	414.8019	475.9161	465.5332	469.6147	511.3249	494.3258	402.7636	437.3142	614.6323	594.9306	451.2371548	2018	2018	7	451	16,013	409
481.9442	457.9729	459.0521	415.3212	525.775	690.8077	821.4309	801.6392	797.6929	701.6556	632.4859	722.1081	692.3789	636.3013	802.1724	579.0421032	2019	2019	7	579	19,517	499
486.4382	541.2953	567.725	596.8628	589.0685	599.8073	593.1577	610.9873	512.6076	520.6261	534.4446	559.0504	568.0861	611.0148	617.1058	537.4815355	2020	2020	7	537	19,387	496
720.9896	789.042	781.0073	839.4863	871.6134	815.5522	720.5941	684.3785	745.3447	832.746	829.958	793.937	709.4526	784.707	800.964	798.3394871	2021	2021	7	798	30,030	768
564.7558	595.8561	640.0887	652.9151	512.3313	487.9201	517.3853	577.6223	586.4103	621.2947	596.4991	564.4383	570.5169	539.4566	571.8995	539.9839323	2017	2017	8	540	19,426	497
403.5955	427.9326	430.9152	360.3764	353.6978	357.0021	340.0599	345.1187	397.0403	383.5169	330.7721	87.1332	429.2715	478.9697	455.2581	423.9714226	2018	2018	8	424	13,568	347
651.0367	576.2069	572.379	566.7258	585.7219	619.3071	619.457	615.3156	606.9928	773.293	789.9013	726.8878	717.053	762.736	718.4585	658.7498839	2019	2019	8	659	23,402	598
626.4166	645.3588	629.726	576.8093	602.0312	523.4844	509.1584	448.1895	572.6097	442.155	347.2351	390.0928	459.316	494.2633	549.3856	576.1551032	2020	2020	8	576	21,054	538
613.2213	803.257	569.187	611.76	529.606	565.129	727.567	26.5609	508.5527	538.4594	196.4845	664.604	631.306	601.467	603.561	617.6656	2021	2021	8	618	21,023	537
697.4935	607.3617	566.1828	599.3732	629.87	740.5979	705.9629	695.6035	629.2523	512.62	486.1225	552.1831	636.4266	750.2248		617.0287867	2017	2017	9	617	22,429	573
615.6823	652.5018	624.8685	629.8051	691.7766	787.302	756.3161	623.3357	651.8962	724.9027	674.6293	645.6081	707.8783	676.6527		605.3892567	2018	2018	9	605	21,236	543
788.9745	707.0761	716.6837	687.9502	753.6181	795.053	742.7359	701.4451	755.6525	785.8191	783.5709	756.7321	806.8741	762.2555		720.9611167	2019	2019	9	721	26,960	689
515.6037	603.2678	530.6529	507.9395	510.5982	506.4043	461.8337	461.6499	436.4154	317.9888	290.1153	489.0601	472.4866	625.3821		421.4607067	2020	2020	9	421	14,351	367
672.4482	711.6538	683.908	674.5101	693.413	741.9194	812.8567	727.5807	778.2953	718.8582	713.8322	756.7937	754.6262	757.7895		746.1269567	2021	2021	9	746	24,224	619
643.3796	659.7918	673.2629	753.9888	765.9371	682.9139	628.428</															

773	832	983	1,138	1,190	1,191	1,218	1,240	1,255	1,313	1,349	1,391	1,508
974	1,131	1,134	1,242	1,277	1,298	1,363	1,363	1,476	1,542	1,560	1,612	1,642
1,037	1,130	1,134	1,159	1,228	1,323	1,345	1,407	1,474	1,477	1,509	1,548	1,549
1,215	1,302	1,334	1,472	1,503	1,505	1,531	1,533	1,563	1,574	1,577	1,588	1,609
1,345	1,510	1,514	1,525	1,525	1,547	1,548	1,575	1,621	1,654	1,670	1,676	1,676
734	751	798	814	852	857	871	976	1,014	1,107	1,179	1,202	1,221
839	916	944	1,106	1,140	1,212	1,221	1,267	1,277	1,328	1,398	1,453	1,487
1,037	1,098	1,294	1,304	1,385	1,411	1,436	1,456	1,464	1,487	1,539	1,626	1,648
1,392	1,407	1,423	1,443	1,531	1,559	1,562	1,642	1,652	1,663	1,671	1,684	1,731
1,327	1,376	1,415	1,420	1,449	1,498	1,617	1,646	1,670	1,683	1,690	1,709	1,777
666	831	880	929	1,018	1,025	1,070	1,080	1,087	1,090	1,229	1,259	1,262
1,178	1,244	1,334	1,372	1,427	1,463	1,471	1,521	1,549	1,554	1,581	1,587	1,597
885	955	1,025	1,035	1,092	1,154	1,183	1,193	1,206	1,217	1,248	1,312	1,326
988	1,053	1,082	1,111	1,137	1,160	1,163	1,190	1,195	1,233	1,247	1,263	1,270
779	861	899	943	954	996	1,010	1,074	1,102	1,140	1,160	1,223	1,225
442	480	503	514	526	529	531	558	587	592	601	618	637
522	716	748	770	795	849	863	867	923	938	949	976	1,116
816	820	823	843	846	861	864	881	904	916	917	920	960
846	850	863	880	887	894	908	944	951	978	979	987	1,023
868	870	875	884	889	925	941	1,043	1,057	1,064	1,067	1,074	1,090
492	495	520	528	566	570	589	633	648	651	652	672	679
487	495	509	524	527	534	552	570	572	573	588	599	618
551	567	581	616	617	632	646	655	666	680	714	720	735
469	597	643	688	721	731	764	777	793	835	839	841	854
735	760	773	786	789	790	802	824	845	854	855	862	866
465	469	488	489	490	490	491	499	501	514	517	524	526
321	400	570	607	647	659	664	672	677	692	692	696	700
563	566	574	588	589	597	607	609	610	615	617	619	631
214	277	315	330	351	360	366	391	405	407	417	425	428
556	569	643	653	670	671	761	778	785	788	797	799	805
176	268	371	376	378	408	416	432	442	445	448	534	553
321	335	339	344	357	395	395	403	405	414	415	423	431
382	385	391	406	415	421	426	458	458	459	482	526	528
284	308	396	399	428	486	505	513	518	521	530	534	541
684	706	709	721	721	732	745	762	768	781	781	785	787
389	437	441	442	444	445	451	470	488	502	512	517	518
87	270	289	326	331	340	345	354	357	359	360	363	368
485	504	546	559	564	567	572	576	582	586	607	615	619
347	390	442	448	459	494	509	523	549	573	577	586	602
27	196	509	520	530	538	565	569	571	579	593	597	601
486	513	532	534	546	550	552	558	566	566	578	582	585
-23	146	279	302	402	616	620	623	625	630	646	649	652
544	571	610	613	662	675	675	688	700	701	705	707	712
165	262	286	290	292	318	323	340	350	354	354	407	417
58	509	550	555	561	585	594	619	639	663	672	675	684
-247	76	565	601	610	622	625	628	630	643	648	651	660
618	652	652	665	668	683	713	730	732	755	760	780	834
690	707	750	751	756	772	774	775	780	780	784	786	786
600	677	716	726	733	774	787	798	808	824	838	842	861
175	407	589	676	682	687	689	693	695	696	697	699	699
737	741	780	845	882	930	955	999	1,023	1,024	1,052	1,074	1,077
889	961	963	1,069	1,082	1,088	1,097	1,115	1,138	1,248	1,249	1,252	1,271
1,021	1,026	1,040	1,116	1,153	1,179	1,191	1,210	1,218	1,220	1,291	1,311	1,319
830	891	919	979	989	1,001	1,014	1,058	1,102	1,192	1,195	1,202	1,297
990	1,005	1,042	1,103	1,114	1,144	1,266	1,295	1,326	1,326	1,361	1,368	1,374
941	1,045	1,083	1,119	1,287	1,336	1,337	1,401	1,450	1,461	1,462	1,468	1,477
956	989	995	1,008	1,008	1,074	1,095	1,106	1,108	1,121	1,170	1,171	1,182
1,019	1,137	1,144	1,190	1,221	1,258	1,279	1,279	1,381	1,393	1,398	1,416	1,436
1,120	1,139	1,223	1,228	1,234	1,271	1,332	1,356	1,361	1,434	1,485	1,485	1,487
970	1,090	1,115	1,128	1,154	1,224	1,290	1,305	1,320	1,335	1,336	1,397	1,402
959	974	980	1,006	1,012	1,016	1,021	1,023	1,026	1,030	1,031	1,033	1,037

							Windsor	
							Month	5 Year Averages - Low 20
1,515	1,588	1,612	1,634	1,642	1,668	1,697	1	58,732
1,661	1,758	1,986	1,989	2,008	2,020	2,030	2	57,245
1,554	1,586	1,657	1,694	1,696	1,755	1,755	3	48,814
1,625	1,631	1,657	1,660	1,678	1,678	1,679	4	35,802
1,682	1,684	1,721	1,728	1,734	1,735	1,735	5	27,786
1,252	1,259	1,292	1,439	1,445	1,448	1,476	6	23,014
1,621	1,667	1,801	1,813	1,821	1,859	1,862	7	20,602
1,667	1,668	1,689	1,723	1,761	1,780	1,812	8	19,695
1,748	1,751	1,764	1,776	1,780	1,780	1,847	9	21,840
1,782	1,801	1,814	1,865	1,868	1,907	1,908	10	28,460
1,287	1,299	1,319	1,348	1,363	1,365	1,384	11	46,056
1,616	1,624	1,626	1,657	1,662	1,663	1,668	12	51,789
1,347	1,350	1,357	1,367	1,384	1,392	1,401		
1,328	1,333	1,386	1,393	1,417	1,429	1,436		
1,229	1,232	1,271	1,286	1,301	1,324	1,343		
650	658	687	693	721	727	767		
1,219	1,257	1,262	1,311	1,357	1,493	1,497		
961	993	1,032	1,066	1,093	1,107	1,108		
1,064	1,072	1,078	1,099	1,150	1,152	1,211		
1,094	1,099	1,106	1,126	1,126	1,142	1,183		
688	698	715	719	736	738	739		
637	654	661	663	666	669	674		
736	745	751	752	763	777	799		
859	860	866	899	909	910	914		
902	902	933	936	942	943	957		
529	535	537	538	542	546	547		
723	729	737	738	747	754	761		
633	650	651	658	664	667	673		
439	440	448	474	484	508	526		
806	809	815	824	825	827	839		
566	567	567	567	568	574	577		
437	442	457	465	466	470	476		
534	582	603	625	629	632	636		
542	552	559	568	568	569	589		
789	794	801	815	816	825	830		
526	539	539	564	565	571	572		
383	384	392	397	401	404	428		
619	630	642	651	664	674	701		
603	604	605	608	611	613	619		
604	612	612	613	616	631	665		
589	599	607	627	629	630	636		
653	654	665	675	677	682	686		
717	739	743	754	756	756	757		
427	436	439	462	462	472	479		
693	712	713	714	719	728	742		
663	673	682	683	686	686	717		
844	864	891	893	904	918	969		
788	790	810	813	816	818	820		
903	907	948	963	1,007	1,017	1,043		
709	723	739	745	771	800	836		
1,080	1,081	1,103	1,141	1,146	1,150	1,166		
1,271	1,311	1,340	1,350	1,364	1,372	1,429		
1,322	1,326	1,349	1,363	1,365	1,368	1,386		
1,297	1,298	1,398	1,405	1,415	1,420	1,432		
1,396	1,400	1,431	1,446	1,455	1,464	1,472		
1,494	1,502	1,559	1,578	1,624	1,627	1,654		
1,184	1,188	1,201	1,220	1,253	1,276	1,282		
1,490	1,512	1,512	1,513	1,522	1,530	1,535		
1,528	1,578	1,581	1,582	1,586	1,630	1,633		
1,458	1,467	1,475	1,478	1,491	1,498	1,518		
1,039	1,042	1,043	1,045	1,049	1,050	1,052		

Windsor

Lowest 20 Day Look

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly (GJ)	59,000	57,000	49,000	36,000	28,000	23,000	21,000	20,000	22,000	28,000	46,000	52,000
Compression	80,000	80,000	80,000	88,000	88,000	88,000	88,000	88,000	88,000	88,000	80,000	80,000
Total	139,000	137,000	129,000	124,000	116,000	111,000	109,000	108,000	110,000	116,000	126,000	132,000

Notes:
 - Data considered 2017 to 2021 calendar years
 - Average of lowest 20 days of market were calculated for each month.

Windsor Month	5 Year Averages - Low 20	Rounded
1	58,732	59,000
2	57,245	57,000
3	48,814	49,000
4	35,802	36,000
5	27,786	28,000
6	23,014	23,000
7	20,602	21,000
8	19,695	20,000
9	21,840	22,000
10	28,460	28,000
11	46,056	46,000
12	51,789	52,000

ENBRIDGE GAS INC.

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

INTERROGATORY

Reference:

Exhibit B, Tab 2, Schedule 1, p. 3, 5, 6, 7 and
EB-2016-0186 including Exhibit K2.1 Union_Further Correspondence_20161122

Preamble:

EGI evidence states: The minimum firm Panhandle Market is limited by the base load summer Windsor market demands and the capacity of Sandwich Compressor to compress gas from Windsor towards Dawn. The capacity of the Sandwich Compressor is 80 TJ/d and limited by the fixed amount of horsepower available.

Question:

Please provide the current function and operating range of the current Sandwich Compressor.

- i) Please describe the limitations of the compressor and what could be done to increase the amount of Windsor market available in the summer.
 - (1) How much could the market be increased and what is the cost estimate of improvements.
- ii) Please describe the limitations of the compressor and what could be done to increase the amount of gas that could be accepted at Ojibway in the winter including additional compression to push gas into the Leamington market.
 - (1) How much could the amount that could be accepted at Ojibway in the winter be increased and what is the cost estimate of improvements.

Response

The Sandwich Compressor unit is a Centaur T4502 turbine engine (4387 ISO HP) with a Solar C306 compressor.

When fully utilized this unit provides 88 TJ/d of import capacity in the summer and 80 TJ/d of import capacity in the winter. There are no options to modify the existing unit to provide further capability.

To increase import capability at Ojibway, pipeline reinforcement is required from the Detroit River Crossing to the Sandwich Compressor station. In addition, compressor units at the Sandwich Compressor Station would also be required. The cost estimate for these improvements can be found at Exhibit I.FRPO.8.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

INTERROGATORY

Reference:

Exhibit B, Tab 2, Schedule 1, p. 3, 5, 6, 7 and
EB-2016-0186 including Exhibit K2.1 Union_Further Correspondence_20161122

Preamble:

EGL evidence states: The Panhandle System currently has two minimum pressure constraints which must be maintained:

- The BBGS is located at the extreme western end of the Panhandle System just east of Ojibway. The pressure constraint for the entire Panhandle System is located at the outlet of the BBGS customer station, where the contracted minimum delivery pressure must be maintained at or above 1,724 kPag; and
- The Leamington North Gate Station is the endpoint of the Leamington North Line which is a lateral connected to the NPS 20 Panhandle Line. The system pressure at the Leamington North Gate Station must be maintained at or above of 2,275 kPag.

Question:

We would like to understand better the identified constraints and what may be done to overcome them.

Did EGL contact BBGS to determine if the customer would be willing to accept any form of interruptible contract, demand response reduction or payment to lower inlet pressure requirements (possibly to 1200 kPa or lower) to assist with reducing this constraint?

- a) If not, why not?
- b) If so, please describe all efforts and reasons why this approach would not assist in reducing the constraint.

Response

No, the customer requested incremental firm gas at the existing contracted delivery pressure, as part of their EOI bid, to serve their needs.

There is no capacity to be gained in the system by reducing the current pressure constraints on the system. Please see the response to Exhibit I.FRPO.13.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

INTERROGATORY

Reference:

Exhibit B, Tab 2, Schedule 1, p. 3, 5, 6, 7 and
EB-2016-0186 including Exhibit K2.1 Union_Further Correspondence_20161122

Preamble:

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- The BBGS is located at the extreme western end of the Panhandle System just east of Ojibway. The pressure constraint for the entire Panhandle System is located at the outlet of the BBGS customer station, where the contracted minimum delivery pressure must be maintained at or above 1,724 kPag; and
- The Leamington North Gate Station is the endpoint of the Leamington North Line which is a lateral connected to the NPS 20 Panhandle Line. The system pressure at the Leamington North Gate Station must be maintained at or above of 2,275 kPag.

Question:

Please describe and provide a cost estimate for station enhancements (e.g., control valves, etc.) that could replace current regulating equipment at Leamington North Gate to maximize the throughput while minimizing the station pressure differential to reduce the pressure constraint significantly (1725 kPa or lower) while allowing forecasted 2023/24 flows (or higher).

Response

There is no capacity to be gained in the system by reducing the current pressure constraints on the system. Please see the response to Exhibit I.FRPO.13.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Federation of Rental-housing Providers of Ontario ("FRPO")

INTERROGATORY

Reference:

Exhibit B, Tab 2, Schedule 1, p. 3, 5, 6, 7 and
EB-2016-0186 including Exhibit K2.1 Union_Further Correspondence_20161122

Preamble:

EGI evidence states: The Panhandle System currently has two minimum pressure constraints which must be maintained:

- The BBGS is located at the extreme western end of the Panhandle System just east of Ojibway. The pressure constraint for the entire Panhandle System is located at the outlet of the BBGS customer station, where the contracted minimum delivery pressure must be maintained at or above 1,724 kPag; and
- The Leamington North Gate Station is the endpoint of the Leamington North Line which is a lateral connected to the NPS 20 Panhandle Line. The system pressure at the Leamington North Gate Station must be maintained at or above of 2,275 kPag.

Question:

If the pressure constraint at BBGS were reduced to 1200 kPa or lower and the inlet to Leamington North Gate were reduced to 1725 kPa or lower, please identify what year further reinforcement would be required to accommodate forecasted need provided in Attachment 1.

- a) Please provide the results of the Winter 23/24 simulations with all pressures and the flows and pressures requested in IR#4.

Response

- a) If the pressure constraint at either BBGS or Leamington North station were reduced to the numbers specified, a new pressure constraint would become the controlling pressure constraint for the system.

If the BBGS pressure constraint was to be reduced, the new pressure constraint would shift to West Windsor Power Generation ("WWPG"). WWPG is located immediately adjacent to BBGS with the same delivery pressure constraint of 1724 kPag. Many other distribution stations in the City of Windsor near BBGS have similar pressure constraints.

Likewise, reducing the inlet pressure of Leamington North Gate Station to 1725 kPag would shift the pressure constraint to the County Road 18 Station which operates with similar minimum inlet pressure conditions and is located close to Leamington North Gate Station. Furthermore, the downstream distribution system operates at 1900 kPag which is above the requested pressure. This situation is not feasible as the minimum inlet pressure required to service that market must be maintained above 1900 kPag to account for losses through the regulating station.

There is no capacity to be gained in the system by reducing the current pressure constraints on the system.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Ontario Greenhouse Vegetable Growers ("OGVG")

INTERROGATORY

References:

EB-2022-0133, Exhibit A, Tab 2, Schedule 1, page 2, paragraph 4
EB-2022-0157, Exhibit A, Tab 3, Schedule 1, page 5, paragraph 13

Preamble:

In its 2023 Rates Application filed June 30, 2022 (EB-2022-0133), EGI makes the following assertion with respect to the applicability of the Ontario Energy Board's Incremental Capital Module ("ICM") in 2023:

This 2023 Rate Application is the final annual rate adjustment application under the IRM approved in the MAADs Decision. Enbridge Gas will not be proposing an ICM request for 2023 Rates. As such, there will not be a Phase 2 of the 2023 Rates application. Enbridge Gas will be filing a rebasing application for rates in 2024 prepared under a cost of service. (emphasis added)¹

By contrast, in the Leave to Construct Application, most recently updated on June 23, 2022, EGI makes the following, apparently inconsistent assertion:

As outlined in Exhibit E, Tab 1, Schedule 1, Enbridge Gas is not seeking cost recovery of the Project as part of this application. The OEB approved the use of the Incremental Capital Module ("ICM") for Enbridge Gas as a mechanism to fund incremental capital investments during the current deferred rebasing period. If the Project meets the criteria for rate recovery through the ICM mechanism, then an ICM request for the costs of the Project may form part of the Company's 2023 Rates (Phase 2) application. (emphasis added)²

1 EB-2022-0133, Exhibit A, Tab 2, Schedule 1, page 2, paragraph 4.

2 EB-2022-0157, Exhibit A, Tab 3, Schedule 1, page 5, paragraph 13.

Question:

- a) Please confirm that EGI will not be seeking ICM relief for any part of the Panhandle Regional Expansion Project.
- b) Assuming that a) is confirmed, please confirm that, accordingly, spending on the Panhandle Regional Expansion Project will not impact EGI's rates until that project spending is considered by the OEB in EGI's next rebasing application for, under EGI's current plans, approval of rates effective January 1, 2024.
- c) Assuming that a) and b) are confirmed, please confirm that, as a result of a) and b), the appropriate allocation of costs and rate design implications of the Panhandle Regional Expansion Project will be considered in the context of EGI's next rebasing application.

Response

- a) Confirmed.
- b) Confirmed.
- c) Confirmed.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Ontario Greenhouse Vegetable Growers ("OGVG")

INTERROGATORY

References:

Exhibit B Tab 1 Schedule 1 Page 8

Preamble:

Each customer that requests incremental contract rate service may require an individual service line, main extension, station(s), and/or local distribution reinforcement to bring sufficient natural gas from the Panhandle System to their site. These costs will be the responsibility of the customer and will be assessed in accordance with E.B.O. 188 guidelines, which may result in the need for the customer to pay a contribution in aid of construction.

Question:

- a) Does EGI anticipate utilizing the "hourly allocation factor" when determining each customers' responsibility for a potential contribution in aid of construction for any new distribution assets required to connect customers to the incremental capacity provided by the Panhandle Regional Expansion Project?
- b) Does EGI anticipate that the Profitability Index for any distribution projects related to the incremental capacity provided by the Panhandle Regional Expansion Project will be at least 1.0 because of the use of the "hourly allocation factor", and that the actual Profitability Index for any such distribution projects will likely be more than 1.0?

Response

- a) Enbridge Gas will evaluate the need for any new distribution assets required and assess whether they meet the OEB approved guidelines to use the hourly allocation factor ("HAF").¹ At this time, Enbridge Gas anticipates one of the facility expansions may use HAF (this facility expansion does not require Leave to Construct). At this time, there are no distribution assets for which Leave to Construct is required.

¹ For reference, see Page 26 of the OEB Natural Gas Facilities Handbook dated March 31, 2022

- b) Enbridge Gas cannot comment on what the PI for distribution assets will be at this time, as the facilities have not yet been designed or constructed.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Ontario Greenhouse Vegetable Growers ("OGVG")

INTERROGATORY

References:

Exhibit B Tab 1 Schedule 1 Page 11

Preamble:

Table 1 shows a 9 TJ/day decline in General Service demand in the 2020/2021 winter.

Question:

- a) Please explain the driver of the decline in General Service demand in the 2020/2021 winter.

Response

The decline is attributed to a combination of lower customer usage than previously predicted, and to customers switching rate classes (from existing M1 or M2 rate class into contract rate M4).

ENBRIDGE GAS INC.

Answer to Interrogatory from
Ontario Greenhouse Vegetable Growers ("OGVG")

INTERROGATORY

References:

EB-2022-0157 Exhibit B Tab 1 Schedule 1 Page 18

Preamble:

Enbridge Gas has also identified the potential need for a second phase of transmission expansion to meet the demands that are forecasted over the next 20 years. This second phase has been identified within the Enbridge Gas 2021-2025 AMP with a forecasted 2029 in-service date as shown below.

Question:

- a) Please discuss the potential for Integrated Resource Planning to defer, mitigate or obviate the need for a second phase of transmission expansion in 2029.

Response

- a) Please see the response at Exhibit I.STAFF.10 part b).

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe (“PP”)

INTERROGATORY

Reference:

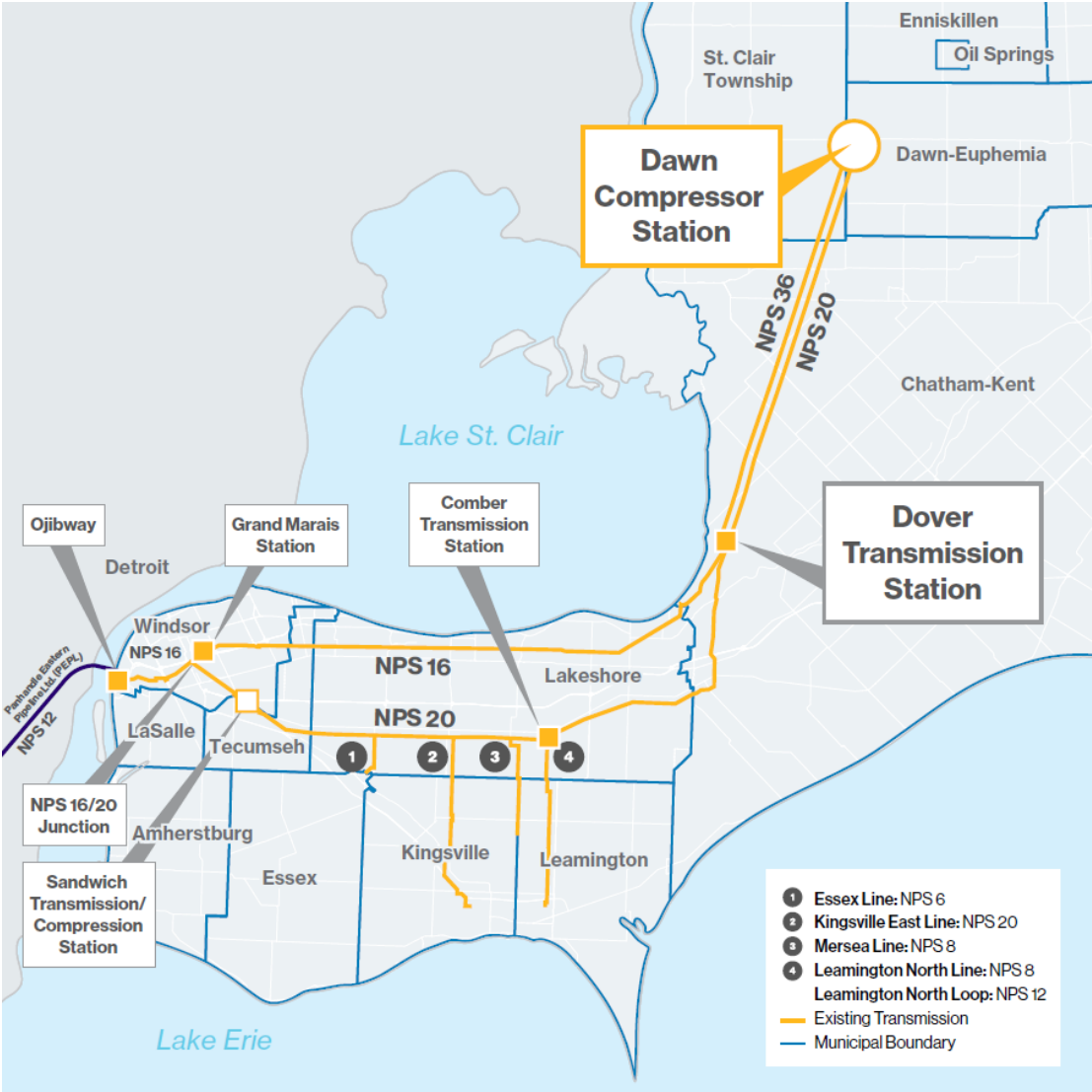
“The Panhandle System is critical to providing safe, reliable, and affordable natural gas to Enbridge Gas’s in-franchise residential, commercial, and industrial customers in the Panhandle Market.” [B/2/1 Pg.1]

Question:

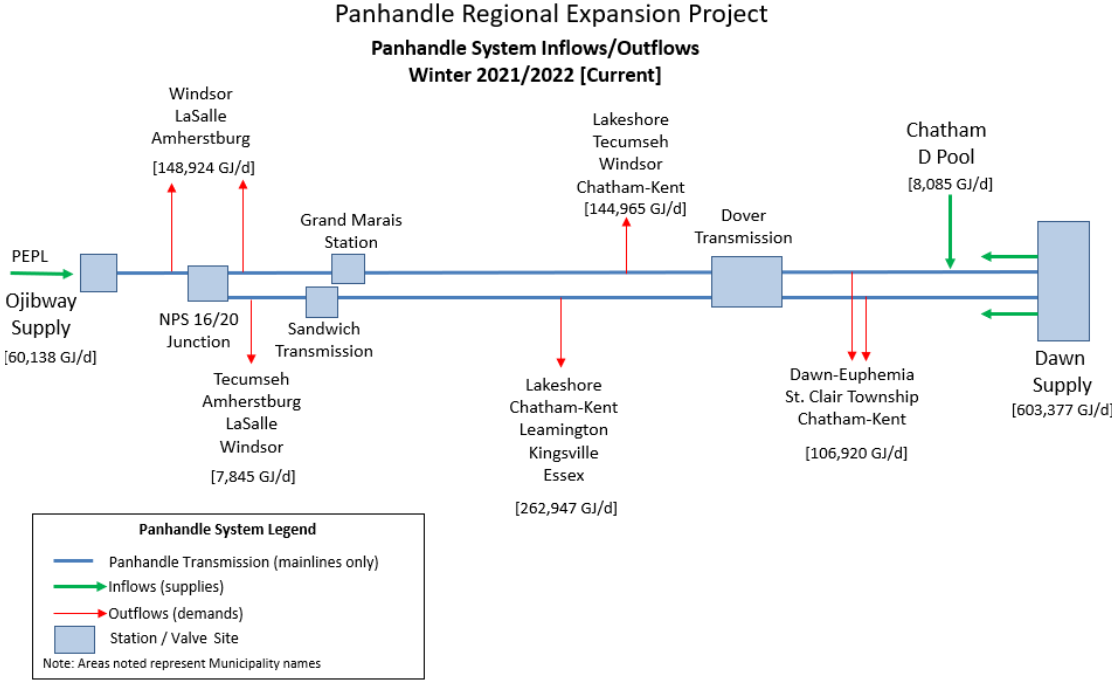
- a) Please provide a map showing the area of customers served by natural gas that travels through the Panhandle System.
- b) Please provide a diagram showing the peak inflows (GJ and/or cubic meter) and peak outflows (GJ and/or cubic meter) for the Panhandle System and which systems feed or receive the inflows/outflow.

Response

- a) Please refer to the map below, displaying the municipalities served by the Panhandle System.



b) Please refer to the line diagram below of the Panhandle System, displaying both inflows and outflows, shown in GJ/d as of Winter 2021/2022 (representing the current customer demands).



ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe (“PP”)

INTERROGATORY

Reference:

“The facilities, collectively referred to as the Panhandle Regional Expansion Project (“Project”), are required to expand Enbridge Gas’s Panhandle Transmission System (“Panhandle System”), which transports natural gas between Enbridge Gas’s Dawn Compressor Station, ...”. [A/2/1 Page 2]

Question:

- a) Please explain the full scope of system analysis conducted on the broader Enbridge Ontario transmission and distribution system with and without the proposed project (e.g. was this included in the Dawn/Storage assessment)
- b) When was the proposed project first identified in the Enbridge Asset Management Plan (AMP)?
- c) Please provide the page references from Enbridge’s most current Asset Management Plan that explains the basis for the project and where it ranks against all other projects in the AMP.

Response

- a) The Panhandle System is independent and serves a discreet area of the Southern Ontario market. The Panhandle System expansion has no impact on other transmission systems throughout the province. The facilities required at Dawn to support the proposed Project are identified in Exhibit D, Tab 1, Schedule 1, Page 3, Table 1.
- b) Additional facilities required for reinforcement of the Panhandle System was first identified in the Union Gas Limited Asset Management Plan 2018-2027 (EB-2017-0306/EB-2017-0307).
- c) The Project was identified as a growth-driven investment under EBO 134. Growth-driven investments under EBO 134 have fixed timing based on when the incremental

facilities are required and have not been directly ranked against other projects in the asset management plan.

The excerpts and references to the Panhandle Regional Expansion Project in Enbridge Gas' most current AMP are included below:

1. EB-2021-0148, Exhibit B, Tab 2, Schedule 3, Page 8

“Panhandle Regional Expansion Project (PREP) Strategy Development

The Panhandle Regional Expansion Project (PREP) is required to provide reliable, secure, economic natural gas supply to meet the growing design day demand of the EGI Panhandle Transmission System which serves in-franchise markets (including residential, commercial and industrial customers). As a result of a non-binding Expression of Interest (EOI) conducted in February 2021, EGI is forecasting firm transportation growth driven by general service growth, greenhouse market demand in Leamington / Kingsville / Chatham-Kent and industrial demand in Windsor requiring incremental facilities as early as winter 2023-24. Alternatives are being evaluated at varying levels of detail depending upon project feasibility including engineering, cost, construction feasibility, capacity and reliability. Through this process, EGI will identify the most efficient project to provide the Panhandle Transmission System with reliable supply and adequate capacity for both design day conditions and operational conditions. As part of the project plan, EGI will complete a supply-side IRP assessment in addition to a binding reverse open season. In this way, EGI will minimize the facilities required to serve incremental demand while optimizing any unwanted existing capacity.”

2. EB-2021-0148, Exhibit B, Tab 2, Schedule 3, Page 14

“+\$63.0M – Inclusion of PREP: Panhandle Expansion Project based on current growth model projections”

3. EB-2021-0148, Exhibit B, Tab 2, Schedule 3, Page 18

“Increase in large projects including Panhandle Expansion Project and Dawn to Cuthbert NPS 42 Replacement (ICM-eligible)””

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe (“PP”)

INTERROGATORY

Reference:

“Growth is forecast to occur across the entire Panhandle System with concentration in the Leamington-Kingsville and Windsor areas.

Question:

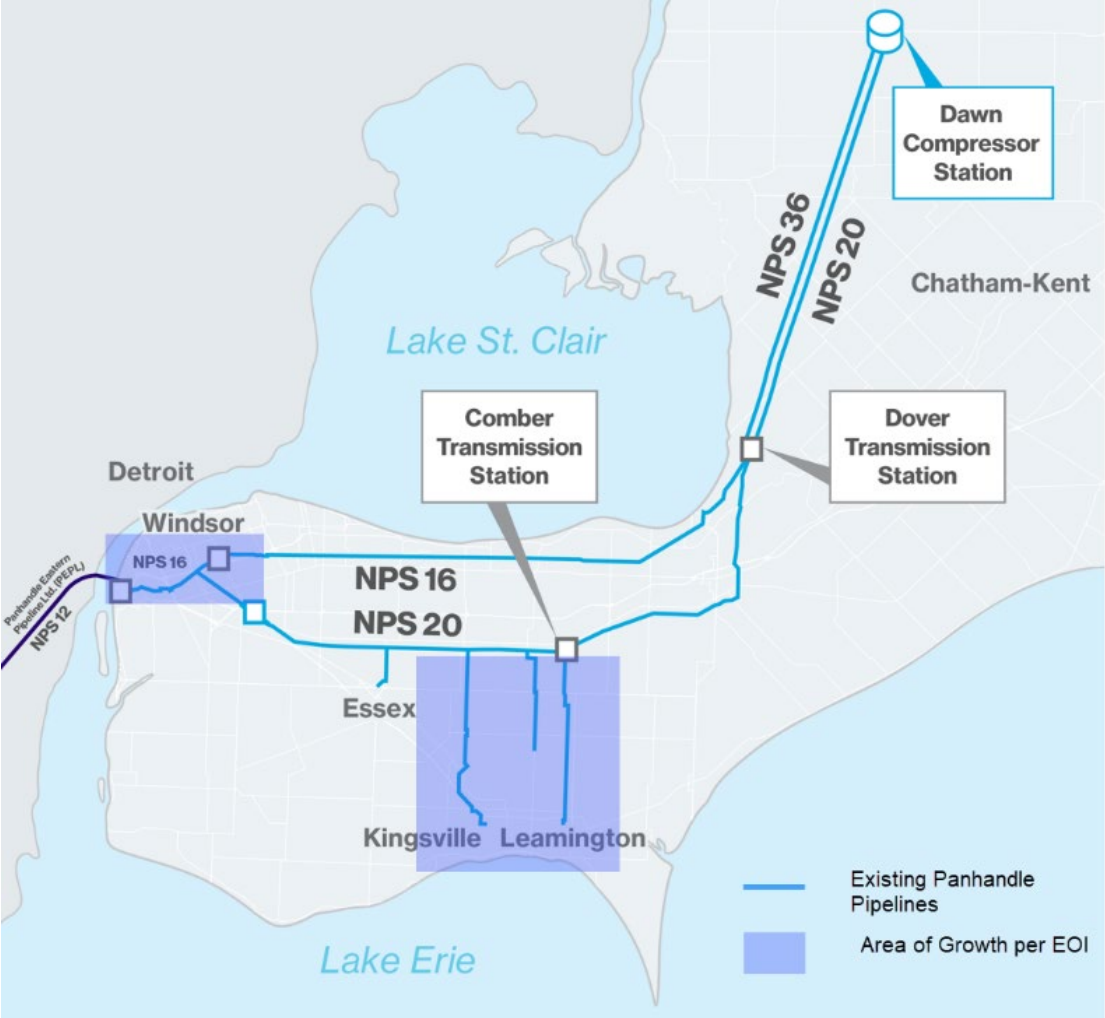
Please provide a copy of all documents and specific information sources outlining the growth assumptions that would affect the Panhandle system as noted above.

Response

The growth forecast is provided in Exhibit B, Tab 1, Schedule 1. The growth forecast is informed by the specific bids and commitment letters from the EOI, in which customers provided their volume, location and approximate timing of demand. Please see the response at Exhibit I.STAFF.4, and Exhibit I.PP.4 c).

Please see the Figure 1 below for a diagram of locations of interest based on the EOI results.

Figure 1



ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe (“PP”)

INTERROGATORY

Reference:

“Enbridge Gas’s current Panhandle System Design Day demand forecast is developed from the contract demand and customer attachment forecasts.” [A/3/1, Pg. 2]

Question:

- a) Please provide a summary of customer numbers by type (e.g. residential, industrial, commercial) currently served by the Panhandle system on a peak day.
- b) Please provide a copy of the Enbridge customer attachment forecast by year from 2023 to 2028 and indicate what portion of the forecast will be served by the Panhandle system.
- c) Does Enbridge have a customer forecast to cover the next 40 years (e.g. amortization period for the proposed pipeline) related to customers that would be served by the Panhandle system? If yes, please provide a copy.

Response

- a) The number of customers served by the Panhandle System is approximately 178,200 residential and 14,400 commercial/industrial customers.
- b) Enbridge Gas respectfully declines to respond on the basis of relevance. The Company’s customer attachment forecast for the entirety of Enbridge Gas’s service area is not relevant to the approvals sought for leave to construct in the current proceeding. Enbridge Gas has prepared a customer attachment forecast for the relevant Project area for the years 2021-2028 which is discussed within the responses at Exhibit I.ED.2, parts a) – b).
- c) No, Enbridge Gas does not produce a 40-year customer forecast.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe ("PP")

INTERROGATORY

Reference:

"The Project as proposed is designed to reliably serve increased demands for firm service in the Panhandle Market, including, in particular, incremental demands from the greenhouse, automotive, and power generation sectors." [A/2/1 Page 2]

Question:

- a) What is the current peak demand (GJ) for the Panhandle system and what will be the peak demand capacity if the project is approved and completed.
- b) Please provide a copy of all firm contracts and firm commitments from greenhouse, automotive, and power generation sectors customers that drive the incremental peak demand identified.
- c) Please provide a table showing each customer incremental natural gas peak demand that would be supplied by the proposed pipeline and include columns indicating the start and end date for each firm contractual commitment related to those peak demand commitments.
- d) Please identify any additional peak demand capacity that the proposed project would provide in excess of the contracted demand identified.
- e) Please confirm that the Panhandle system has the capacity to provide for ex-franchise delivery (e.g. export) and what the capacity is available for ex-franchise deliver.

Response

- a) The current Panhandle System peak day demand is 671,893 GJ/d and the system capacity is 713,346 GJ/day. The system capacity will be 916,313 GJ/day once the Project is placed into service.
- b) Please see the contract and commitment templates set out in Attachment 1 of this response, which are representative of all executed commitments from customers. Please see the response to part c) below for customer-specific bid details.

c) Please see Table 1 below for the firm customer commitments received to date. To preserve confidentiality of customer-specific commercially sensitive information that could divulge the nature and timing of investment decisions, customer names have been redacted.

Table 1

Customer	TJ/day	Start Date ¹	End Date ^{2,3}
	57.7	16-Jul-24	15-Jul-29
	1.4	1-Nov-23	31-Oct-28
	2.4	1-Nov-23	31-Oct-40
	1.6	1-Nov-23	31-Oct-28
	19.0	N/A	N/A
	3.1	N/A	N/A
	10.6	N/A	N/A
	2.3	N/A	N/A
	2.1	N/A	N/A
	2.8	N/A	N/A
	0.8	N/A	N/A
	2.8	N/A	N/A
	2.8	N/A	N/A
	11.3	N/A	N/A
	1.2	N/A	N/A
	6.8	N/A	N/A
	0.8	N/A	N/A
	1.4	N/A	N/A
	1.7	N/A	N/A
	1.0	N/A	N/A
	0.1	N/A	N/A
	0.4	N/A	N/A
	1.1	N/A	N/A
	1.7	N/A	N/A
	5.7	N/A	N/A
	1.0	N/A	N/A
	2.4	N/A	N/A
	0.9	N/A	N/A
	3.5	N/A	N/A
	3.5	N/A	N/A
	1.4	N/A	N/A
	3.3	N/A	N/A
	3.2	N/A	N/A
	1.8	N/A	N/A
	1.8	N/A	N/A
	1.8	N/A	N/A
Distribution Contract Total	63.1		
Letters of Indemnity / Commitment Letters	104.2		
Total Commitments (TJ/d)	167.3		

1 Start dates not applicable to a Letter of Indemnity or a Commitment Letter.
 2 End dates not applicable to a Letter of Indemnity or a Commitment Letter.
 3 Distribution Contracts continue on a year to year basis after the Initial Term of a Distribution Contract.

- d) The capacity of the proposed Project is 203 TJ/day. The amount currently under binding commitment is 167 TJ/day, however the remaining 36 TJ/day of capacity is forecasted to be fully subscribed by Winter 2028/2029.
- e) Confirmed.

Enbridge Gas's Panhandle System connects with the Panhandle Eastern Pipeline Company ("PEPL") system at Ojibway. The capacity for ex-franchise delivery is limited by the ability for PEPL system capacity to accept gas, which isn't known by Enbridge Gas at this time. There are currently no customers of Enbridge Gas with C1 service from Dawn to Ojibway and no requests have been received for this service by Enbridge Gas.

Contract ID	
Contract Name	

M4 Contract

This GAS DISTRIBUTION CONTRACT (“**Contract**”), made as of the [REDACTED] day of [REDACTED], 20[REDACTED].

BETWEEN:

Enbridge Gas Inc.

hereinafter called "**the Company**"

- and -

Customer Name

hereinafter called "**Customer**"

WHEREAS, the Company has built, or proposes to build, certain facilities for the Panhandle Regional Expansion Project (the “**Project**”) to increase the capacity of its natural gas pipeline system. In connection with the Project, the Company will be required to construct distribution facilities (the “**Expansion Facilities**”) to serve the Customer’s facilities at [REDACTED] (the “**Site**”);

AND WHEREAS, Customer has requested from the Company and the Company has agreed to provide Customer with Services as specified in Schedule 1 (the “**Services**”);

AND WHEREAS, if Customer has elected direct purchase services, Customer will be responsible for supplying Gas to the Company under a separate Contract called the Southern Bundled T;

AND WHEREAS, the Company will distribute Gas to Customer’s Point(s) of Consumption under this Contract identified in Schedule 1;

IN CONSIDERATION of the mutual covenants contained herein, and other good and valuable consideration, the receipt of and sufficiency of which is hereby acknowledged, the parties agree as follows:

1. INCORPORATIONS

The following are hereby incorporated in and form part of this Contract:

- a) Contract Parameters as contained in Schedule 1 as amended from time to time; and
- b) The latest posted version of the Company’s general terms and conditions applicable to Union Rate Zones (“**General Terms and Conditions**”) subject to Section 12.18 of the General Terms and Conditions; and
- c) Rate M4 Schedule as amended from time to time and as approved by the Ontario Energy Board.

2. CONDITIONS PRECEDENT

2.01 The obligations of the Company to provide Services hereunder are subject to the following conditions precedent that are for the sole benefit of the Company and which may be waived or extended, in whole or in part:

- a) The Company shall have obtained, in form and substance satisfactory to the Company, and all conditions shall have been satisfied under all governmental, regulatory and other third party approvals, consents, orders and authorizations in relation to the Project and Expansion Facilities that are required to:
 - i. provide the Services; and
 - ii. construct the Project and Expansion Facilities; and
- b) The Company shall have obtained all internal approvals that are necessary or appropriate to:
 - i. provide the Services; and
 - ii. construct the Project and Expansion Facilities; and
- c) The Company shall have completed and placed into Service the Project and Expansion Facilities; and
- d) Financial assurances acceptable to the Company shall be supplied and maintained in accordance with the General Terms and Conditions and Section 10 of this Agreement; and
- e) The Company shall have received a contribution in aid of construction to the Company of \$0.00 (the “**Aid Amount**”) from Customer pursuant to Customer’s obligations herein; and
- f) If Customer has elected direct purchase services, Customer and the Company shall have executed and maintained in good standing a Southern Bundled T.

The Company shall use commercially reasonable efforts to satisfy and fulfill the conditions precedent specified in Sections a), c), d), e), and f). The Company shall notify Customer forthwith in writing of the Company’s satisfaction or waiver of each condition precedent. If the Company concludes that it will not be able to satisfy a condition precedent, the Company may, upon written Notice to Customer, terminate this Contract and upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder, subject to Customer’s obligations pursuant to Section 11 herein.

2.02 The obligations of the Customer hereunder are subject to the following condition precedent that is for the sole benefit of the Customer and which may be waived by Customer:

- a) Customer shall have received all required financing necessary, on or before November 1, 2022, to ensure the Customer’s ability to construct new facilities at the Site and honour the provisions of this Contract.

Customer shall use commercially reasonable efforts to satisfy and fulfill the condition precedent specified in Section 2.02 a). Customer shall notify the Company forthwith in writing of the Customer's satisfaction or waiver of such condition precedent. If Customer concludes that it will not be able to satisfy or waive such condition precedent on or before the date specified, it may, upon written Notice to the Company no later than November 1, 2022, terminate this Contract and upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder.

2.03 Should this Contract be terminated by virtue of this Section 2, Customer and the Company shall remain bound by any pre-existing Gas Distribution Contract(s) between Customer and the Company.

3. CONTRACT TERM

This Contract shall be effective from the date hereof. However, the Services and the Company's obligation to provide the Services under Section 4 shall commence on the later of (such later date being the "Day of First Delivery") (a) [Date], and (b) the date that the last condition precedent as set out in Section 2 is satisfied or waived by the Company. Subject to the provisions hereof, this Contract shall continue in full force and effect for a period of xx Contract Years (the "Initial Term") and continuing thereafter on a year to year basis unless written Notice to terminate is provided by one party to the other at least three (3) Months prior to the end of the then-current term.

"Contract Year" means a period of twelve (12) consecutive Months, beginning on [redacted] of any year and ending on the subsequent [redacted], except for the first Contract Year which shall begin on the Day of First Delivery and end on the subsequent [redacted].

4. SERVICES PROVIDED

The Company agrees to provide Services as specified in Schedule 1 and Customer agrees to pay for such Services pursuant to the terms and conditions as set out in this Contract and the referenced attachments and the rate(s) referenced in Schedule 1.

To be eligible for services under the Rate M4 Rate Schedule, Customer must have an annual natural gas consumption of at least 350,400 m³ and Daily Contracted Demand between 2,400 m³ and 60,000 m³. If the Customer does not maintain this level of consumption during the current Contract Year or is not expected to maintain this level of consumption then, notwithstanding any other remedy available to the Company under this Contract or any other term of this Contract, effective the following Contract Year, the Customer may no longer qualify for service under the Rate M4 Rate Schedule and may be placed on an alternate service by the Company. If the Customer's Daily Contracted Demand exceeds 60,000 m³ then the Customer no longer qualifies for services under the Rate M4 Rate Schedule.

If Customer has elected direct purchase services, and if the Company does not receive Gas from Customer under the Southern Bundled T, then the Company's obligations to provide Services under this Contract may, at the Company's option, be suspended by the Company. This suspension

will be effective as of the date specified in the Company's Notice to Customer, notwithstanding the General Terms and Conditions.

5. FIRM DAILY CONTRACT DEMAND

The Firm Contract Demand ("CD") is as specified in Schedule 1.

5.01 CD INCREASES DURING CONTRACT YEAR

The first day in each Contract Year that the Customer overruns its CD ("**First Occurrence**") shall be recorded. "**Overrun**" shall have the meaning given that term in the M4 Rate Schedule. The second day in each Contract Year that the customer overruns its CD ("**Second Occurrence**"), shall result in an increase in the Customer's CD to the higher quantity used on the First Occurrence or the Second Occurrence effective as of the 1st day of the month of this Second Occurrence, at the Company's sole discretion. Customer charges will reflect the increased CD.

5.02 SUBSEQUENT CD INCREASES DURING CONTRACT YEAR

After the CD has been increased and anytime thereafter that it has been increased pursuant to Section 5.01, the next day that Customer overruns the increased CD within the Contract Year shall be deemed to be a new First Occurrence for the purposes of Section 5.01, and the next time thereafter that Customer overruns the CD within the Contract Term shall be deemed to be a new Second Occurrence for the purposes of Section 5.01, resulting in another increase in the CD as per the procedure set out in Section 5.01. For greater clarity, every time the CD is increased in a Contract Year, the occurrence number is set back to zero and thereafter if two more occurrences happen, the CD will be raised again, and so on for the remainder of the Contract Year. At the beginning of each Contract Year any outstanding First Occurrences will be set back to zero.

6. MINIMUM ANNUAL VOLUME

6.01 FIRM MINIMUM ANNUAL VOLUME

In each Contract Year, the Customer shall consume or, in any event, pay for the Adjusted Firm Minimum Annual Volume ("**AFMAV**") as determined in the formula below. This AFMAV will not be less than the minimum quantity required to qualify for firm service in the M4 Rate Schedule.

The firm quantity not consumed in any Contract Year (the "**Firm Deficiency Volume**" or "**FDV**") shall be as determined in the formula below.

$$\text{AFMAV} = \text{FMAV} \times [(U - D_F) / U]$$

$$\text{FDV} = \text{AFMAV} - (\text{FV} - \text{F})$$

Where:

FMAV = Firm Minimum Annual Volume (as identified in Schedule 1)

U = number of days in the Contract Year

D_F = number of days of Force Majeure in the Contract Year

FV = total firm volume taken in the Contract Year

F = volumes delivered to the Points of Consumption during Force Majeure

The payment required for the FDV shall be calculated by multiplying FDV by the MAV Delivery charge specified in the Rate M4 Rate Schedule as of the last day of the Contract Year. This payment would only apply if the FDV was greater than zero.

6.02 INTERRUPTIBLE MINIMUM ANNUAL VOLUME

In each Contract Year, the Customer shall consume or, in any event, pay for the Adjusted Interruptible Minimum Annual Volume (“**AIMAV**”) as determined in the formula below. This AIMAV will not be less than the minimum quantity required to qualify for interruptible service in the Rate M4 Rate Schedule.

The interruptible quantity not consumed in any Contract Year (the "**Interruptible Deficiency Volume**") (“**IDV**”) shall be determined in the formula below.

$$\text{AIMAV} = \text{IMAV} - (\text{CD}_i \times \text{D}_i)$$

$$\text{IDV} = \text{AIMAV} - (\text{IV} - \text{I})$$

Where:

- IMAV** = Interruptible Minimum Annual Volume (as identified in Schedule 1)
- CD_i** = Interruptible Contract Demand
- D_i** = number of days of interruption in the Contract Year
- IV** = total interruptible volume taken in the Contract Year
- I** = volumes delivered to the Points of Consumption during an interruption

The payment required for the IDV shall be calculated by multiplying the IDV by the MAV Delivery charge specified in the Rate M4 Rate Schedule as of the last day of the Contract Year. This payment would only apply if the IDV was greater than zero.

7. EXPANSION FACILITIES

The Company will use commercially reasonable efforts to construct the Project and Expansion Facilities to serve the Site. The target date for completion of these facilities is [Date]. The Company will provide written Notice to Customer when such facilities are complete and placed into service.

The Company and Customer agree that the Company shall not be obligated to construct any portion of the Expansion Facilities between December 15 of any year and March 31 of the subsequent calendar year.

8. AID AMOUNT PAYMENT SCHEDULE

Customer will be required to pay to the Company the Aid Amount of \$ [redacted] by [Date].

Any applicable taxes will be applied to all amounts paid under this Section. Customer warrants and represents that no payment to be made by Customer under this Contract is subject to any withholding tax.

[NTD:If there are multiple years, then a payment table should be used:]

Year	Payment	Due Date

9. LATE PAYMENT CHARGES

Any amounts due and payable by Customer to the Company arising under Section 8 and 11 of this Contract shall, if not paid by the due date thereof, be subject to late payment charges equal to 1.5% per month (for a nominal rate of 18% per annum compounded monthly) on any unpaid balance including previous arrears.

10. CREDIT REQUIREMENTS DURING INITIAL TERM

In addition to the terms of Section 5.04 of the General Terms and Conditions, the Company may, at any time during the Initial Term, request financial assurances to cover the potential financial exposure to the Company to the end of the Initial Term. Such financial assurances shall be determined by the Company in a commercially reasonable manner and may include, without limitation, expected return on capital invested. Failure to provide such financial assurances shall be treated in a manner provided for in Section 5.04 of the General Terms and Conditions. Customer shall provide financial assurances acceptable to the Company by no later than November 1, 2022.

11. TERMINATION PRIOR TO COMPLETION OF EXPANSION FACILITIES

The Company shall have the right to terminate this Contract at any time prior to the Day of First Delivery, pursuant to Section 2, by giving written notice hereof, subject to the terms hereof.

If this Contract is terminated by the Company as outlined above, then:

- (a) Upon such termination, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder, provided that any rights or remedies that a party may have for breaches of this Contract prior to such termination and any liability that a party may have incurred prior to such termination, and the parties’ obligations under this Section 11, shall not thereby be released;
- (b) Customer shall reimburse the Company for all Project Costs; and
- (c) Customer shall reimburse the Company for all cancellation costs, fees or other amounts paid under contracts entered into by the Company to support the satisfaction of the conditions precedent set out in Section 2 (“**Cancellation Costs**”).

The Company may invoice amounts under this Section from time to time, with the expectation that there will be an invoice rendered within 30 days of termination, and subsequent invoices as

additional amounts payable hereunder are incurred from time to time. After delivery of such Notice of termination by the Company, the Company will use commercially reasonable efforts to cease incurring Project Costs and to mitigate Cancellation Costs upon such termination. In no event shall the Company invoice Customer for any Cancellation Costs or Project Costs not previously invoiced by the Company after 12 months from the termination date. Without limiting the foregoing, Customer shall have the right to audit at Customer's expense the costs claimed for reimbursement by the Company for a period of six (6) months after each invoice is issued.

"Project Costs" means any and all reasonable costs (including litigation costs, cancellation costs, carrying costs, and third party claims) expenses, losses, demands, damages, obligations, or other liabilities (whether of a capital or operating nature, and whether incurred or suffered before or after the date of this Contract) of the Company (including amounts paid to affiliates in accordance with the Affiliate Relationship Code as established by the Ontario Energy Board) in connection with or in respect of development and construction of the Expansion Facilities (including without limitation the construction and placing into service of the Expansion Facilities, the obtaining of all governmental, regulatory, and other third party approvals, and the obtaining of rights of way) except for costs that have arisen from the gross negligence, fraud, or willful misconduct of the Company.

12. CONTRACT SUCCESSION

This Contract, unless terminated pursuant to Section 2 hereof, replaces all previous Gas Distribution Contracts between the parties, subject to settlement of any surviving obligations.

IN WITNESS WHEREOF this Contract has been duly executed by the parties hereto as of the date first written above. If an Agent on behalf of Customer executes this Contract then, if requested by the Company, Agent or Customer shall at any time provide a copy of such authorization to the Company.

Authorized Signatory
Customer

Authorized Signatory
Enbridge Gas Inc.

Please Print Name

Please Print Name

Contract ID	
Contract Name	

M4 Contract

This GAS DISTRIBUTION CONTRACT (“**Contract**”), made as of the [REDACTED] day of [REDACTED], 20[REDACTED].

BETWEEN:

Enbridge Gas Inc.

hereinafter called "**the Company**"

- and -

Customer Name

hereinafter called "**Customer**"

WHEREAS, the Company has built, or proposes to build, certain facilities for the Panhandle Regional Expansion Project (the “**Project**”) to increase the capacity of its natural gas pipeline system. In connection with the Project, the Company will be required to construct distribution facilities (the “**Expansion Facilities**”) to serve the Customer’s facilities at [REDACTED] (the “**Site**”);

AND WHEREAS, Customer has requested from the Company and the Company has agreed to provide Customer with Services as specified in Schedule 1 (the “**Services**”);

AND WHEREAS, if Customer has elected direct purchase services, Customer will be responsible for supplying Gas to the Company under a separate Contract called the Southern Bundled T;

AND WHEREAS, the Company will distribute Gas to Customer’s Point(s) of Consumption under this Contract identified in Schedule 1;

IN CONSIDERATION of the mutual covenants contained herein, and other good and valuable consideration, the receipt of and sufficiency of which is hereby acknowledged, the parties agree as follows:

1. INCORPORATIONS

The following are hereby incorporated in and form part of this Contract:

- a) Contract Parameters as contained in Schedule 1 as amended from time to time; and
- b) The latest posted version of the Company’s general terms and conditions applicable to Union Rate Zones (“**General Terms and Conditions**”) subject to Section 12.18 of the General Terms and Conditions; and
- c) Rate M4 Schedule as amended from time to time and as approved by the Ontario Energy Board.

2. CONDITIONS PRECEDENT

2.01 The obligations of the Company to provide Services hereunder are subject to the following conditions precedent that are for the sole benefit of the Company and which may be waived or extended, in whole or in part, in the manner provided in this Contract:

- a) The Company shall have obtained, in form and substance satisfactory to the Company, and all conditions shall have been satisfied under all governmental, regulatory and other third party approvals, consents, orders and authorizations, that are required to:
 - i. provide the Services; and
 - ii. construct the Project and Expansion Facilities; and
- b) The Company shall have obtained all internal approvals that are necessary or appropriate to:
 - i. provide the Services; and
 - ii. construct the Project and Expansion Facilities; and
- c) The Company shall have completed and placed into Service the Project and Expansion Facilities; and
- d) The Company shall have received a contribution in aid of construction to the Company of \$0.00 (the “**Aid Amount**”) from Customer pursuant to Customer’s obligations herein; and
- e) If Customer has elected direct purchase services, Customer and the Company shall have executed and maintained in good standing a Southern Bundled T.

The Company shall use commercially reasonable efforts to satisfy and fulfill the conditions precedent specified in Sections 2.01 a), c), d) and e). The Company shall notify Customer forthwith in writing of the Company’s satisfaction or waiver of each condition precedent for the Company’s benefit. If Company concludes that it will not be able to satisfy or waive a condition precedent, it may, upon written Notice, terminate this Contract and upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder.

2.02 The obligations of the Customer hereunder are subject to the following condition precedent that is for the sole benefit of the Customer and which may be waived by Customer:

- a) Customer shall have received all required financing necessary, on or before November 1, 2022, to ensure the Customer’s ability to construct new facilities at the Site and honour the provisions of this Contract.

Customer shall use commercially reasonable efforts to satisfy and fulfill the condition precedent specified in Section 2.02 a). Customer shall notify the Company forthwith in writing of the Customer’s satisfaction or waiver of such condition precedent. If Customer concludes that it will not be able to satisfy or waive such condition precedent on or before the date specified, it may, upon written Notice to the Company no later than November 1, 2022, terminate this Contract and

upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder.

2.03 Should this Contract be terminated by virtue of this Section 2, Customer and the Company shall remain bound by any pre-existing Gas Distribution Contract(s) between Customer and the Company.

3. CONTRACT TERM

This Contract shall be effective from the date hereof. However, the Services and the Company's obligation to provide the Services under Section 4 shall commence on the later of (such later date being the "**Day of First Delivery**") (a) [Date], and (b) the date that the last condition precedent as set out in Section 2 is satisfied or waived by the Company. Subject to the provisions hereof, this Contract shall continue in full force and effect for a period of xx Contract Years (the "**Initial Term**") and continuing thereafter on a year to year basis unless written Notice to terminate is provided by one party to the other at least three (3) Months prior to the end of the then-current term.

"**Contract Year**" means a period of twelve (12) consecutive Months, beginning on [redacted] of any year and ending on the subsequent [redacted], except for the first Contract Year which shall begin on the Day of First Delivery and end on the subsequent [redacted].

4. SERVICES PROVIDED

The Company agrees to provide Services as specified in Schedule 1 and Customer agrees to pay for such Services pursuant to the terms and conditions as set out in this Contract and the referenced attachments and the rate(s) referenced in Schedule 1.

To be eligible for services under the Rate M4 Rate Schedule, Customer must have an annual natural gas consumption of at least 350,400 m³ and Daily Contracted Demand between 2,400 m³ and 60,000 m³. If the Customer does not maintain this level of consumption during the current Contract Year or is not expected to maintain this level of consumption then, notwithstanding any other remedy available to the Company under this Contract or any other term of this Contract, effective the following Contract Year, the Customer may no longer qualify for service under the Rate M4 Rate Schedule and may be placed on an alternate service by the Company. If the Customer's Daily Contracted Demand exceeds 60,000 m³ then the Customer no longer qualifies for services under the Rate M4 Rate Schedule.

If Customer has elected direct purchase services, and if the Company does not receive Gas from Customer under the Southern Bundled T, then the Company's obligations to provide Services under this Contract may, at the Company's option, be suspended by the Company. This suspension will be effective as of the date specified in the Company's Notice to Customer, notwithstanding the General Terms and Conditions.

5. FIRM DAILY CONTRACT DEMAND

The Firm Contract Demand ("**CD**") is as specified in Schedule 1.

5.01 CD INCREASES DURING CONTRACT YEAR

The first day in each Contract Year that the Customer overruns its CD (“**First Occurrence**”) shall be recorded. “**Overrun**” shall have the meaning given that term in the M4 Rate Schedule. The second day in each Contract Year that the customer overruns its CD (“**Second Occurrence**”), shall result in an increase in the Customer’s CD to the higher quantity used on the First Occurrence or the Second Occurrence effective as of the 1st day of the month of this Second Occurrence, at the Company’s sole discretion. Customer charges will reflect the increased CD.

5.02 SUBSEQUENT CD INCREASES DURING CONTRACT YEAR

After the CD has been increased and anytime thereafter that it has been increased pursuant to Section 5.01, the next day that Customer overruns the increased CD within the Contract Year shall be deemed to be a new First Occurrence for the purposes of Section 5.01, and the next time thereafter that Customer overruns the CD within the Contract Term shall be deemed to be a new Second Occurrence for the purposes of Section 5.01, resulting in another increase in the CD as per the procedure set out in Section 5.01. For greater clarity, every time the CD is increased in a Contract Year, the occurrence number is set back to zero and thereafter if two more occurrences happen, the CD will be raised again, and so on for the remainder of the Contract Year. At the beginning of each Contract Year any outstanding First Occurrences will be set back to zero.

6. MINIMUM ANNUAL VOLUME

6.01 FIRM MINIMUM ANNUAL VOLUME

In each Contract Year, the Customer shall consume or, in any event, pay for the Adjusted Firm Minimum Annual Volume (“**AFMAV**”) as determined in the formula below. This AFMAV will not be less than the minimum quantity required to qualify for firm service in the M4 Rate Schedule.

The firm quantity not consumed in any Contract Year (the "**Firm Deficiency Volume**" or "**FDV**") shall be as determined in the formula below.

$$AFMAV = FMAV \times [(U - D_F) / U]$$

$$FDV = AFMAV - (FV - F)$$

Where:

- FMAV** = Firm Minimum Annual Volume (as identified in Schedule 1)
- U** = number of days in the Contract Year
- D_F** = number of days of Force Majeure in the Contract Year
- FV** = total firm volume taken in the Contract Year
- F** = volumes delivered to the Points of Consumption during Force Majeure

The payment required for the FDV shall be calculated by multiplying FDV by the MAV Delivery charge specified in the Rate M4 Rate Schedule as of the last day of the Contract Year. This payment would only apply if the FDV was greater than zero.

6.02 INTERRUPTIBLE MINIMUM ANNUAL VOLUME

In each Contract Year, the Customer shall consume or, in any event, pay for the Adjusted Interruptible Minimum Annual Volume (“AIMAV”) as determined in the formula below. This AIMAV will not be less than the minimum quantity required to qualify for interruptible service in the Rate M4 Rate Schedule.

The interruptible quantity not consumed in any Contract Year (the "**Interruptible Deficiency Volume**") (“IDV”) shall be determined in the formula below.

$$AIMAV = IMAV - (CD_i \times D_i)$$

$$IDV = AIMAV - (IV - I)$$

Where:

- IMAV** Interruptible Minimum Annual Volume (as identified in Schedule 1)
- CD_i** = Interruptible Contract Demand
- D_i** = number of days of interruption in the Contract Year
- IV** = total interruptible volume taken in the Contract Year
- I** = volumes delivered to the Points of Consumption during an interruption

The payment required for the IDV shall be calculated by multiplying the IDV by the MAV Delivery charge specified in the Rate M4 Rate Schedule as of the last day of the Contract Year. This payment would only apply if the IDV was greater than zero.

7. EXPANSION FACILITIES

The Company will use commercially reasonable efforts to construct the Project and Expansion Facilities to serve the Site. The target date for completion of these facilities is [Date]. The Company will provide written Notice to Customer when such facilities are complete and placed into service.

The Company and Customer agree that the Company shall not be obligated to construct any portion of the Expansion Facilities between December 15 of any year and March 31 of the subsequent calendar year.

8. AID AMOUNT PAYMENT SCHEDULE

Customer will be required to pay to the Company the Aid Amount of \$ [redacted] by [Date].

Any applicable taxes will be applied to all amounts paid under this Section. Customer warrants and represents that no payment to be made by Customer under this Contract is subject to any withholding tax.

[NTD:If there are multiple years, then a payment table should be used:]

Year	Payment	Due Date
------	---------	----------

9. LATE PAYMENT CHARGES

Any amounts due and payable by Customer to the Company arising under Section 8 of this Contract shall, if not paid by the due date thereof, be subject to late payment charges equal to 1.5% per month (for a nominal rate of 18% per annum compounded monthly) on any unpaid balance including previous arrears.

10. CREDIT REQUIREMENTS DURING INITIAL TERM

In accordance with Section 5.04 of the General Terms and Conditions, the Company may, at any time during the Initial Term, request financial assurances to cover the potential financial exposure to the Company to the end of the Initial Term. Such financial assurances shall be determined by the Company in a commercially reasonable manner. Failure to provide such financial assurances shall be treated in a manner provided for in Section 5.04 of the General Terms and Conditions.

Customer shall provide financial assurances acceptable to the Company by no later than June 1, 2023.

11. CONTRACT SUCCESSION

This Contract, unless terminated pursuant to Section 2 hereof, replaces all previous Gas Distribution Contracts between the parties, subject to settlement of any surviving obligations.

IN WITNESS WHEREOF this Contract has been duly executed by the parties hereto as of the date first written above. If an Agent on behalf of Customer executes this Contract then, if requested by the Company, Agent or Customer shall at any time provide a copy of such authorization to the Company.

 Authorized Signatory
Customer

 Authorized Signatory
Enbridge Gas Inc.

 Please Print Name

 Please Print Name

Contract ID	
Contract Name	

M4 Contract

This GAS DISTRIBUTION CONTRACT (“**Contract**”), made as of the [REDACTED] day of [REDACTED], 20[REDACTED].

BETWEEN:

Enbridge Gas Inc.

hereinafter called "**the Company**"

- and -

Customer Name

hereinafter called "**Customer**"

WHEREAS, the Company has built, or proposes to build, certain facilities for the Panhandle Regional Expansion Project (the “**Project**”) to increase the capacity of its natural gas pipeline system to serve the Customer’s facilities at [REDACTED] (the “**Site**”);

AND WHEREAS, Customer has requested from the Company and the Company has agreed to provide Customer with Services as specified in Schedule 1 (the “**Services**”);

AND WHEREAS, if Customer has elected direct purchase services, Customer will be responsible for supplying Gas to the Company under a separate Contract called the Southern Bundled T;

AND WHEREAS, the Company will distribute Gas to Customer’s Point(s) of Consumption under this Contract identified in Schedule 1;

IN CONSIDERATION of the mutual covenants contained herein, and other good and valuable consideration, the receipt of and sufficiency of which is hereby acknowledged, the parties agree as follows:

1. INCORPORATIONS

The following are hereby incorporated in and form part of this Contract:

- a) Contract Parameters as contained in Schedule 1 as amended from time to time; and
- b) The latest posted version of the Company’s general terms and conditions applicable to Union Rate Zones (“**General Terms and Conditions**”) subject to Section 12.18 of the General Terms and Conditions; and
- c) Rate M4 Schedule as amended from time to time and as approved by the Ontario Energy Board.

2. CONDITIONS PRECEDENT

2.01 The obligations of the Company to provide Services hereunder are subject to the following conditions precedent that are for the sole benefit of the Company and which may be waived or extended, in whole or in part, in the manner provided in this Contract:

- a) The Company shall have obtained, in form and substance satisfactory to the Company, and all conditions shall have been satisfied under all governmental, regulatory and other third party approvals, consents, orders and authorizations, that are required to:
 - i. provide the Services; and
 - ii. construct the Project; and
- b) The Company shall have obtained all internal approvals that are necessary or appropriate to:
 - i. provide the Services; and
 - ii. construct the Project; and
- c) The Company shall have completed and placed into Service the Project; and
- d) If Customer has elected direct purchase services, Customer and the Company shall have executed and maintained in good standing a Southern Bundled T.

The Company shall use commercially reasonable efforts to satisfy and fulfill the conditions precedent specified in Sections 2.01 a), c) and d). The Company shall notify Customer forthwith in writing of the Company's satisfaction or waiver of each condition precedent for the Company's benefit. If Company concludes that it will not be able to satisfy or waive a condition precedent, it may, upon written Notice, terminate this Contract and upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder.

2.02 The obligations of the Customer hereunder are subject to the following condition precedent that is for the sole benefit of the Customer and which may be waived by Customer:

- a) Customer shall have received all required financing necessary, on or before November 1, 2022, to ensure the Customer's ability to construct new facilities at the Site and honour the provisions of this Contract.

Customer shall use commercially reasonable efforts to satisfy and fulfill the condition precedent specified in Section 2.02 a). Customer shall notify the Company forthwith in writing of the Customer's satisfaction or waiver of such condition precedent. If Customer concludes that it will not be able to satisfy or waive such condition precedent on or before the date specified, it may, upon written Notice to the Company no later than November 1, 2022, terminate this Contract and upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder.

2.03 Should this Contract be terminated by virtue of this Section 2, Customer and the Company shall remain bound by any pre-existing Gas Distribution Contract(s) between Customer and the Company.

3. CONTRACT TERM

This Contract shall be effective from the date hereof. However, the Services and the Company's obligation to provide the Services under Section 4 shall commence on the later of (such later date being the "**Day of First Delivery**") (a) [Date], and (b) the date that the last condition precedent as set out in Section 2 is satisfied or waived by the Company. Subject to the provisions hereof, this Contract shall continue in full force and effect for a period of **five (5)** Contract Years (the "**Initial Term**") and continuing thereafter on a year to year basis unless written Notice to terminate is provided by one party to the other at least three (3) Months prior to the end of the then-current term.

"**Contract Year**" means a period of twelve (12) consecutive Months, beginning on [redacted] of any year and ending on the subsequent [redacted], except for the first Contract Year which shall begin on the Day of First Delivery and end on the subsequent [redacted].

4. SERVICES PROVIDED

The Company agrees to provide Services as specified in Schedule 1 and Customer agrees to pay for such Services pursuant to the terms and conditions as set out in this Contract and the referenced attachments and the rate(s) referenced in Schedule 1.

To be eligible for services under the Rate M4 Rate Schedule, Customer must have an annual natural gas consumption of at least 350,400 m³ and Daily Contracted Demand between 2,400 m³ and 60,000 m³. If the Customer does not maintain this level of consumption during the current Contract Year or is not expected to maintain this level of consumption then, notwithstanding any other remedy available to the Company under this Contract or any other term of this Contract, effective the following Contract Year, the Customer may no longer qualify for service under the Rate M4 Rate Schedule and may be placed on an alternate service by the Company. If the Customer's Daily Contracted Demand exceeds 60,000 m³ then the Customer no longer qualifies for services under the Rate M4 Rate Schedule.

If Customer has elected direct purchase services, and if the Company does not receive Gas from Customer under the Southern Bundled T, then the Company's obligations to provide Services under this Contract may, at the Company's option, be suspended by the Company. This suspension will be effective as of the date specified in the Company's Notice to Customer, notwithstanding the General Terms and Conditions.

5. FIRM DAILY CONTRACT DEMAND

The Firm Contract Demand ("**CD**") is as specified in Schedule 1.

5.01 CD INCREASES DURING CONTRACT YEAR

The first day in each Contract Year that the Customer overruns its CD ("**First Occurrence**") shall be recorded. "**Overrun**" shall have the meaning given that term in the M4 Rate Schedule. The

second day in each Contract Year that the customer overruns its CD (“**Second Occurrence**”), shall result in an increase in the Customer’s CD to the higher quantity used on the First Occurrence or the Second Occurrence effective as of the 1st day of the month of this Second Occurrence, at the Company’s sole discretion. Customer charges will reflect the increased CD.

5.02 SUBSEQUENT CD INCREASES DURING CONTRACT YEAR

After the CD has been increased and anytime thereafter that it has been increased pursuant to Section 5.01, the next day that Customer overruns the increased CD within the Contract Year shall be deemed to be a new First Occurrence for the purposes of Section 5.01, and the next time thereafter that Customer overruns the CD within the Contract Term shall be deemed to be a new Second Occurrence for the purposes of Section 5.01, resulting in another increase in the CD as per the procedure set out in Section 5.01. For greater clarity, every time the CD is increased in a Contract Year, the occurrence number is set back to zero and thereafter if two more occurrences happen, the CD will be raised again, and so on for the remainder of the Contract Year. At the beginning of each Contract Year any outstanding First Occurrences will be set back to zero.

6. MINIMUM ANNUAL VOLUME

6.01 FIRM MINIMUM ANNUAL VOLUME

In each Contract Year, the Customer shall consume or, in any event, pay for the Adjusted Firm Minimum Annual Volume (“**AFMAV**”) as determined in the formula below. This AFMAV will not be less than the minimum quantity required to qualify for firm service in the M4 Rate Schedule.

The firm quantity not consumed in any Contract Year (the "**Firm Deficiency Volume**" or "**FDV**") shall be as determined in the formula below.

$$AFMAV = FMAV \times [(U - D_F) / U]$$

$$FDV = AFMAV - (FV - F)$$

Where:

- FMAV** = Firm Minimum Annual Volume (as identified in Schedule 1)
- U** = number of days in the Contract Year
- D_F** = number of days of Force Majeure in the Contract Year
- FV** = total firm volume taken in the Contract Year
- F** = volumes delivered to the Points of Consumption during Force Majeure

The payment required for the FDV shall be calculated by multiplying FDV by the MAV Delivery charge specified in the Rate M4 Rate Schedule as of the last day of the Contract Year. This payment would only apply if the FDV was greater than zero.

6.02 INTERRUPTIBLE MINIMUM ANNUAL VOLUME

In each Contract Year, the Customer shall consume or, in any event, pay for the Adjusted Interruptible Minimum Annual Volume (“**AIMAV**”) as determined in the formula below. This

AIMAV will not be less than the minimum quantity required to qualify for interruptible service in the Rate M4 Rate Schedule.

The interruptible quantity not consumed in any Contract Year (the "**Interruptible Deficiency Volume**") ("**IDV**") shall be determined in the formula below.

$$\text{AIMAV} = \text{IMAV} - (\text{CD}_i \times \text{D}_i)$$

$$\text{IDV} = \text{AIMAV} - (\text{IV} - \text{I})$$

Where:

IMAV	=	Interruptible Minimum Annual Volume (as identified in Schedule 1)
CD_i	=	Interruptible Contract Demand
D_i	=	number of days of interruption in the Contract Year
IV	=	total interruptible volume taken in the Contract Year
I	=	volumes delivered to the Points of Consumption during an interruption

The payment required for the IDV shall be calculated by multiplying the IDV by the MAV Delivery charge specified in the Rate M4 Rate Schedule as of the last day of the Contract Year. This payment would only apply if the IDV was greater than zero.

7. EXPANSION FACILITIES

The Company will use commercially reasonable efforts to construct the Project to serve the Site. The target date for completion of these facilities is [Date]. The Company will provide written Notice to Customer when such facilities are complete and placed into service.

The Company and Customer agree that the Company shall not be obligated to construct any portion of the Project between December 15 of any year and March 31 of the subsequent calendar year.

8. AID AMOUNT PAYMENT SCHEDULE

Customer will be required to pay to the Company the Aid Amount of \$0.00.

Any applicable taxes will be applied to all amounts paid under this Section. Customer warrants and represents that no payment to be made by Customer under this Contract is subject to any withholding tax.

9. CREDIT REQUIREMENTS DURING INITIAL TERM

In accordance with Section 5.04 of the General Terms and Conditions, the Company may, at any time during the Initial Term, request financial assurances to cover the potential financial exposure to the Company to the end of the Initial Term. Such financial assurances shall be determined by the Company in a commercially reasonable manner. Failure to provide such financial assurances shall be treated in a manner provided for in Section 5.04 of the General Terms and Conditions.

Customer shall provide financial assurances acceptable to the Company by no later than June 1, 2023.

10. CONTRACT SUCCESSION

This Contract, unless terminated pursuant to Section 2 hereof, replaces all previous Gas Distribution Contracts between the parties, subject to settlement of any surviving obligations.

IN WITNESS WHEREOF this Contract has been duly executed by the parties hereto as of the date first written above. If an Agent on behalf of Customer executes this Contract then, if requested by the Company, Agent or Customer shall at any time provide a copy of such authorization to the Company.

Authorized Signatory
Customer

Authorized Signatory
Enbridge Gas Inc.

Please Print Name

Please Print Name

Contract ID	
Contract Name	

M7 Contract

This GAS DISTRIBUTION CONTRACT (“**Contract**”), made as of the [REDACTED] day of [REDACTED], 20[REDACTED].

BETWEEN:

Enbridge Gas Inc.

hereinafter called "**the Company**"

- and -

Customer Name

hereinafter called "**Customer**"

WHEREAS, the Company has built, or proposes to build, certain facilities for the Panhandle Regional Expansion Project (the “**Project**”) to increase the capacity of its natural gas pipeline system. In connection with the Project, the Company will be required to construct distribution facilities (the “**Expansion Facilities**”) to serve the Customer’s facilities at [REDACTED] (the “**Site**”);

AND WHEREAS, Customer has requested from the Company and the Company has agreed to provide Customer with Services as specified in Schedule 1 (the “**Services**”);

AND WHEREAS, if Customer has elected direct purchase services, Customer will be responsible for supplying Gas to the Company under a separate Contract called the Southern Bundled T;

AND WHEREAS, the Company will distribute Gas to Customer’s Point(s) of Consumption under this Contract identified in Schedule 1;

IN CONSIDERATION of the mutual covenants contained herein, and other good and valuable consideration, the receipt of and sufficiency of which is hereby acknowledged, the parties agree as follows:

1. INCORPORATIONS

The following are hereby incorporated in and form part of this Contract:

- a) Contract Parameters as contained in Schedule 1 as amended from time to time; and
- b) The latest posted version of the Company’s general terms and conditions applicable to Union Rate Zones (“**General Terms and Conditions**”) subject to Section 12.18 of the General Terms and Conditions; and
- c) Rate M7 Schedule as amended from time to time and as approved by the Ontario Energy Board.

2. CONDITIONS PRECEDENT

2.01 The obligations of the Company to provide Services hereunder are subject to the following conditions precedent that are for the sole benefit of the Company and which may be waived or extended, in whole or in part:

- a) The Company shall have obtained, in form and substance satisfactory to the Company, and all conditions shall have been satisfied under all governmental, regulatory and other third party approvals, consents, orders and authorizations in relation to the Project and Expansion Facilities that are required to:
 - i. provide the Services; and
 - ii. construct the Project and Expansion Facilities; and
- b) The Company shall have obtained all internal approvals that are necessary or appropriate to:
 - i. provide the Services; and
 - ii. construct the Project and Expansion Facilities; and
- c) The Company shall have completed and placed into Service the Project and Expansion Facilities; and
- d) Financial assurances acceptable to the Company shall be supplied and maintained in accordance with the General Terms and Conditions and Section 10 of this Agreement; and
- e) The Company shall have received a contribution in aid of construction to the Company of \$0.00 (the “**Aid Amount**”) from Customer pursuant to Customer’s obligations herein; and
- f) If Customer has elected direct purchase services, Customer and the Company shall have executed and maintained in good standing a Southern Bundled T.

The Company shall use commercially reasonable efforts to satisfy and fulfill the conditions precedent specified in Sections a), c), d), e), and f). The Company shall notify Customer forthwith in writing of the Company’s satisfaction or waiver of each condition precedent. If the Company concludes that it will not be able to satisfy a condition precedent, the Company may, upon written Notice to Customer, terminate this Contract and upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder, subject to Customer’s obligations pursuant to Section 11 herein.

2.02 The obligations of the Customer hereunder are subject to the following condition precedent that is for the sole benefit of the Customer and which may be waived by Customer:

- a) Customer shall have received all required financing necessary, on or before November 1, 2022, to ensure the Customer’s ability to construct new facilities at the Site and honour the provisions of this Contract.

Customer shall use commercially reasonable efforts to satisfy and fulfill the condition precedent specified in Section 2.02 a). Customer shall notify the Company forthwith in writing of the Customer's satisfaction or waiver of such condition precedent. If Customer concludes that it will not be able to satisfy or waive such condition precedent on or before the date specified, it may, upon written Notice to the Company no later than November 1, 2022, terminate this Contract and upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder.

2.03 Should this Contract be terminated by virtue of this Section 2, Customer and the Company shall remain bound by any pre-existing Gas Distribution Contract(s) between Customer and the Company.

3. CONTRACT TERM

This Contract shall be effective from the date hereof. However, the Services and the Company's obligation to provide the Services under Section 4 shall commence on the later of (such later date being the "Day of First Delivery") (a) [Date], and (b) the date that the last condition precedent as set out in Section 2 is satisfied or waived by the Company. Subject to the provisions hereof, this Contract shall continue in full force and effect for a period of xx Contract Years (the "Initial Term") and continuing thereafter on a year to year basis unless written Notice to terminate is provided by one party to the other at least three (3) Months prior to the end of the then-current term.

"Contract Year" means a period of twelve (12) consecutive Months, beginning on [redacted] of any year and ending on the subsequent [redacted], except for the first Contract Year which shall begin on the Day of First Delivery and end on the subsequent [redacted].

4. SERVICES PROVIDED

The Company agrees to provide Services as specified in Schedule 1 and Customer agrees to pay for such Services pursuant to these Contract terms and conditions as set out in this Contract, the referenced attachments, and the rate(s) referenced in Schedule 1.

To be eligible for services under the Rate M7 Rate Schedule, Customer must have a combined Firm, Interruptible and Seasonal Daily Contracted Demand greater than sixty thousand (60,000) m³. If the Customer does not maintain this level of consumption during the current Contract Year or is not expected to maintain this level of consumption then, notwithstanding any other remedy available to the Company under this Contract or any other term of this Contract, effective the following Contract Year, the Customer may no longer qualify for service under the Rate M7 Rate Schedule and may be placed on an alternate service by the Company.

If a Customer has elected direct purchase services, and if the Company does not receive Gas from Customer under the Southern Bundled T, then the Company's obligations to provide Services under this Contract may, at the Company's option, be suspended or terminated by the Company. This suspension or termination will be effective as of the date specified in the Company's Notice to Customer, notwithstanding the General Terms and Conditions.

5. FIRM DAILY CONTRACT DEMAND

The Firm Contract Demand (“CD”) is as specified in Schedule 1.

5.01 CD INCREASES DURING CONTRACT YEAR

The first day in each Contract Year that the Customer overruns its CD (“**First Occurrence**”) shall be recorded. “**Overrun**” shall have the meaning given that term in the M7 Rate Schedule. The second day in each Contract Year that the customer overruns its CD (“**Second Occurrence**”), shall result in an increase in the Customer’s CD to the higher quantity used on the First Occurrence or the Second Occurrence effective as of the 1st day of the month of this Second Occurrence, at the Company’s sole discretion. Customer charges will reflect the increased CD.

5.02 SUBSEQUENT CD INCREASES DURING CONTRACT YEAR

After the CD has been increased and anytime thereafter that it has been increased pursuant to Section 5.01, the next day that Customer overruns the increased CD within the Contract Year shall be deemed to be a new First Occurrence for the purposes of Section 5.01, and the next time thereafter that Customer overruns the CD within the Contract Term shall be deemed to be a new Second Occurrence for the purposes of Section 5.01, resulting in another increase in the CD as per the procedure set out in Section 5.01. For greater clarity, every time the CD is increased in a Contract Year, the occurrence number is set back to zero and thereafter if two more occurrences happen, the CD will be raised again, and so on for the remainder of the Contract Year. At the beginning of each Contract Year any outstanding First Occurrences will be set back to zero.

6. MINIMUM ANNUAL VOLUME

6.01 FIRM MINIMUM ANNUAL VOLUME

In each Contract Year, the Customer shall consume or, in any event, pay for the Adjusted Firm Minimum Annual Volume (“AFMAV”) as determined in the formula below.

The firm quantity not consumed in any Contract Year (the “**Firm Deficiency Volume**” or “**FDV**”) shall be as determined in the formula below.

$$\text{AFMAV} = \text{FMAV} \times \left[\frac{(\text{U} - \text{D}_F)}{\text{U}} \right]$$

$$\text{FDV} = \text{AFMAV} - (\text{FV} - \text{F})$$

Where:

FMAV = Firm Minimum Annual Volume (as identified in Schedule 1)

U = number of days in the Contract Year

D_F = number of days of Force Majeure in the Contract Year

FV = total firm volume taken in the Contract Year

F = volumes delivered to the Points of Consumption during Force Majeure

The payment required for the FDV shall be calculated by multiplying FDV by the Monthly Firm Delivery Commodity Charge specified in the Rate M7 Rate Schedule as of the last day of the Contract Year. This payment would only apply if the FDV was greater than zero.

6.02 INTERRUPTIBLE MINIMUM ANNUAL VOLUME

In each Contract Year, the Customer shall consume or, in any event, pay for the Adjusted Interruptible Minimum Annual Volume (“AIMAV”) as determined in the formula below.

The interruptible quantity not consumed in any Contract Year (the “Interruptible Deficiency Volume”) (“IDV”) shall be determined in the formula below.

$$\text{AIMAV} = \text{IMAV} \times [(U - D_i) / U]$$

$$\text{IDV} = \text{AIMAV} - (\text{IV} - I)$$

Where:

IMAV	=	Interruptible Minimum Annual Volume (as identified in Schedule 1)
U	=	number of days in the Contract Year
D_i	=	number of days of interruption in the Contract Year
IV	=	total interruptible volume taken in the Contract Year
I	=	volume delivered to point of consumption during an interruption

The payment required for the IDV shall be calculated by multiplying IDV by the Monthly Interruptible Delivery Commodity Charge as of the last day of the Contract Year. This payment would only apply if the IDV was greater than zero.

7. EXPANSION FACILITIES

The Company will use commercially reasonable efforts to construct the Project and Expansion Facilities to serve the Site. The target date for completion of these facilities is [Date]. The Company will provide written Notice to Customer when such facilities are complete and placed into service.

The Company and Customer agree that the Company shall not be obligated to construct any portion of the Expansion Facilities between December 15 of any year and March 31 of the subsequent calendar year.

8. AID AMOUNT PAYMENT SCHEDULE

Customer will be required to pay to the Company the Aid Amount of \$ [] by [Date].

Any applicable taxes will be applied to all amounts paid under this Section. Customer warrants and represents that no payment to be made by Customer under this Contract is subject to any withholding tax.

[NTD:If there are multiple years, then a payment table should be used:]

Year	Payment	Due Date

9. LATE PAYMENT CHARGES

Any amounts due and payable by Customer to the Company arising under Section 8 and 11 of this Contract shall, if not paid by the due date thereof, be subject to late payment charges equal to 1.5% per month (for a nominal rate of 18% per annum compounded monthly) on any unpaid balance including previous arrears.

10. CREDIT REQUIREMENTS DURING INITIAL TERM

In addition to the terms of Section 5.04 of the General Terms and Conditions, the Company may, at any time during the Initial Term, request financial assurances to cover the potential financial exposure to the Company to the end of the Initial Term. Such financial assurances shall be determined by the Company in a commercially reasonable manner and may include, without limitation, expected return on capital invested. Failure to provide such financial assurances shall be treated in a manner provided for in Section 5.04 of the General Terms and Conditions. Customer shall provide financial assurances acceptable to the Company by no later than November 1, 2022.

11. TERMINATION PRIOR TO COMPLETION OF EXPANSION FACILITIES

The Company shall have the right to terminate this Contract at any time prior to the Day of First Delivery, pursuant to Section 2, by giving written notice hereof, subject to the terms hereof.

If this Contract is terminated by the Company as outlined above, then:

- (a) Upon such termination, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder, provided that any rights or remedies that a party may have for breaches of this Contract prior to such termination and any liability that a party may have incurred prior to such termination, and the parties’ obligations under this Section 11, shall not thereby be released;
- (b) Customer shall reimburse the Company for all Project Costs; and
- (c) Customer shall reimburse the Company for all cancellation costs, fees or other amounts paid under contracts entered into by the Company to support the satisfaction of the conditions precedent set out in Section 2 (“**Cancellation Costs**”).

The Company may invoice amounts under this Section from time to time, with the expectation that there will be an invoice rendered within 30 days of termination, and subsequent invoices as additional amounts payable hereunder are incurred from time to time. After delivery of such

Notice of termination by the Company, the Company will use commercially reasonable efforts to cease incurring Project Costs and to mitigate Cancellation Costs upon such termination. In no event shall the Company invoice Customer for any Cancellation Costs or Project Costs not previously invoiced by the Company after 12 months from the termination date. Without limiting the foregoing, Customer shall have the right to audit at Customer's expense the costs claimed for reimbursement by the Company for a period of six (6) months after each invoice is issued.

"Project Costs" means any and all reasonable costs (including litigation costs, cancellation costs, carrying costs, and third party claims) expenses, losses, demands, damages, obligations, or other liabilities (whether of a capital or operating nature, and whether incurred or suffered before or after the date of this Contract) of the Company (including amounts paid to affiliates in accordance with the Affiliate Relationship Code as established by the Ontario Energy Board) in connection with or in respect of development and construction of the Expansion Facilities (including without limitation the construction and placing into service of the Expansion Facilities, the obtaining of all governmental, regulatory, and other third party approvals, and the obtaining of rights of way) except for costs that have arisen from the gross negligence, fraud, or willful misconduct of the Company.

12. CONTRACT SUCCESSION

This Contract, unless terminated pursuant to Section 2 hereof, replaces all previous Gas Distribution Contracts between the parties, subject to settlement of any surviving obligations.

IN WITNESS WHEREOF this Contract has been duly executed by the parties hereto as of the date first written above. If an Agent on behalf of Customer executes this Contract then, if requested by the Company, Agent or Customer shall at any time provide a copy of such authorization to the Company.

Authorized Signatory
Customer

Authorized Signatory
Enbridge Gas Inc.

Please Print Name

Please Print Name

Contract ID	
Contract Name	

M7 Contract

This GAS DISTRIBUTION CONTRACT (“**Contract**”), made as of the [REDACTED] day of [REDACTED], 20[REDACTED].

BETWEEN:

Enbridge Gas Inc.

hereinafter called "**the Company**"

- and -

Customer Name

hereinafter called "**Customer**"

WHEREAS, the Company has built, or proposes to build, certain facilities for the Panhandle Regional Expansion Project (the “**Project**”) to increase the capacity of its natural gas pipeline system. In connection with the Project, the Company will be required to construct distribution facilities (the “**Expansion Facilities**”) to serve the Customer’s facilities at [REDACTED] (the “**Site**”);

AND WHEREAS, Customer has requested from the Company and the Company has agreed to provide Customer with Services as specified in Schedule 1 (the “**Services**”);

AND WHEREAS, if Customer has elected direct purchase services, Customer will be responsible for supplying Gas to the Company under a separate Contract called the Southern Bundled T;

AND WHEREAS, the Company will distribute Gas to Customer’s Point(s) of Consumption under this Contract identified in Schedule 1;

IN CONSIDERATION of the mutual covenants contained herein, and other good and valuable consideration, the receipt of and sufficiency of which is hereby acknowledged, the parties agree as follows:

1. INCORPORATIONS

The following are hereby incorporated in and form part of this Contract:

- a) Contract Parameters as contained in Schedule 1 as amended from time to time; and
- b) The latest posted version of the Company’s general terms and conditions applicable to Union Rate Zones (“**General Terms and Conditions**”) subject to Section 12.18 of the General Terms and Conditions; and
- c) Rate M7 Schedule as amended from time to time and as approved by the Ontario Energy Board.

2. CONDITIONS PRECEDENT

2.01 The obligations of the Company to provide Services hereunder are subject to the following conditions precedent that are for the sole benefit of the Company and which may be waived or extended, in whole or in part, in the manner provided in this Contract:

- a) The Company shall have obtained, in form and substance satisfactory to the Company, and all conditions shall have been satisfied under all governmental, regulatory and other third party approvals, consents, orders and authorizations, that are required to:
 - i. provide the Services; and
 - ii. construct the Project and Expansion Facilities; and
- b) The Company shall have obtained all internal approvals that are necessary or appropriate to:
 - i. provide the Services; and
 - ii. construct the Project and Expansion Facilities; and
- c) The Company shall have completed and placed into Service the Project and Expansion Facilities; and
- d) The Company shall have received a contribution in aid of construction to the Company of \$0.00 (the “**Aid Amount**”) from Customer pursuant to Customer’s obligations herein; and
- e) If Customer has elected direct purchase services, Customer and the Company shall have executed and maintained in good standing a Southern Bundled T.

The Company shall use commercially reasonable efforts to satisfy and fulfill the conditions precedent specified in Sections 2.01 a), c), d) and e). The Company shall notify Customer forthwith in writing of the Company’s satisfaction or waiver of each condition precedent for the Company’s benefit. If Company concludes that it will not be able to satisfy or waive a condition precedent, it may, upon written Notice, terminate this Contract and upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder.

2.02 The obligations of the Customer hereunder are subject to the following condition precedent that is for the sole benefit of the Customer and which may be waived by Customer:

- a) Customer shall have received all required financing necessary, on or before November 1, 2022, to ensure the Customer’s ability to construct new facilities at the Site and honour the provisions of this Contract.

Customer shall use commercially reasonable efforts to satisfy and fulfill the condition precedent specified in Section 2.02 a). Customer shall notify the Company forthwith in writing of the Customer’s satisfaction or waiver of such condition precedent. If Customer concludes that it will not be able to satisfy or waive such condition precedent on or before the date specified, it may, upon written Notice to the Company no later than November 1, 2022, terminate this Contract and

upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder.

2.03 Should this Contract be terminated by virtue of this Section 2, Customer and the Company shall remain bound by any pre-existing Gas Distribution Contract(s) between Customer and the Company.

3. CONTRACT TERM

This Contract shall be effective from the date hereof. However, the Services and the Company's obligation to provide the Services under Section 4 shall commence on the later of (such later date being the "**Day of First Delivery**") (a) [Date], and (b) the date that the last condition precedent as set out in Section 2 is satisfied or waived by the Company. Subject to the provisions hereof, this Contract shall continue in full force and effect for a period of xx Contract Years (the "**Initial Term**") and continuing thereafter on a year to year basis unless written Notice to terminate is provided by one party to the other at least three (3) Months prior to the end of the then-current term.

"**Contract Year**" means a period of twelve (12) consecutive Months, beginning on [redacted] of any year and ending on the subsequent [redacted], except for the first Contract Year which shall begin on the Day of First Delivery and end on the subsequent [redacted].

4. SERVICES PROVIDED

The Company agrees to provide Services as specified in Schedule 1 and Customer agrees to pay for such Services pursuant to these Contract terms and conditions as set out in this Contract, the referenced attachments, and the rate(s) referenced in Schedule 1.

To be eligible for services under the Rate M7 Rate Schedule, Customer must have a combined Firm, Interruptible and Seasonal Daily Contracted Demand greater than sixty thousand (60,000) m³. If the Customer does not maintain this level of consumption during the current Contract Year or is not expected to maintain this level of consumption then, notwithstanding any other remedy available to the Company under this Contract or any other term of this Contract, effective the following Contract Year, the Customer may no longer qualify for service under the Rate M7 Rate Schedule and may be placed on an alternate service by the Company.

If a Customer has elected direct purchase services, and if the Company does not receive Gas from Customer under the Southern Bundled T, then the Company's obligations to provide Services under this Contract may, at the Company's option, be suspended or terminated by the Company. This suspension or termination will be effective as of the date specified in the Company's Notice to Customer, notwithstanding the General Terms and Conditions.

5. FIRM DAILY CONTRACT DEMAND

The Firm Contract Demand ("**CD**") is as specified in Schedule 1.

5.01 CD INCREASES DURING CONTRACT YEAR

The first day in each Contract Year that the Customer overruns its CD (“**First Occurrence**”) shall be recorded. “**Overrun**” shall have the meaning given that term in the M7 Rate Schedule. The second day in each Contract Year that the customer overruns its CD (“**Second Occurrence**”), shall result in an increase in the Customer’s CD to the higher quantity used on the First Occurrence or the Second Occurrence effective as of the 1st day of the month of this Second Occurrence, at the Company’s sole discretion. Customer charges will reflect the increased CD.

5.02 SUBSEQUENT CD INCREASES DURING CONTRACT YEAR

After the CD has been increased and anytime thereafter that it has been increased pursuant to Section 5.01, the next day that Customer overruns the increased CD within the Contract Year shall be deemed to be a new First Occurrence for the purposes of Section 5.01, and the next time thereafter that Customer overruns the CD within the Contract Term shall be deemed to be a new Second Occurrence for the purposes of Section 5.01, resulting in another increase in the CD as per the procedure set out in Section 5.01. For greater clarity, every time the CD is increased in a Contract Year, the occurrence number is set back to zero and thereafter if two more occurrences happen, the CD will be raised again, and so on for the remainder of the Contract Year. At the beginning of each Contract Year any outstanding First Occurrences will be set back to zero.

6. MINIMUM ANNUAL VOLUME

6.01 FIRM MINIMUM ANNUAL VOLUME

In each Contract Year, the Customer shall consume or, in any event, pay for the Adjusted Firm Minimum Annual Volume (“**AFMAV**”) as determined in the formula below.

The firm quantity not consumed in any Contract Year (the "**Firm Deficiency Volume**" or “**FDV**”) shall be as determined in the formula below.

$$AFMAV = FMAV \times [(U - D_F) / U]$$

$$FDV = AFMAV - (FV - F)$$

Where:

FMAV = Firm Minimum Annual Volume (as identified in Schedule 1)

U = number of days in the Contract Year

D_F = number of days of Force Majeure in the Contract Year

FV = total firm volume taken in the Contract Year

F = volumes delivered to the Points of Consumption during Force Majeure

The payment required for the FDV shall be calculated by multiplying FDV by the Monthly Firm Delivery Commodity Charge specified in the Rate M7 Rate Schedule as of the last day of the Contract Year. This payment would only apply if the FDV was greater than zero.

6.02 INTERRUPTIBLE MINIMUM ANNUAL VOLUME

In each Contract Year, the Customer shall consume or, in any event, pay for the Adjusted Interruptible Minimum Annual Volume (“AIMAV”) as determined in the formula below.

The interruptible quantity not consumed in any Contract Year (the “Interruptible Deficiency Volume”) (“IDV”) shall be determined in the formula below.

$$\text{AIMAV} = \text{IMAV} \times [(U - D_i) / U]$$

$$\text{IDV} = \text{AIMAV} - (\text{IV} - \text{I})$$

Where:

IMAV	=	Interruptible Minimum Annual Volume (as identified in Schedule 1)
U	=	number of days in the Contract Year
D_i	=	number of days of interruption in the Contract Year
IV	=	total interruptible volume taken in the Contract Year
I	=	volume delivered to point of consumption during an interruption

The payment required for the IDV shall be calculated by multiplying IDV by the Monthly Interruptible Delivery Commodity Charge as of the last day of the Contract Year. This payment would only apply if the IDV was greater than zero.

7. EXPANSION FACILITIES

The Company will use commercially reasonable efforts to construct the Project and Expansion Facilities to serve the Site. The target date for completion of these facilities is [Date]. The Company will provide written Notice to Customer when such facilities are complete and placed into service.

The Company and Customer agree that the Company shall not be obligated to construct any portion of the Expansion Facilities between December 15 of any year and March 31 of the subsequent calendar year.

8. AID AMOUNT PAYMENT SCHEDULE

Customer will be required to pay to the Company the Aid Amount of \$ [redacted] by [Date].

Any applicable taxes will be applied to all amounts paid under this Section. Customer warrants and represents that no payment to be made by Customer under this Contract is subject to any withholding tax.

[NTD:If there are multiple years, then a payment table should be used:]

Year	Payment	Due Date

9. LATE PAYMENT CHARGES

Any amounts due and payable by Customer to the Company arising under Section 8 of this Contract shall, if not paid by the due date thereof, be subject to late payment charges equal to 1.5% per month (for a nominal rate of 18% per annum compounded monthly) on any unpaid balance including previous arrears.

10. CREDIT REQUIREMENTS DURING INITIAL TERM

In accordance with Section 5.04 of the General Terms and Conditions, the Company may, at any time during the Initial Term, request financial assurances to cover the potential financial exposure to the Company to the end of the Initial Term. Such financial assurances shall be determined by the Company in a commercially reasonable manner. Failure to provide such financial assurances shall be treated in a manner provided for in Section 5.04 of the General Terms and Conditions.

Customer shall provide financial assurances acceptable to the Company by no later than June 1, 2023.

11. CONTRACT SUCCESSION

This Contract, unless terminated pursuant to Section 2 hereof, replaces all previous Gas Distribution Contracts between the parties, subject to settlement of any surviving obligations.

IN WITNESS WHEREOF this Contract has been duly executed by the parties hereto as of the date first written above. If an Agent on behalf of Customer executes this Contract then, if requested by the Company, Agent or Customer shall at any time provide a copy of such authorization to the Company.

 Authorized Signatory
Customer

 Please Print Name

 Authorized Signatory
Enbridge Gas Inc.

 Please Print Name

Contract ID	
Contract Name	

M7 Contract

This GAS DISTRIBUTION CONTRACT (“**Contract**”), made as of the [REDACTED] day of [REDACTED], 20[REDACTED].

BETWEEN:

Enbridge Gas Inc.

hereinafter called "**the Company**"

- and -

Customer Name

hereinafter called "**Customer**"

WHEREAS, the Company has built, or proposes to build, certain facilities for the Panhandle Regional Expansion Project (the “**Project**”) to increase the capacity of its natural gas pipeline system to serve the Customer’s facilities at [REDACTED] (the “**Site**”);

AND WHEREAS, Customer has requested from the Company and the Company has agreed to provide Customer with Services as specified in Schedule 1 (the “**Services**”);

AND WHEREAS, if Customer has elected direct purchase services, Customer will be responsible for supplying Gas to the Company under a separate Contract called the Southern Bundled T;

AND WHEREAS, the Company will distribute Gas to Customer’s Point(s) of Consumption under this Contract identified in Schedule 1;

IN CONSIDERATION of the mutual covenants contained herein, and other good and valuable consideration, the receipt of and sufficiency of which is hereby acknowledged, the parties agree as follows:

1. INCORPORATIONS

The following are hereby incorporated in and form part of this Contract:

- a) Contract Parameters as contained in Schedule 1 as amended from time to time; and
- b) The latest posted version of the Company’s general terms and conditions applicable to Union Rate Zones (“**General Terms and Conditions**”) subject to Section 12.18 of the General Terms and Conditions; and
- c) Rate M7 Schedule as amended from time to time and as approved by the Ontario Energy Board.

2. CONDITIONS PRECEDENT

2.01 The obligations of the Company to provide Services hereunder are subject to the following conditions precedent that are for the sole benefit of the Company and which may be waived or extended, in whole or in part, in the manner provided in this Contract:

- a) The Company shall have obtained, in form and substance satisfactory to the Company, and all conditions shall have been satisfied under all governmental, regulatory and other third party approvals, consents, orders and authorizations, that are required to:
 - i. provide the Services; and
 - ii. construct the Project; and
- b) The Company shall have obtained all internal approvals that are necessary or appropriate to:
 - i. provide the Services; and
 - ii. construct the Project; and
- c) The Company shall have completed and placed into Service the Project; and
- d) If Customer has elected direct purchase services, Customer and the Company shall have executed and maintained in good standing a Southern Bundled T.

The Company shall use commercially reasonable efforts to satisfy and fulfill the conditions precedent specified in Sections 2.01 a), c) and d). The Company shall notify Customer forthwith in writing of the Company's satisfaction or waiver of each condition precedent for the Company's benefit. If Company concludes that it will not be able to satisfy or waive a condition precedent, it may, upon written Notice, terminate this Contract and upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder.

2.02 The obligations of the Customer hereunder are subject to the following condition precedent that is for the sole benefit of the Customer and which may be waived by Customer:

- a) Customer shall have received all required financing necessary, on or before November 1, 2022, to ensure the Customer's ability to construct new facilities at the Site and honour the provisions of this Contract.

Customer shall use commercially reasonable efforts to satisfy and fulfill the condition precedent specified in Section 2.02 a). Customer shall notify the Company forthwith in writing of the Customer's satisfaction or waiver of such condition precedent. If Customer concludes that it will not be able to satisfy or waive such condition precedent on or before the date specified, it may, upon written Notice to the Company no later than November 1, 2022, terminate this Contract and upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder.

2.03 Should this Contract be terminated by virtue of this Section 2, Customer and the Company shall remain bound by any pre-existing Gas Distribution Contract(s) between Customer and the Company.

3. CONTRACT TERM

This Contract shall be effective from the date hereof. However, the Services and the Company's obligation to provide the Services under Section 4 shall commence on the later of (such later date being the "**Day of First Delivery**") (a) [Date], and (b) the date that the last condition precedent as set out in Section 2 is satisfied or waived by the Company. Subject to the provisions hereof, this Contract shall continue in full force and effect for a period of **five (5)** Contract Years (the "**Initial Term**") and continuing thereafter on a year to year basis unless written Notice to terminate is provided by one party to the other at least three (3) Months prior to the end of the then-current term.

"**Contract Year**" means a period of twelve (12) consecutive Months, beginning on [redacted] of any year and ending on the subsequent [redacted], except for the first Contract Year which shall begin on the Day of First Delivery and end on the subsequent [redacted].

4. SERVICES PROVIDED

The Company agrees to provide Services as specified in Schedule 1 and Customer agrees to pay for such Services pursuant to these Contract terms and conditions as set out in this Contract, the referenced attachments, and the rate(s) referenced in Schedule 1.

To be eligible for services under the Rate M7 Rate Schedule, Customer must have a combined Firm, Interruptible and Seasonal Daily Contracted Demand greater than sixty thousand (60,000) m³. If the Customer does not maintain this level of consumption during the current Contract Year or is not expected to maintain this level of consumption then, notwithstanding any other remedy available to the Company under this Contract or any other term of this Contract, effective the following Contract Year, the Customer may no longer qualify for service under the Rate M7 Rate Schedule and may be placed on an alternate service by the Company.

If a Customer has elected direct purchase services, and if the Company does not receive Gas from Customer under the Southern Bundled T, then the Company's obligations to provide Services under this Contract may, at the Company's option, be suspended or terminated by the Company. This suspension or termination will be effective as of the date specified in the Company's Notice to Customer, notwithstanding the General Terms and Conditions.

5. FIRM DAILY CONTRACT DEMAND

The Firm Contract Demand ("**CD**") is as specified in Schedule 1.

5.01 CD INCREASES DURING CONTRACT YEAR

The first day in each Contract Year that the Customer overruns its CD ("**First Occurrence**") shall be recorded. "**Overrun**" shall have the meaning given that term in the M7 Rate Schedule. The second day in each Contract Year that the customer overruns its CD ("**Second Occurrence**"), shall result in an increase in the Customer's CD to the higher quantity used on the First Occurrence or

the Second Occurrence effective as of the 1st day of the month of this Second Occurrence, at the Company's sole discretion. Customer charges will reflect the increased CD.

5.02 SUBSEQUENT CD INCREASES DURING CONTRACT YEAR

After the CD has been increased and anytime thereafter that it has been increased pursuant to Section 5.01, the next day that Customer overruns the increased CD within the Contract Year shall be deemed to be a new First Occurrence for the purposes of Section 5.01, and the next time thereafter that Customer overruns the CD within the Contract Term shall be deemed to be a new Second Occurrence for the purposes of Section 5.01, resulting in another increase in the CD as per the procedure set out in Section 5.01. For greater clarity, every time the CD is increased in a Contract Year, the occurrence number is set back to zero and thereafter if two more occurrences happen, the CD will be raised again, and so on for the remainder of the Contract Year. At the beginning of each Contract Year any outstanding First Occurrences will be set back to zero.

6. MINIMUM ANNUAL VOLUME

6.01 FIRM MINIMUM ANNUAL VOLUME

In each Contract Year, the Customer shall consume or, in any event, pay for the Adjusted Firm Minimum Annual Volume ("AFMAV") as determined in the formula below.

The firm quantity not consumed in any Contract Year (the "**Firm Deficiency Volume**" or "**FDV**") shall be as determined in the formula below.

$$\text{AFMAV} = \text{FMAV} \times \left[\frac{U - D_F}{U} \right]$$

$$\text{FDV} = \text{AFMAV} - (\text{FV} - \text{F})$$

Where:

FMAV = Firm Minimum Annual Volume (as identified in Schedule 1)

U = number of days in the Contract Year

D_F = number of days of Force Majeure in the Contract Year

FV = total firm volume taken in the Contract Year

F = volumes delivered to the Points of Consumption during Force Majeure

The payment required for the FDV shall be calculated by multiplying FDV by the Monthly Firm Delivery Commodity Charge specified in the Rate M7 Rate Schedule as of the last day of the Contract Year. This payment would only apply if the FDV was greater than zero.

6.02 INTERRUPTIBLE MINIMUM ANNUAL VOLUME

In each Contract Year, the Customer shall consume or, in any event, pay for the Adjusted Interruptible Minimum Annual Volume ("AIMAV") as determined in the formula below.

The interruptible quantity not consumed in any Contract Year (the "**Interruptible Deficiency Volume**") ("**IDV**") shall be determined in the formula below.

$$\text{AIMAV} = \text{IMAV} \times [(U - D_i) / U]$$

$$\text{IDV} = \text{AIMAV} - (\text{IV} - \text{I})$$

Where:

IMAV = Interruptible Minimum Annual Volume (as identified in Schedule 1)

U = number of days in the Contract Year

D_i = number of days of interruption in the Contract Year

IV = total interruptible volume taken in the Contract Year

I = volume delivered to point of consumption during an interruption

The payment required for the IDV shall be calculated by multiplying IDV by the Monthly Interruptible Delivery Commodity Charge as of the last day of the Contract Year. This payment would only apply if the IDV was greater than zero.

7. EXPANSION FACILITIES

The Company will use commercially reasonable efforts to construct the Project to serve the Site. The target date for completion of these facilities is [Date]. The Company will provide written Notice to Customer when such facilities are complete and placed into service.

The Company and Customer agree that the Company shall not be obligated to construct any portion of the Project between December 15 of any year and March 31 of the subsequent calendar year.

8. AID AMOUNT PAYMENT SCHEDULE

Customer will be required to pay to the Company the Aid Amount of \$0.00.

Any applicable taxes will be applied to all amounts paid under this Section. Customer warrants and represents that no payment to be made by Customer under this Contract is subject to any withholding tax.

9. CREDIT REQUIREMENTS DURING INITIAL TERM

In accordance with Section 5.04 of the General Terms and Conditions, the Company may, at any time during the Initial Term, request financial assurances to cover the potential financial exposure to the Company to the end of the Initial Term. Such financial assurances shall be determined by the Company in a commercially reasonable manner. Failure to provide such financial assurances shall be treated in a manner provided for in Section 5.04 of the General Terms and Conditions.

Customer shall provide financial assurances acceptable to the Company by no later than June 1, 2023.

10. CONTRACT SUCCESSION

This Contract, unless terminated pursuant to Section 2 hereof, replaces all previous Gas Distribution Contracts between the parties, subject to settlement of any surviving obligations.

IN WITNESS WHEREOF this Contract has been duly executed by the parties hereto as of the date first written above. If an Agent on behalf of Customer executes this Contract then, if requested by the Company, Agent or Customer shall at any time provide a copy of such authorization to the Company.

Authorized Signatory
Customer

Authorized Signatory
Enbridge Gas Inc.

Please Print Name

Please Print Name

Contract ID	<Field1>
Contract Name	<Field2>

T2 CONTRACT

This GAS STORAGE AND DISTRIBUTION CONTRACT (“Contract”), made as of the <Field4> day of <Field5>, <Field6>

BETWEEN:

Enbridge Gas Inc.

hereinafter called "the Company"

- and -

<Field7>

hereinafter called "Customer"

WHEREAS, the Company has built, or proposes to build, certain facilities for the Panhandle Regional Expansion Project (the “**Project**”) to increase the capacity of its natural gas pipeline system. In connection with the Project, the Company will be required to construct distribution facilities (the “**Expansion Facilities**”) to serve the Customer’s facilities at [REDACTED] (the “**Site**”);

WHEREAS, Customer has requested the Company and the Company has agreed to provide Customer Services;

AND WHEREAS, the Company will deliver Customer owned Gas to Customer’s Point(s) of Consumption or Storage under this Contract pursuant to the T2 Rate Schedule;

IN CONSIDERATION of the mutual covenants contained herein, and other good and valuable consideration, the receipt of and sufficiency of which is hereby acknowledged, the parties agree as follows:

1 INCORPORATIONS

The following are hereby incorporated in and form part of this Contract:

- a) Contract Parameters contained in Schedule 1 – DCQ, Storage and Distribution Services Parameters, and Schedule 1a – Supplemental Services Parameters as amended from time to time; and
- b) The latest posted version of the T2 Contract Terms and Conditions contained in Schedule 2 subject to Section 12.18 of the Company’s general terms and conditions applicable to Union Rate Zones (“General Terms and Conditions”); and

- c) The latest posted version of the General Terms and Conditions subject to Section 12.18 of the General Terms and Conditions; and
- d) The applicable T2 Rate Schedule as amended from time to time and as approved by the Ontario Energy Board.

For the purposes of this Contract, “Point(s) of Receipt” shall mean those points identified in Schedule 1 where the Company may receive Gas from Customer.

2 CONDITIONS PRECEDENT

2.01 The obligations of the Company to provide Services hereunder are subject to the following conditions precedent that are for the sole benefit of the Company and which may be waived or extended, in whole or in part:

- a) The Company shall have obtained, in form and substance satisfactory to the Company, and all conditions shall have been satisfied under all governmental, regulatory and other third party approvals, consents, orders and authorizations in relation to the Project and Expansion Facilities that are required to:
 - i. provide the Services; and
 - ii. construct the Project and Expansion Facilities; and
- b) The Company shall have obtained all internal approvals that are necessary or appropriate to:
 - i. provide the Services; and
 - ii. construct the Project and Expansion Facilities; and
- c) The Company shall have completed and placed into Service the Project and Expansion Facilities; and
- d) Financial assurances acceptable to the Company shall be supplied and maintained in accordance with the General Terms and Conditions and Section 10 of this Agreement; and
- e) The Company shall have received a contribution in aid of construction to the Company of \$0.00 (the “**Aid Amount**”) from Customer pursuant to Customer’s obligations herein; and
- f) If Customer has elected direct purchase services, Customer and the Company shall have executed and maintained in good standing a Southern Bundled T.

The Company shall use commercially reasonable efforts to satisfy and fulfill the conditions precedent specified in Sections a), c), and f). The Company shall notify Customer forthwith in writing of the Company’s satisfaction or waiver of each condition precedent. If the Company concludes that it will not be able to satisfy a condition precedent, the Company may, upon written Notice to Customer, terminate this Contract and upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder, subject to Customer’s obligations pursuant to Section 11 herein.

2.02 The obligations of the Customer hereunder are subject to the following condition precedent that is for the sole benefit of the Customer and which may be waived by Customer:

a) Customer shall have received all required financing necessary, on or before November 1, 2022, to ensure the Customer's ability to construct new facilities at the Site and honour the provisions of this Contract.

Customer shall use commercially reasonable efforts to satisfy and fulfill the condition precedent specified in Section 2.02 a). Customer shall notify the Company forthwith in writing of the Customer's satisfaction or waiver of such condition precedent. If Customer concludes that it will not be able to satisfy or waive such condition precedent on or before the date specified, it may, upon written Notice to the Company no later than November 1, 2022, terminate this Contract and upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder.

2.03 Should this Contract be terminated by virtue of this Section 2, Customer and the Company shall remain bound by any pre-existing Gas Distribution Contract(s) between Customer and the Company.

3 CONTRACT TERM

This Contract shall be effective from the date hereof. However, the Services and the Company's obligation to provide the Services under Section 4 shall commence on the later of (such later date being the "**Day of First Delivery**") (a) _____, and (b) the date that the last condition precedent as set out in Section 2.01 is satisfied or waived by the Company. Subject to the provisions hereof, this Contract shall continue in full force and effect for a period of XX Contract Years (the "**Initial Term**") and continuing thereafter on a year to year basis unless written Notice to terminate is provided by one party to the other at least three (3) Months prior to the end of the then-current term.

"**Contract Year**" means a period of twelve (12) consecutive Months, beginning on _____ of any year and ending on the subsequent _____, except for the first Contract Year which shall begin on the Day of First Delivery and end on the subsequent _____.

4 SERVICES PROVIDED

The Company agrees to provide Storage Services and Distribution Services as specified in Schedule 1 and Schedule 1a.

5 FIRM DAILY CONTRACT DEMAND

The Firm Contract Demand (“CD”) is as specified in Schedule 1.

5.01 CD INCREASES DURING CONTRACT YEAR

The first day in each Contract Year that the Customer overruns its CD (“**First Occurrence**”) shall be recorded. “**Overrun**” shall have the meaning given that term in the T2 Rate Schedule. The second day in each Contract Year that the customer overruns its CD (“**Second Occurrence**”), shall result in an increase in the Customer’s CD to the higher quantity used on the First Occurrence or the Second Occurrence effective as of the 1st day of the month of this Second Occurrence, at the Company’s sole discretion. Customer charges will reflect the increased CD.

5.02 SUBSEQUENT CD INCREASES DURING CONTRACT YEAR

After the CD has been increased and anytime thereafter that it has been increased pursuant to Section 5.01, the next day that Customer overruns the increased CD within the Contract Year shall be deemed to be a new First Occurrence for the purposes of Section 5.01, and the next time thereafter that Customer overruns the CD within the Contract Term shall be deemed to be a new Second Occurrence for the purposes of Section 5.01, resulting in another increase in the CD as per the procedure set out in Section 5.01. For greater clarity, every time the CD is increased in a Contract Year, the occurrence number is set back to zero and thereafter if two more occurrences happen, the CD will be raised again, and so on for the remainder of the Contract Year. At the beginning of each Contract Year any outstanding First Occurrences will be set back to zero.

6 RATES FOR SERVICE

Customer agrees to pay for Services herein pursuant to the terms and conditions of the following:

- a) The T2 Rate Schedule as amended from time to time by the Ontario Energy Board; and
- b) This Contract and the incorporations hereto.

7. EXPANSION FACILITIES

The Company will use commercially reasonable efforts to construct the Project and Expansion Facilities to serve the Site. The target date for completion of these facilities is [Date]. The Company will provide written Notice to Customer when such facilities are complete and placed into service.

The Company and Customer agree that the Company shall not be obligated to construct any portion of the Project and Expansion Facilities between December 15 of any year and March 31 of the subsequent calendar year.

8 AID AMOUNT PAYMENT SCHEDULE

Customer will be required to pay to the Company the Aid Amount of \$0.00 by [DATE].

Any applicable taxes will be applied to all amounts paid under this Section. Customer warrants and represents that no payment to be made by Customer under this Contract is subject to any withholding tax.

9 LATE PAYMENT CHARGES

Any amounts due and payable by Customer to the Company arising under Sections 8 and 11 of this Contract shall, if not paid by the due date thereof, be subject to late payment charges equal to 1.5% per month (for a nominal rate of 18% per annum compounded monthly) on any unpaid balance including previous arrears.

10 CREDIT REQUIREMENTS DURING INITIAL TERM

In addition to the terms of Section 5.04 of the General Terms and Conditions, the Company may, at any time during the Initial Term, request financial assurances to cover the potential financial exposure to the Company to the end of the Initial Term. Such financial assurances shall be determined by the Company in a commercially reasonable manner and may include, without limitation, expected return on capital invested. Failure to provide such financial assurances shall be treated in a manner provided for in Section 5.04 of the General Terms and Conditions. Customer shall provide financial assurances acceptable to the Company by no later than November 1, 2022.

11 TERMINATION PRIOR TO COMPLETION OF EXPANSION FACILITIES

The Company shall have the right to terminate this Contract at any time prior to the Day of First Delivery, pursuant to Section 2, by giving written notice hereof, subject to the terms hereof.

If this Contract is terminated by the Company as outlined above, then:

(a) Upon such termination, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder, provided that any rights or remedies that a party may have for breaches of this Contract prior to such termination and any liability that a party may have incurred prior to such termination, and the parties' obligations under this Section 11, shall not thereby be released;

(b) Customer shall reimburse the Company for all Project Costs; and

(c) Customer shall reimburse the Company for all cancellation costs, fees or other amounts paid under contracts entered into by the Company to support the satisfaction of the conditions precedent set out in Section 2 ("**Cancellation Costs**").

The Company may invoice amounts under this Section from time to time, with the expectation that there will be an invoice rendered within 30 days of termination, and subsequent invoices as additional amounts payable hereunder are incurred from time to time. After delivery of such Notice of termination by the Company, the Company will use commercially reasonable efforts to cease incurring Project Costs and to mitigate Cancellation Costs upon such termination. In no event shall the Company invoice Customer for any Cancellation Costs or Project Costs not previously invoiced by the Company after 12 months from the termination date. Without limiting

the foregoing, Customer shall have the right to audit at Customer's expense the costs claimed for reimbursement by the Company for a period of six (6) months after each invoice is issued.

"Project Costs" means any and all reasonable costs (including litigation costs, cancellation costs, carrying costs, and third party claims) expenses, losses, demands, damages, obligations, or other liabilities (whether of a capital or operating nature, and whether incurred or suffered before or after the date of this Contract) of the Company (including amounts paid to affiliates in accordance with the Affiliate Relationship Code as established by the Ontario Energy Board) in connection with or in respect of development and construction of the Expansion Facilities (including without limitation the construction and placing into service of the Expansion Facilities, the obtaining of all governmental, regulatory, and other third party approvals, and the obtaining of rights of way) except for costs that have arisen from the gross negligence, fraud, or willful misconduct of the Company.

12 AGENCY

If an agent on behalf of the Customer executes this Contract then, if requested by the Company, the agent shall at any time provide a copy of such authorization to the Company.

Notwithstanding the provisions of Section 10, the agent shall be responsible for providing security arrangements acceptable to the Company in accordance with the General Terms and Conditions.

The agent and Customer acknowledge and agree that they are unconditionally and irrevocably jointly and severally liable for all Customer obligations under the Contract.

13 CONTRACT SUCCESSION

This Contract, unless terminated pursuant to Section 2 hereof, replaces all previous Gas Distribution Contracts between the parties, subject to settlement of any surviving obligations.

The undersigned execute this Contract as of the above date. If an Agent on behalf of Customer executes this Contract then, if requested by the Company, Agent or Customer shall at any time provide a copy of such authorization to the Company.

Enbridge Gas Inc.

Authorized Signatory

Please Print Name

CUSTOMER

Authorized Signatory

Please Print Name

Contract ID	<Field1>
Contract Name	<Field2>

T2 CONTRACT

This GAS STORAGE AND DISTRIBUTION CONTRACT (“Contract”), made as of the <Field4> day of <Field5>, <Field6>

BETWEEN:

Enbridge Gas Inc.

hereinafter called "the Company"

- and -

<Field7>

hereinafter called "Customer"

WHEREAS, the Company has built, or proposes to build, certain facilities for the Panhandle Regional Expansion Project (the “**Project**”) to increase the capacity of its natural gas pipeline system. In connection with the Project, the Company will be required to construct distribution facilities (the “**Expansion Facilities**”) to serve the Customer’s facilities at [REDACTED] (the “**Site**”);

WHEREAS, Customer has requested the Company and the Company has agreed to provide Customer Services;

AND WHEREAS, the Company will deliver Customer owned Gas to Customer’s Point(s) of Consumption or Storage under this Contract pursuant to the T2 Rate Schedule;

IN CONSIDERATION of the mutual covenants contained herein, and other good and valuable consideration, the receipt of and sufficiency of which is hereby acknowledged, the parties agree as follows:

1 INCORPORATIONS

The following are hereby incorporated in and form part of this Contract:

- a) Contract Parameters contained in Schedule 1 – DCQ, Storage and Distribution Services Parameters, and Schedule 1a – Supplemental Services Parameters as amended from time to time; and
- b) The latest posted version of the T2 Contract Terms and Conditions contained in Schedule 2 subject to Section 12.18 of the Company’s general terms and conditions applicable to Union Rate Zones (“General Terms and Conditions”); and

- c) The latest posted version of the General Terms and Conditions subject to Section 12.18 of the General Terms and Conditions; and
- d) The applicable T2 Rate Schedule as amended from time to time and as approved by the Ontario Energy Board.

For the purposes of this Contract, “Point(s) of Receipt” shall mean those points identified in Schedule 1 where the Company may receive Gas from Customer.

2 CONDITIONS PRECEDENT

2.01 The obligations of the Company to provide Services hereunder are subject to the following conditions precedent that are for the sole benefit of the Company and which may be waived or extended, in whole or in part, in the manner provided in this Contract:

- a) The Company shall have obtained, in form and substance satisfactory to the Company, and all conditions shall have been satisfied under all governmental, regulatory and other third party approvals, consents, orders and authorizations, that are required to:
 - i. provide the Services; and
 - ii. construct the Project and Expansion Facilities; and
- b) The Company shall have obtained all internal approvals that are necessary or appropriate to:
 - i. provide the Services; and
 - ii. construct the Project and Expansion Facilities; and
- c) The Company shall have completed and placed into Service the Project and Expansion Facilities; and
- d) The Company shall have received a contribution in aid of construction to the Company of \$0.00 (the “**Aid Amount**”) from Customer pursuant to Customer’s obligations herein; and
- e) If Customer has elected direct purchase services, Customer and the Company shall have executed and maintained in good standing a Southern Bundled T.

The Company shall use commercially reasonable efforts to satisfy and fulfill the conditions precedent specified in Sections 2.01 a), c), and e). The Company shall notify Customer forthwith in writing of the Company’s satisfaction or waiver of each condition precedent for the Company’s benefit. If Company concludes that it will not be able to satisfy or waive a condition precedent, it may, upon written Notice, terminate this Contract and upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder.

2.02 The obligations of the Customer hereunder are subject to the following condition precedent that is for the sole benefit of the Customer and which may be waived by Customer:

a) Customer shall have received all required financing necessary, on or before November 1, 2022, to ensure the Customer's ability to construct new facilities at the Site and honour the provisions of this Contract.

Customer shall use commercially reasonable efforts to satisfy and fulfill the condition precedent specified in Section 2.02 a). Customer shall notify the Company forthwith in writing of the Customer's satisfaction or waiver of such condition precedent. If Customer concludes that it will not be able to satisfy or waive such condition precedent on or before the date specified, it may, upon written Notice to the Company no later than November 1, 2022, terminate this Contract and upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder.

2.03 Should this Contract be terminated by virtue of this Section 2, Customer and the Company shall remain bound by any pre-existing Gas Distribution Contract(s) between Customer and the Company.

3 CONTRACT TERM

This Contract shall be effective from the date hereof. However, the Services and the Company's obligation to provide the Services under Section 4 shall commence on the later of (such later date being the "**Day of First Delivery**") (a) _____, and (b) the date that the last condition precedent as set out in Section 2.01 is satisfied or waived by the Company. Subject to the provisions hereof, this Contract shall continue in full force and effect for a period of XX Contract Years (the "**Initial Term**") and continuing thereafter on a year to year basis unless written Notice to terminate is provided by one party to the other at least three (3) Months prior to the end of the then-current term.

"**Contract Year**" means a period of twelve (12) consecutive Months, beginning on _____ of any year and ending on the subsequent _____, except for the first Contract Year which shall begin on the Day of First Delivery and end on the subsequent _____.

4 SERVICES PROVIDED

The Company agrees to provide Storage Services and Distribution Services as specified in Schedule 1 and Schedule 1a.

5 FIRM DAILY CONTRACT DEMAND

The Firm Contract Demand ("**CD**") is as specified in Schedule 1.

5.01 CD INCREASES DURING CONTRACT YEAR

The first day in each Contract Year that the Customer overruns its CD ("**First Occurrence**") shall be recorded. "**Overrun**" shall have the meaning given that term in the T2 Rate Schedule. The second day in each Contract Year that the customer overruns its CD ("**Second**

Occurrence”), shall result in an increase in the Customer’s CD to the higher quantity used on the First Occurrence or the Second Occurrence effective as of the 1st day of the month of this Second Occurrence, at the Company’s sole discretion. Customer charges will reflect the increased CD.

5.02 SUBSEQUENT CD INCREASES DURING CONTRACT YEAR

After the CD has been increased and anytime thereafter that it has been increased pursuant to Section 5.01, the next day that Customer overruns the increased CD within the Contract Year shall be deemed to be a new First Occurrence for the purposes of Section 5.01, and the next time thereafter that Customer overruns the CD within the Contract Term shall be deemed to be a new Second Occurrence for the purposes of Section 5.01, resulting in another increase in the CD as per the procedure set out in Section 5.01. For greater clarity, every time the CD is increased in a Contract Year, the occurrence number is set back to zero and thereafter if two more occurrences happen, the CD will be raised again, and so on for the remainder of the Contract Year. At the beginning of each Contract Year any outstanding First Occurrences will be set back to zero.

6 RATES FOR SERVICE

Customer agrees to pay for Services herein pursuant to the terms and conditions of the following:

- a) The T2 Rate Schedule as amended from time to time by the Ontario Energy Board; and
- b) This Contract and the incorporations hereto.

7. EXPANSION FACILITIES

The Company will use commercially reasonable efforts to construct the Project and Expansion Facilities to serve the Site. The target date for completion of these facilities is [Date]. The Company will provide written Notice to Customer when such facilities are complete and placed into service.

The Company and Customer agree that the Company shall not be obligated to construct any portion of the Project and Expansion Facilities between December 15 of any year and March 31 of the subsequent calendar year.

8 AID AMOUNT PAYMENT SCHEDULE

Customer will be required to pay to the Company the Aid Amount of \$0.00 by [DATE].

Any applicable taxes will be applied to all amounts paid under this Section. Customer warrants and represents that no payment to be made by Customer under this Contract is subject to any withholding tax.

9 LATE PAYMENT CHARGES

Any amounts due and payable by Customer to the Company arising under Section 8 of this Contract shall, if not paid by the due date thereof, be subject to late payment charges equal to 1.5% per month (for a nominal rate of 18% per annum compounded monthly) on any unpaid balance including previous arrears.

10 CREDIT REQUIREMENTS DURING INITIAL TERM

In accordance with Section 5.04 of the General Terms and Conditions, the Company may, at any time during the Initial Term, request financial assurances to cover the potential financial exposure to the Company to the end of the Initial Term. Such financial assurances shall be determined by the Company in a commercially reasonable manner. Failure to provide such financial assurances shall be treated in a manner provided for in Section 5.04 of the General Terms and Conditions.

Customer shall provide financial assurances acceptable to the Company by no later than June 1, 2023.

11 AGENCY

If an agent on behalf of the Customer executes this Contract then, if requested by the Company, the agent shall at any time provide a copy of such authorization to the Company.

Notwithstanding the provisions of Section 10, the agent shall be responsible for providing security arrangements acceptable to the Company in accordance with the General Terms and Conditions.

The agent and Customer acknowledge and agree that they are unconditionally and irrevocably jointly and severally liable for all Customer obligations under the Contract.

12 CONTRACT SUCCESSION

This Contract, unless terminated pursuant to Section 2 hereof, replaces all previous Gas Distribution Contracts between the parties, subject to settlement of any surviving obligations.

The undersigned execute this Contract as of the above date. If an Agent on behalf of Customer executes this Contract then, if requested by the Company, Agent or Customer shall at any time provide a copy of such authorization to the Company.

Enbridge Gas Inc.

Authorized Signatory

Please Print Name

CUSTOMER

Authorized Signatory

Please Print Name

DRAFT

Contract ID	<Field1>
Contract Name	<Field2>

T2 CONTRACT

This GAS STORAGE AND DISTRIBUTION CONTRACT (“Contract”), made as of the <Field4> day of <Field5>, <Field6>

BETWEEN:

Enbridge Gas Inc.

hereinafter called "the Company"

- and -

<Field7>

hereinafter called "Customer"

WHEREAS, the Company has built, or proposes to build, certain facilities for the Panhandle Regional Expansion Project (the “**Project**”) to increase the capacity of its natural gas pipeline system to serve the Customer’s facilities at [REDACTED] (the “**Site**”);

WHEREAS, Customer has requested the Company and the Company has agreed to provide Customer Services;

AND WHEREAS, the Company will deliver Customer owned Gas to Customer’s Point(s) of Consumption or Storage under this Contract pursuant to the T2 Rate Schedule;

IN CONSIDERATION of the mutual covenants contained herein, and other good and valuable consideration, the receipt of and sufficiency of which is hereby acknowledged, the parties agree as follows:

1 INCORPORATIONS

The following are hereby incorporated in and form part of this Contract:

- a) Contract Parameters contained in Schedule 1 – DCQ, Storage and Distribution Services Parameters, and Schedule 1a – Supplemental Services Parameters as amended from time to time; and
- b) The latest posted version of the T2 Contract Terms and Conditions contained in Schedule 2 subject to Section 12.18 of the Company’s general terms and conditions applicable to Union Rate Zones (“General Terms and Conditions”); and
- c) The latest posted version of the General Terms and Conditions subject to Section 12.18 of the General Terms and Conditions; and

- d) The applicable T2 Rate Schedule as amended from time to time and as approved by the Ontario Energy Board.

For the purposes of this Contract, “Point(s) of Receipt” shall mean those points identified in Schedule 1 where the Company may receive Gas from Customer.

2 CONDITIONS PRECEDENT

2.01 The obligations of the Company to provide Services hereunder are subject to the following conditions precedent that are for the sole benefit of the Company and which may be waived or extended, in whole or in part, in the manner provided in this Contract:

- a) The Company shall have obtained, in form and substance satisfactory to the Company, and all conditions shall have been satisfied under all governmental, regulatory and other third party approvals, consents, orders and authorizations, that are required to:
 - i. provide the Services; and
 - ii. construct the Project; and
- b) The Company shall have obtained all internal approvals that are necessary or appropriate to:
 - i. provide the Services; and
 - ii. construct the Project; and
- c) The Company shall have completed and placed into Service the Project; and
- d) If Customer has elected direct purchase services, Customer and the Company shall have executed and maintained in good standing a Southern Bundled T.

The Company shall use commercially reasonable efforts to satisfy and fulfill the conditions precedent specified in Sections 2.01 a), c) and d). The Company shall notify Customer forthwith in writing of the Company’s satisfaction or waiver of each condition precedent for the Company’s benefit. If Company concludes that it will not be able to satisfy or waive a condition precedent, it may, upon written Notice, terminate this Contract and upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder.

2.02 The obligations of the Customer hereunder are subject to the following condition precedent that is for the sole benefit of the Customer and which may be waived by Customer:

- a) Customer shall have received all required financing necessary, on or before November 1, 2022, to ensure the Customer’s ability to construct new facilities at the Site and honour the provisions of this Contract.

Customer shall use commercially reasonable efforts to satisfy and fulfill the condition precedent specified in Section 2.02 a). Customer shall notify the Company forthwith in writing of the Customer's satisfaction or waiver of such condition precedent. If Customer concludes that it will not be able to satisfy or waive such condition precedent on or before the date specified, it may, upon written Notice to the Company no later than November 1, 2022, terminate this Contract and upon giving such Notice, this Contract shall be of no further force and effect and each of the parties shall be released from all further obligations hereunder.

2.03 Should this Contract be terminated by virtue of this Section 2, Customer and the Company shall remain bound by any pre-existing Gas Distribution Contract(s) between Customer and the Company.

3 CONTRACT TERM

This Contract shall be effective from the date hereof. However, the Services and the Company's obligation to provide the Services under Section 4 shall commence on the later of (such later date being the "**Day of First Delivery**") (a) _____, and (b) the date that the last condition precedent as set out in Section 2.01 is satisfied or waived by the Company. Subject to the provisions hereof, this Contract shall continue in full force and effect for a period of five (5) Contract Years (the "**Initial Term**") and continuing thereafter on a year to year basis unless written Notice to terminate is provided by one party to the other at least three (3) Months prior to the end of the then-current term.

"**Contract Year**" means a period of twelve (12) consecutive Months, beginning on _____ of any year and ending on the subsequent _____, except for the first Contract Year which shall begin on the Day of First Delivery and end on the subsequent _____.

4 SERVICES PROVIDED

The Company agrees to provide Storage Services and Distribution Services as specified in Schedule 1 and Schedule 1a.

5 FIRM DAILY CONTRACT DEMAND

The Firm Contract Demand ("**CD**") is as specified in Schedule 1.

5.01 CD INCREASES DURING CONTRACT YEAR

The first day in each Contract Year that the Customer overruns its CD ("**First Occurrence**") shall be recorded. "**Overrun**" shall have the meaning given that term in the T2 Rate Schedule. The second day in each Contract Year that the customer overruns its CD ("**Second Occurrence**"), shall result in an increase in the Customer's CD to the higher quantity used on the First Occurrence or the Second Occurrence effective as of the 1st day of the month of this Second Occurrence, at the Company's sole discretion. Customer charges will reflect the increased CD.

5.02 SUBSEQUENT CD INCREASES DURING CONTRACT YEAR

After the CD has been increased and anytime thereafter that it has been increased pursuant to Section 5.01, the next day that Customer overruns the increased CD within the Contract Year shall be deemed to be a new First Occurrence for the purposes of Section 5.01, and the next time thereafter that Customer overruns the CD within the Contract Term shall be deemed to be a new Second Occurrence for the purposes of Section 5.01, resulting in another increase in the CD as per the procedure set out in Section 5.01. For greater clarity, every time the CD is increased in a Contract Year, the occurrence number is set back to zero and thereafter if two more occurrences happen, the CD will be raised again, and so on for the remainder of the Contract Year. At the beginning of each Contract Year any outstanding First Occurrences will be set back to zero.

6 RATES FOR SERVICE

Customer agrees to pay for Services herein pursuant to the terms and conditions of the following:

- a) The T2 Rate Schedule as amended from time to time by the Ontario Energy Board; and
- b) This Contract and the incorporations hereto.

7. EXPANSION FACILITIES

The Company will use commercially reasonable efforts to construct the Project to serve the Site. The target date for completion of these facilities is [Date]. The Company will provide written Notice to Customer when such facilities are complete and placed into service.

The Company and Customer agree that the Company shall not be obligated to construct any portion of the Project between December 15 of any year and March 31 of the subsequent calendar year.

8 AID AMOUNT PAYMENT SCHEDULE

Customer will be required to pay to the Company the Aid Amount of \$0.00 by [DATE].

Any applicable taxes will be applied to all amounts paid under this Section. Customer warrants and represents that no payment to be made by Customer under this Contract is subject to any withholding tax.

9 LATE PAYMENT CHARGES

Any amounts due and payable by Customer to the Company arising under Section 8 of this Contract shall, if not paid by the due date thereof, be subject to late payment charges equal to 1.5% per month (for a nominal rate of 18% per annum compounded monthly) on any unpaid balance including previous arrears.

10 CREDIT REQUIREMENTS DURING INITIAL TERM

In accordance with Section 5.04 of the General Terms and Conditions, the Company may, at any time during the Initial Term, request financial assurances to cover the potential financial exposure to the Company to the end of the Initial Term. Such financial assurances shall be determined by the Company in a commercially reasonable manner. Failure to provide such financial assurances shall be treated in a manner provided for in Section 5.04 of the General Terms and Conditions.

Customer shall provide financial assurances acceptable to the Company by no later than June 1, 2023.

11 AGENCY

If an agent on behalf of the Customer executes this Contract then, if requested by the Company, the agent shall at any time provide a copy of such authorization to the Company.

Notwithstanding the provisions of Section 10, the agent shall be responsible for providing security arrangements acceptable to the Company in accordance with the General Terms and Conditions.

The agent and Customer acknowledge and agree that they are unconditionally and irrevocably jointly and severally liable for all Customer obligations under the Contract.

12 CONTRACT SUCCESSION

This Contract, unless terminated pursuant to Section 2 hereof, replaces all previous Gas Distribution Contracts between the parties, subject to settlement of any surviving obligations.

The undersigned execute this Contract as of the above date. If an Agent on behalf of Customer executes this Contract then, if requested by the Company, Agent or Customer shall at any time provide a copy of such authorization to the Company.

Enbridge Gas Inc.

Authorized Signatory

Please Print Name

CUSTOMER

Authorized Signatory

Please Print Name

<Letter Date>

<Customers Legal Name>

<Property Address>

<City>, Ontario

<Postal Code>

Re: Commitment Letter (“CL”) for the Panhandle Regional Expansion Project (the “Project”)

Enbridge Gas Inc. (“**Enbridge Gas**”) continues to experience strong growth in demand for natural gas service by new and existing customers in the municipalities of Chatham-Kent, Windsor, Lakeshore, Leamington, Kingsville, Essex, Amherstburg, LaSalle, and Tecumseh.

In order to meet this growing demand from our in-franchise customer markets (which include the residential, commercial, industrial and greenhouse sectors), Enbridge Gas is proposing to expand its Panhandle Transmission System and associated gas distribution facilities in the area. The proposed Project will help unlock access to abundant, affordable and clean natural gas supply.

Enbridge Gas is requesting that customers who are interested in securing natural gas service from the proposed Project demonstrate their commitment to it by executing this CL, confirming their intentions to proceed with a new or amended distribution contract.

1. <Customers Legal Name> and Enbridge Gas intend to formalize a contract for natural gas service (the “**Distribution Contract**”), which will be conditional upon, amongst other things, Enbridge Gas receiving all required internal approvals to proceed with the Project, and Enbridge Gas receiving Ontario Energy Board approval for the Project.
2. The Distribution Contract will be based on the following estimated contract parameters, conditions and understanding:
 - a. <Customers Legal Name> agrees to a minimum 5-year (maximum 20-year) distribution contract for natural gas service based on the conditions outlined in the applicable Enbridge Gas distribution contract and an in service date of the later of <Effective Date>, or the in-service date of the Project.
 - b. Natural gas service will be provided by Enbridge Gas to <Customers Legal Name> under the terms and conditions of the appropriate rate schedule(s), which are available here: <https://www.enbridgegas.com/business-industrial/commercial-industrial/large-volume-services-rates/union-south> (not including natural gas commodity related costs).

- c. Incremental firm hourly quantity of **<Incremental FHQ>** m³/hour, total firm hourly quantity of **<Total FHQ>** m³/hour, firm daily contract demand of **<Firm CD>** m³/day, and minimum annual volume of **<Total MAV>** m³.
 - d. Customer is expected to execute a new or amended distribution contract no later than **<1 year prior to requested in-service date>**.
 - e. If a new or amended distribution contract is not executed by **<1 year prior to requested in-service date>**, Customer will be required to execute a Letter of Indemnification until a new or amended distribution contract is executed.
 - f. Customer shall have received all required financing as well as any Municipal, Provincial or Federal permits necessary, on or before **<Specify Date>**, to ensure the Customer's ability to construct its expansion facilities at **<Customer Expansion Facilities Address>** and honour the provisions of this CL.
 - g. Enbridge Gas shall have received all required internal approvals.
 - h. Enbridge Gas shall have received all required regulatory approvals.
3. **<Customers Legal Name>** has reviewed, and accepts the terms and conditions of the Distribution Contract.
 4. Any additional financial contributions required from **<Customers Legal Name>** to provide natural gas service will be calculated and included in the new or amended distribution contract in the form of a contribution in aid of construction.
 5. This CL shall expire at the earlier of a) **<Expiry Date>** or b) when the CL is replaced with a signed Distribution Contract or indemnification agreement.
 6. **<Customers Legal Name>** hereby warrants that it has taken all appropriate and necessary corporate action to authorise the execution of this CL and the performance of the terms hereof represents a legally binding obligation on **<Customers Legal Name>** with the exception of paragraph 1 of this CL, which indicates the Parties' intentions.
 7. Enbridge Gas hereby warrants that it has taken all appropriate and necessary corporate action to authorise the execution of this CL and the performance of the terms hereof represents a legally binding obligation on Enbridge Gas, with the exception of paragraph 1 of this CL, which indicates the Parties' intentions.
If you have any questions, please contact your account manager:

<Account Manager>

<Phone>

<Email>

If **<Customers Legal Name>** acknowledges and agrees with the foregoing, please execute below and return a copy to my attention by **<Date>**.

Yours truly,

<Enbridge Gas Authorized Person>

<Title>

Enbridge Gas Inc.

Acknowledged and accepted on behalf of **<Customers Legal Name>**

By: _____

Name: _____

Title: _____

Date: _____

[Date]

[Name of Customer]

[Address]

Attention: []

Dear []

Re: Indemnity Letter for Enbridge Gas Inc. facilities at the [Location]

Enbridge Gas Inc. (“**the Company**”) and [Name of Customer] (“**Customer**”) have held discussions related to the provision of natural gas distribution and storage services (the “**Services**”) [NTD: text to describe the driver: for new facilities to be built by Customer / increased demand by the customer at the [Location] as of [date]]. Until a definitive natural gas distribution services agreement (“**Contract**”) is executed by the parties hereto, the Company requires a written covenant from Customer to indemnify and save harmless the Company for all of the Project Costs related to the development and construction of any new Enbridge Gas Inc. facilities (“**Expansion Facilities**”) needed to serve the new facilities.

In consideration of the Company undertaking certain development and construction activities related to the Expansion Facilities [NTD: optional clause for times when further details are needed: as further described in Appendix []], and other good and valuable consideration the receipt and sufficiency of which is hereby acknowledged, Customer hereby irrevocably and unconditionally indemnifies and holds harmless the Company, and all of the Company’s affiliates, employees, officers, and directors (collectively, the “**Indemnitees**”) from all Project Costs which the Indemnitees or any of them may incur or suffer in respect of, or in connection with, or in any manner arising out of the development and construction of the Expansion Facilities. “**Project Costs**” means any and all costs, (including litigation costs, cancellation costs, carrying costs, and third party claims) expenses, losses, demands, damages, obligations, or other liabilities (whether of a capital or operating nature, and whether incurred or suffered before or after the date of this Indemnity Letter) by any of the Indemnitees (including amounts paid to affiliates for services rendered in accordance with the Affiliate Relationships Code as established by the Ontario Energy Board), in connection with or in respect of development and construction of the Expansion Facilities (including without limitation the construction and placing into service of the Expansion Facilities, the obtaining of all governmental, regulatory and other third party approvals, and the obtaining of rights of way,) whether resulting from any of the Indemnitees’ negligence or not, except for any costs that have arisen from the fraud or wilful misconduct of any of the Indemnitees.

Except to the extent of any Project Costs arising out of the Customer’s breach of contract, negligence, fraud, or wilful misconduct, Customer’s liability under this Indemnity Letter will not exceed \$ [Amount] CAD [including/excluding] taxes.

This Indemnity Letter will terminate on the earlier of (a) the date that the Contract is executed, or (b) [Expiry Date] unless extended in writing by mutual consent, provided, however, that if the termination occurs pursuant to item (b) of this Indemnity Letter, Customer shall pay to the Company for all Project Costs as herein defined. Such payment shall be within 30 days of the Company submitting an invoice for Project Costs to Customer. Interest on any amounts due hereunder will accrue at an effective monthly interest rate of 1.5%, compounded monthly, for a nominal annual interest rate of 18%. In the event of termination under item (b), the Company may invoice Customer for Project Costs, from time to time and at any time within 12 months of such termination.

This Indemnity Letter supersedes any prior agreements, understandings, negotiations, or discussions whether oral or written, between the Parties with respect to the subject matter hereof.

If Customer agrees to be bound by the foregoing, please execute below and return a copy to my attention.

Yours very truly,
Enbridge Gas Inc.

Authorized Signatory

Customer agrees to be bound by the foregoing:
[Name of Customer]

Authorized Signatory

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe ("PP")

INTERROGATORY

Reference:

"In total, 44 bid forms from interested parties were received, indicating over 318 TJ/d of interest for incremental firm and interruptible demand over the 2023-2033 period."
[B/1/1, Page 6]

Question:

- a) Please provide the breakdown of survey results by year from 2023-2033 with separate columns for incremental firm, incremental interruptible and incremental total.
- b) How many of the 44 survey respondents (by number and incremental PJ requirement) have entered into the 5 year contract commitments requested by Enbridge.

Response

- a) Please see the response to Exhibit I.STAFF.4 part a), Table 1.
- b) There are currently 4 executed distribution contracts that will be effective for a minimum initial term of 5 years (and continue thereafter on a year-to-year basis) for a total of 63.1 TJ/d as of the date of this filing. Enbridge Gas expects to continue executing additional contracts throughout the course of this proceeding with customers.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe (“PP”)

INTERROGATORY

Reference:

“Natural gas plays a critical role in meeting the energy needs of the EV, EV battery and EV battery component manufacturing sector ...’ [B/1/1 Pg. 16]

Question:

Please explain the how natural gas is used in the creation of an EV and EV battery.

Response

To Enbridge Gas’s knowledge, natural gas is primarily used in EV battery production in 3 ways:

- i) space heating and space conditioning of the facility;
- ii) process heating; and
- iii) to power emergency backup electricity generators.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe ("PP")

INTERROGATORY

Reference:

"203 TJ/d resulting from the Project will support the continued reliable and secure delivery of natural gas to the growing residential, commercial, and industrial customer segments within the Panhandle Market" [A/3/1 pg.3]

"Contract rate customer demand makes up approximately 98% of the capacity of the proposed Project." [B/1/1 Pg.7]

Question:

- a) Please explain how 98% of the project capacity is allocated to contract rate demand, and there can still be 203 TJ/d of additional unallocated future capacity left from the proposed project.
- b) Please explain how the 203 TJ/d of additional unallocated future capacity will be used until it is needed in the future to serve in-franchise customers. Also, if it is idle capacity not planned to be used, please indicate.

Response

- a) and b)
For clarity, Enbridge Gas is forecasting that all 203 TJ/day of the additional capacity resulting from the Project will be needed to meet customer demand until Winter 2028/2029. Enbridge Gas is forecasting that contract rate customer demand will make up approximately 98% of the additional 203 TJ/day capacity created.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe (“PP”)

INTERROGATORY

Question:

Please provide all reports, presentations and related materials that support that Panhandle system demand will exceed capacity by 31 TJ/d beginning in Winter 2023/2024 and increasing to 192 TJ/d by Winter 2027/2028.

Response

The following represent the entirety of reports and related materials that the Company relied upon to determine that the Panhandle System demand would exceed capacity by 31 TJ/d in Winter 2023/2024:

- Attachment 1 to this response: Prior to the development of the Leave to Construct application, Enbridge Gas summarized Project capacity compared to demands and recommended facility timelines.
- Exhibit B, Tab 2, Schedule 1, Table 3: Displays the existing system capacity compared to forecast design day demands.
- The response to Exhibit I.PP.5 part c): Displays customer commitments and letters of indemnity.
- Exhibit B, Tab 2, Table 1: Displays the forecast design day demands.

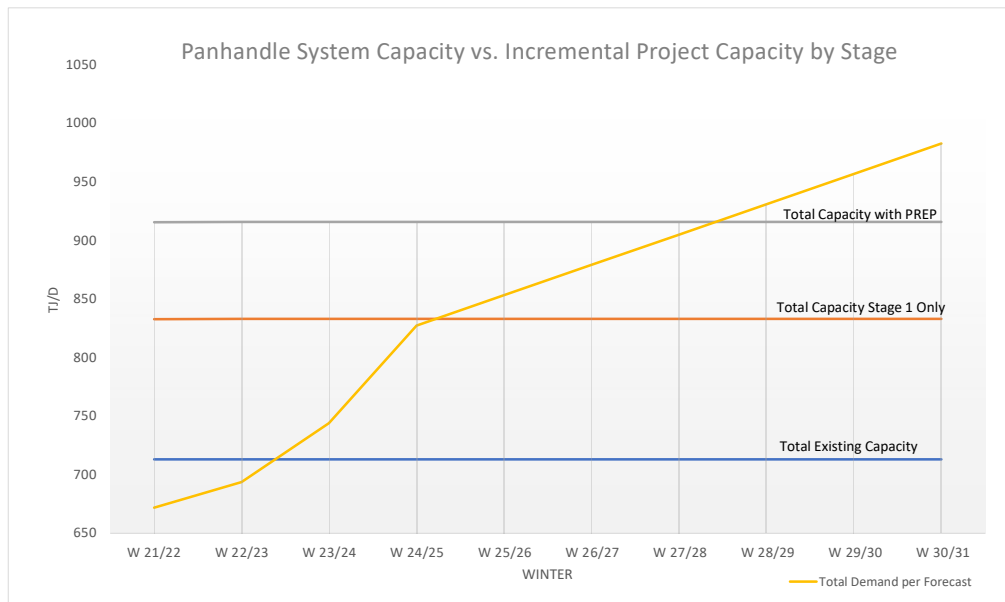
5/4/2022
TJ/d

PREP Timing and Staging Sensitivity

Impacts to Project Staging

	W 21/22	W 22/23	W 23/24	W 24/25	W 25/26	W 26/27	W 27/28	W 28/29	W 29/30	W 30/31
Total Capacity - No Build	713	713	713	713	713	713	713	713	713	713
Total Demand per Forecast	672	694	744	828	854	880	906	932	958	983
Shortfall - No Build	41	19	(31)	(114)	(140)	(167)	(192)	(218)	(244)	(270)
Total New Capacity Stage 1 Only	713	713	833	833	833	833	833	833	833	833
Stage 1 - NPS 36 Loop Incremental Capacity	0	0	120	120	120	120	120	120	120	120
Shortfall - Stage 1 In-service Only	41	19	89	5	(21)	(47)	(73)	(98)	(124)	(150)
Total New Capacity Stage 1 and 2	713	713	833	833	916	916	916	916	916	916
Stage 2 - Incremental Capacity	0	0	0	0	83	83	83	83	83	83
Shortfall - Stage 1 and 2 In-service	41	19	89	5	62	36	10	(15)	(41)	(67)

Summary	
With demand presented per the forecast, the modelling shows we will need a build in 23/24. The amount of shortfall is estimated at 31 TJ/d.	
Staging Impact: The NPS 36 Loop would last through W24/25, Interconnect ISD W25/26 (however 5 TJ/d remaining is high risk in the event customer demands shift, recommendation is moving project forward one year to account for customer shifts). <i>PREP Phase 2 estimated for W2028 ISD</i>	



ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe ("PP")

INTERROGATORY

Question:

Please confirm that Enbridge did not conduct a 40 year demand forecast to validate the peak demand capacity that would be provided by the project options consider and the proposed project. If Enbridge did conduct that analysis, please provide a copy.

Response

Confirmed.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe (“PP”)

INTERROGATORY

Question:

Please provide a copy of the ICF market outlook report referenced in B/3/1 Page 6.

Response

The ICF Base Case is a commercially sensitive proprietary product with significant economic value. Consistent with past practice approved by the OEB, according to ICF, ICF is prepared to license the ICF Gas Market Outlook to any party that is willing to accept its commercial terms.

For these reasons, Enbridge Gas respectfully declines to provide the ICF Base Case as requested by Pollution Probe.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe ("PP")

INTERROGATORY

Reference:

"The Panhandle System Design Day weather condition is a 43.1 Heating Degree Day ("HDD"), which represents an average daily temperature of -25.1 degrees centigrade."
[B/2/1 Pg. 4]

Question:

- a) Please indicate how many days in the past 10 years the Panhandle System Design Day weather condition of 43.1 Heating Degree Day ("HDD") occurred.
- b) For cases in the past 10 years where the Panhandle System Design Day weather condition of 43.1 Heating Degree Day ("HDD") was reached or exceeded, please indicate what additional measures were taken to ensure adequate natural gas supply.

Response

- a) In the past 10 years, the design day weather condition was exceeded on one instance on January 30, 2019. The system observed a 43.7 heating degree day which is higher than the 43.1 heating degree day standard used for the Panhandle System design.
- b) No additional measures were required on January 30, 2019 due to the following conditions:
 - Imports at Ojibway totaled 106 TJ/d. Of the total 106 TJ/d, 60 TJ/d was controlled by Enbridge Gas. The incremental 46 TJ/d was controlled by third parties.
 - The customer demand was less than design day estimates. Specifically, the power generators served by the Panhandle System used only 20% of their contracted capacity.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe (“PP”)

INTERROGATORY

Question:

Hydro One has also applied for a Leave to Construct (EB-2022-0157) to increase energy (natural gas) supply to south-western Ontario including many of the same customer needs. Please identify what coordination has been done to ensure that these independent projects are not duplicating energy supply to the same customers. If no coordination was done, please confirm.

Response

Enbridge Gas is aware of Hydro One’s Leave to Construct Application (EB-2022-0140) to construct transmission line facilities in the Chatham and Tilbury area. While both projects (Enbridge Gas and Hydro One) may supply the same customers, the need and purpose of each project are not duplicative. The need for Enbridge Gas’s proposed Project is underpinned by customer demands for natural gas specifically (as per the EOI process), which is used by agricultural customers for heating and carbon dioxide. Electricity is typically used for lighting and ventilation.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe (“PP”)

INTERROGATORY

Question:

- a) Please list all municipal/community energy plans (or equivalent such as energy & emission plans, etc.) were considered when planning for this project.
- b) Please provide a copy of all DSM related options and analysis conducted to serve current and incremental customers served by the Panhandle system.

Response

- a) Please see the response to Exhibit I.EP.2.
- b) The Company’s assessment of Enhanced Targeted Energy Efficiency (“ETEE”) IRP alternatives can be found at Exhibit C, Tab 1, Schedule 1, Pages 23 to 25.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe (“PP”)

INTERROGATORY

Reference:

“Enbridge Gas identified several facility alternatives and IRPAs to meet the identified system need’. [C/1/1 Pg.5]

Question:

- a) Please provide a list of the stakeholders consulted during the facility alternative and IRPA identification and assessment.
- b) Please provide a copy of the input/comments provided by stakeholders during the facility alternative and IRPA identification and assessment. For each input/comment received, please explain how it was considered in the process.

Response

- a) and b)
Facility and non-facility Project alternatives were determined to not be viable options early in the assessment process, and as a result they were not assessed further or communicated externally prior to submission of the current Project application and pre-filed evidence.

However, the Company did include general IRP information, as well as discussed Project route selection and alternative routes, during Virtual Open House sessions. No comments were received from participants from those sessions.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe (“PP”)

INTERROGATORY

Reference:

“Enbridge Gas has completed an alternatives assessment to determine the optimal solution to meet the identified system need” [C/1/1 Pg. 3]

Question:

Please provide a copy of all materials (e.g. reports, presentations, correspondence, etc. related to the alternatives assessment.

Response

The following represent the entirety of materials related to the Alternative Assessment:

- On September 16, 2021, Enbridge Gas completed a Request for Proposal (“RFP”) for a Firm Exchange Service. The RFP package is included at Exhibit C, Tab 1, Schedule 1. Attachment 1.
- On September 19, 2021, Enbridge Gas held a virtual meeting with members of Energy Transfer Partners to determine whether they were interested in participating in the Firm Exchange Service RFP. The meeting invitation and minutes are included in the response at Exhibit I.FRPO.7, Attachment 1.
- On October 7, 2021 Enbridge Gas received a non-binding bid for a Firm Exchange Service which is included at Attachment 1 to this response.
- As part of the alternatives assessment for non-facility alternatives Enbridge Gas engaged Posterity. Communications between Posterity are set out in the response at Exhibit I.ED.7, Attachment 6, and the Posterity IRP Analysis can be found at Exhibit C, Tab 1, Schedule 1, Attachment 2.
- On March 10, 2022, Enbridge Gas summarized Project alternatives to support a presentation made to the Company’s Capital Allocation Committee on April 4, 2022. The summary of Project alternatives can be found at Attachment 2 to this response, and the presentation made to the Capital Allocation Committee can be found at Attachment 3 to this response.

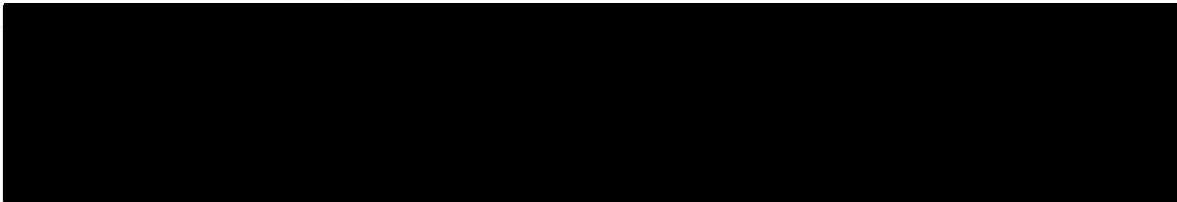
- Prior to the development of the current Leave to Construct application, Enbridge Gas refreshed the summary of Project alternatives to support decision making. That summary is set out at Attachment 4 to this response.
- The proposed Project received Enbridge Board of Director Approval in May 2022, based on the presentation materials set out at Attachment 5 to this response.



Request for Proposal Form

RFP - Ojibway To Dawn Firm Exchange Service With Call Option - 2023

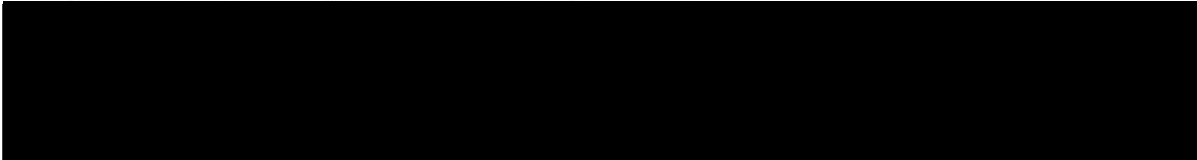
If you wish to participate in the Request for Proposal (RFP), please complete, sign and return this RFP Form on or before 12 p.m. ET / 11 a.m. CT on Oct. 7, 2021.



SERVICE PARAMETERS	
Please indicate if you are submitting an RFP for the "2023 Firm and Obligated Call Option Exchange Service"	WE ARE SUBMITTING A RESPONSE TO THE "OJIBWAY TO DAWN FIRM EXCHANGE SERVICE WITH CALL OPTION - 2023"
Receipt Point:	Ojibway (Enbridge Gas system)
Delivery Point:	Dawn (Facilities)
Start Date:	Nov.1, 2023
Exchange quantity:	up to 55,000 (GJ/day)
Term (years):	Minimum five (5) year initial term with four (4) year renewal right notice
Price	\$0.55 DEMAND (CAD/GJ/d)
• Total price	\$11,041,250 M PER YEAR Five (5) year term
Conditions Precedent: (If any)	PLEASE SEE ATTACHED

Enbridge Gas, at its sole discretion, reserves the right to reject any and all proposals received.

Any suggested conditions precedent proposed should be clearly articulated and attached to the RFP Form and will be considered during the RFP review. Successful bidders, if any, will be expected to enter into negotiations for a binding contract.



Instructions: Please return your completed RFP Form before the **deadline of 12 p.m. ET / 11 a.m. CT on Oct. 7, 2021** via email to:

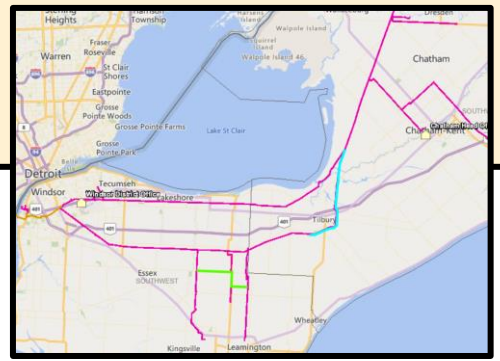
- EnbridgeGas_STSales@enbridge.com.

RE: Conditions Precedent

This proposal is for indicative purposes only and [REDACTED] reserves the right to amend, revise or cancel the proposal at any time.

In addition to the service parameters listed in the Request for Proposal Form, [REDACTED] proposal includes the following conditions:

- Any service parameters including volume and pricing are subject to refresh
- This proposal is subject to [REDACTED] Management Committee approval and [REDACTED] Marketing Ventures Executive approval
- This proposal is subject to [REDACTED] Credit approval
- Exchange Quantity is subject to availability of capacity on Panhandle Eastern Pipeline Company, LP with delivery into Ojibway (currently estimated at 18,000 Dth/d)
- At any time within the term of the deal, the demand rate is subject to change due to potential toll increases on Panhandle Eastern Pipeline Company, LP
- Renewal rights to be negotiated between parties

Alternative	Pipe Size	Pipe Length	STP TJ/d	Project Timeframe	\$/TJ	Image (Expand to enlarge image)
NPS 20 Loop from Dover Transmission To Richardson Sideroad NPS 16 Leamington Interconnect						
A <i>Recommended</i>	NPS 36	19 km	203	W2023 to W2028	1.25	
B	NPS 30	19 km	195	W2023 to W2027	1.29	

Additional Alternatives under review include:

- **Facility Options:**
 - NPS 20 Lift and Lay
 - NPS 16 Lift and Lay with tie-over to NPS 20

- **IRPA Options:**
 - LNG facility
 - CNG trucking deferral options, with and without reinforcement
 - Supply-side alternatives
 - ETEE studies
 - Project staging and deferral of the Leamington Interconnect

Panhandle Regional Expansion Project

Capital Allocation Committee

April 4, 2022



Purpose of Update



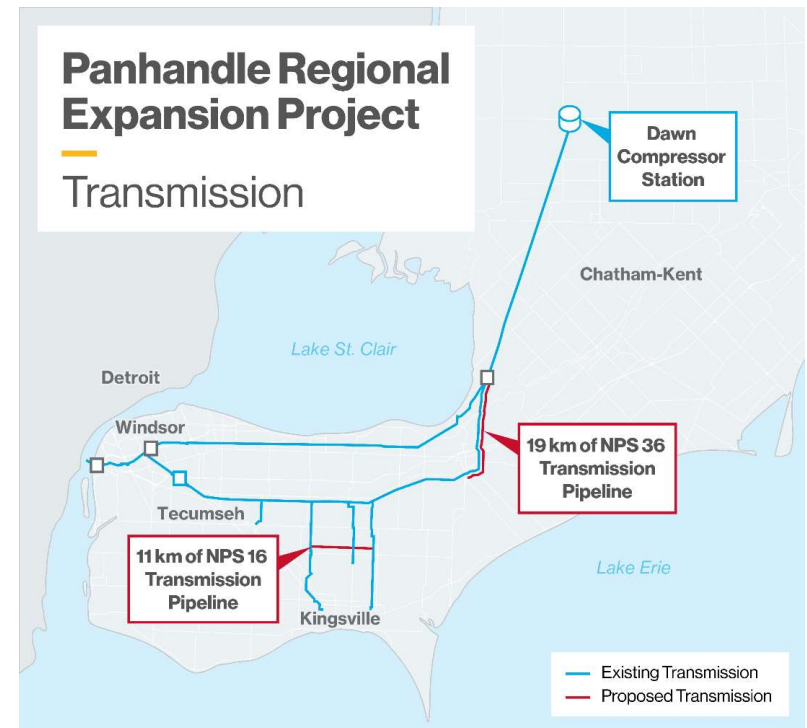
- Requesting Capital Allocation Committee approval to proceed to the IRC (Stage 3)
- Project is estimated to cost \$314 MM CAD, seeking Board of Directors approval for full funding in May 2022
- In January 2022, the Panhandle Regional Expansion Project received Capital Allocation Committee approval to proceed to capital allocation process Stage 2 and establish a full due diligence team with Corporate resources

Background & Executive Summary



- The Panhandle Regional Expansion Project (PREP) supplies natural gas from the Dawn Hub to customers west of Dawn. The Project consists of constructing two transmission pipelines and measurement facilities at Dawn Compressor Station
 - The transmission facilities will increase the system capacity by 203 TJ/d
 - Target ISD is November 2023 and November 2024
- The project will provide Ontario greenhouse, power generator and residential customers with increased access to the diversified, reliable, and cost competitive supply at the Dawn Hub
 - Majority (97%) of the capacity created by the project will serve commercial customers
 - Similar to other regulated projects, a Leave to Construct (LTC) Application must be approved by the OEB, scheduled for February 2023
 - Customer commitment to the project is currently 67% of the total proposed project capacity and will continue to pursue additional customer commitments
- The project is estimated to cost \$314 MM with a commitment of \$68 MM for long lead materials required prior to LTC Approval
- The project is expected to receive a full cost-of-service regulated return
 - Costs will be recovered through rates from commercial agreements with contract customers and the remaining revenue requirement will be recovered from ratepayers

Project Map

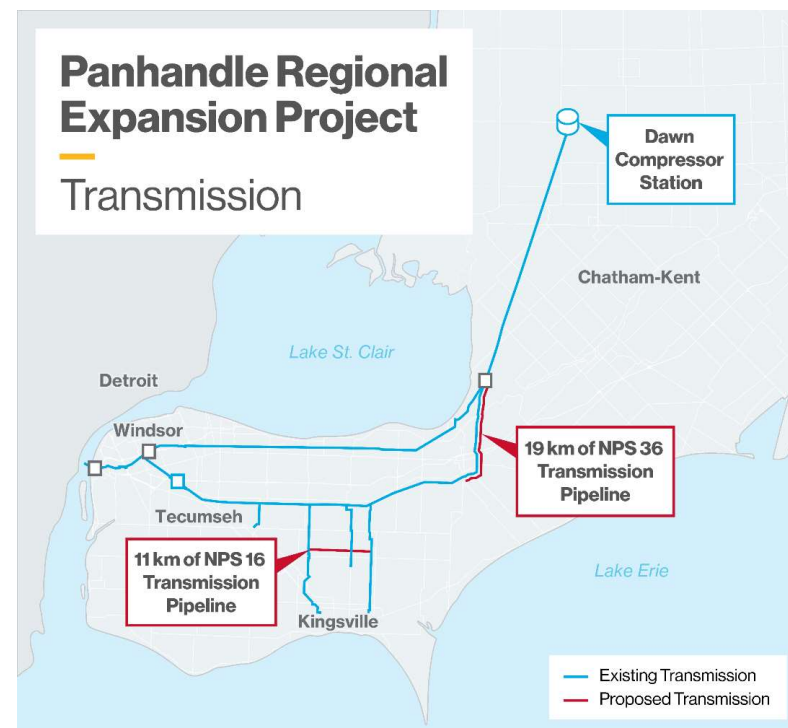


Regulated project that supports significant EGI customer growth



Project Description

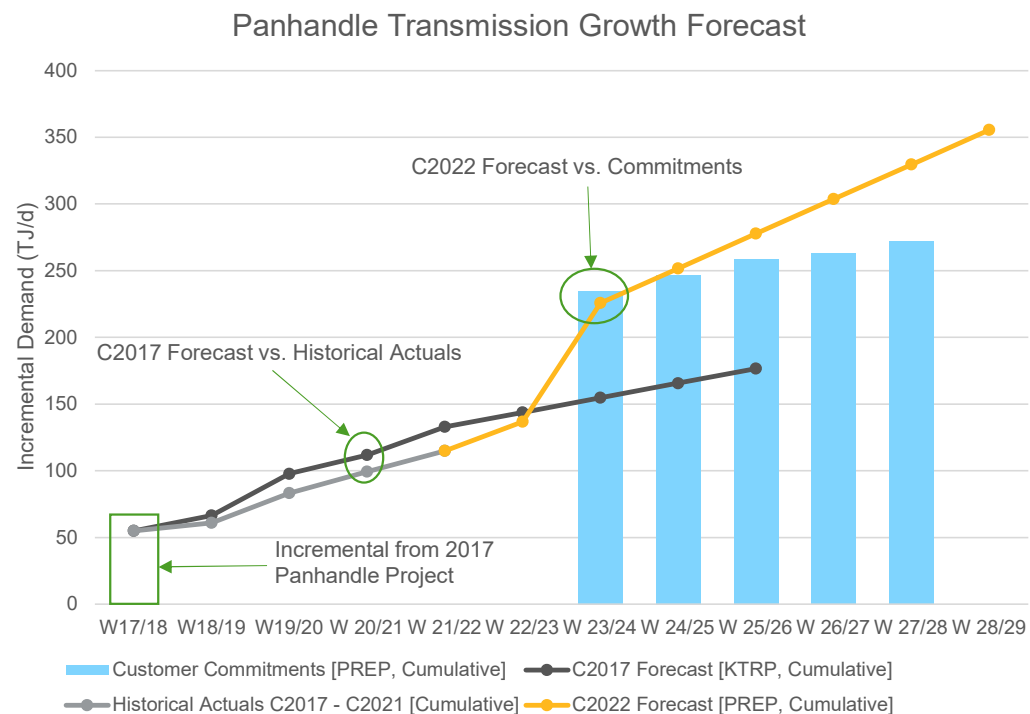
Scope	<ul style="list-style-type: none"> • 36-inch pipeline ~19 km from Dover Station towards Comber Station • 16-inch pipeline ~11 km between Kingsville East Line and Leamington North Lines • Measurement facilities at Dawn Compressor Station
Capex	<ul style="list-style-type: none"> • \$314 MM CAD (\$260 MM direct capital including IDC plus \$54 MM in-direct overheads) (Class 3) <ul style="list-style-type: none"> • 2023 ISD: \$246 MM (\$203 MM plus \$43 MM in-direct overheads) • 2024 ISD: \$68 MM (\$57 MM plus \$11 MM in-direct overheads)
Commercial Terms	<ul style="list-style-type: none"> • Regulated Project – Incremental revenue resulting from increased demand and rate base to be included with 2024 Rate Rebasing and 2023 ICM
Key Dates	<ul style="list-style-type: none"> • Investment Review Committee – April 2022 • ENB Board Request for Full Funding – May 2022 • Ontario Energy Board (OEB) LTC Application – June 2022 • Ontario Energy Board Approval Target – February 2023 • In-Service Date – November 2023 (36-Inch Pipeline & Measurement Facilities) • In-Service Date – November 2024 (16-Inch Pipeline)
Capacity	203 TJ/d of Panhandle Transmission System Capacity
Customers	<p>Parties Contractually Involved</p> <ul style="list-style-type: none"> • In-franchise contract customers (Greenhouse & Power Generation markets) and residential demand growth



Market Fundamentals



- Demand for greenhouse grown vegetables has been continually growing over the past decade supported by consumer preference and favourable market conditions
- The Kingsville Transmission Reinforcement Project (KTRP) was placed in service in November 2019 creating 71 TJ/d of capacity. This incremental capacity was forecasted to be fully utilized by Winter 2025-26
- In February 2021, ENB held a non-binding expression of interest for customers seeking firm capacity on the Panhandle System. The results showed significant interest and informed the C2022 Forecast for PREP indicating that incremental capacity is required for Winter 2023-24
- 67% of the proposed PREP transmission capacity has been committed to by customers. This includes 58 TJ/d of contracted capacity and 78 TJ/d of executed commitment letters to support the Leave to Construct application



Incremental capacity is required for Winter 2023-24 supported by forecast and customer commitments



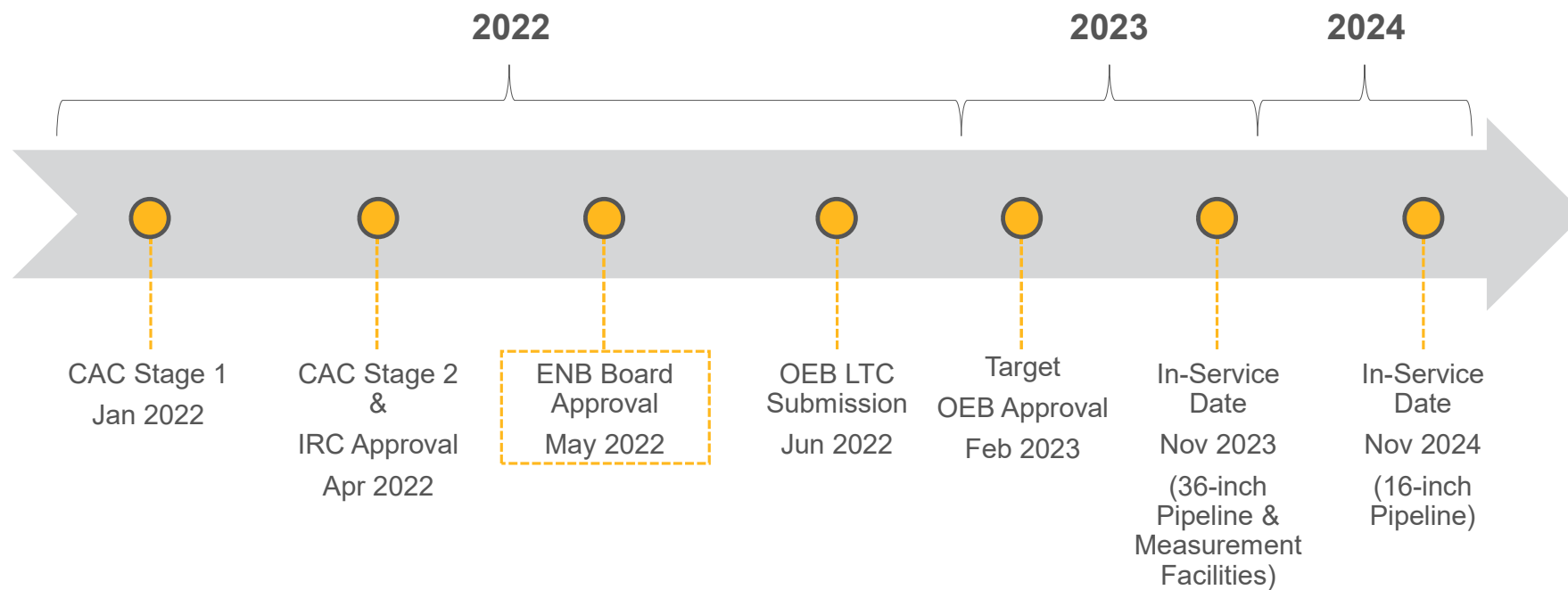
Regulatory Approval Strategy

- Development of a thorough Regulatory Strategy for approval of the project was undertaken early in the project development given the large capital commitment (\$68 MM) required prior to the OEB LTC approval
- File comprehensive evidence with OEB to support project need and timing including:
 - Customer interest underpinning project scope
 - Importance to Ontario economy/industry
 - Lack of interest in turnback or interruptible service
 - Impact of project not moving forward
- OEB Application will include letters of support from key stakeholders (Municipalities) and agencies (Ontario Vegetable Growers Association)
- Majority (90%) of the \$68 MM capital spend before OEB Approval is in lands (\$6 MM) and pipeline assets (\$55 MM), in the event of unfavorable OEB decision the mitigations include:
 - Lands acquisition strategy to include options to reduce at risk capex prior to OEB Decision
 - Assess other Enbridge projects that can use long lead material in the event PREP is not approved by the OEB
 - Seek OEB approval for prudently incurred development costs

		Low	Medium	High
Approval Criteria	Rank	Considerations		
Project Need		<ul style="list-style-type: none"> • Customer commitment to the project is currently 67% of the total proposed project capacity and are continuing to pursue additional customer commitments • Completed a binding reverse open season (turnback) and received no bids 		
Alternatives Assessment		<ul style="list-style-type: none"> • Project provides best long term value to customers • Supply-side and enhanced targeted energy efficiency alternatives were evaluated and are not practical or economic 		
Commercial Model		<ul style="list-style-type: none"> • OEB has approved previous projects in 2016 & 2018 that support greenhouse markets in Ontario with the proposed commercial model 		
OEB Economic Test		<ul style="list-style-type: none"> • Project is economic based on OEB 134 criteria and analysis that shows the project is in the Public Interest 		



Project Execution



Project on track for scheduled in-service dates



Strategic Rationale

- The project will provide Ontario greenhouse, power generator and residential customers with increased access to the diversified, reliable, and cost competitive supply at the Dawn Hub
- Project is underpinned by strong demand in the greenhouse and power generation markets. OEB has approved previous projects that support greenhouse markets in Ontario with proposed commercial model
 - Customer commitment to the project is currently 67% of the total proposed project capacity and continuing to pursue additional customer commitment
 - The 2017 & 2019 Panhandle Projects were expected to meet demand growth through 2021 and 2026. Actual demand growth has accelerated the need and timing for this project
- Expansion of Panhandle Transmission System and Dawn Compressor Station under cost of service revenue model supports EGI’s in-franchise growth with low-risk financial return
- Upon OEB approval, the project is expected to receive a full cost of service regulated return

Project Scorecard



Key Attribute	Rank	Considerations
Strategic Fit		<ul style="list-style-type: none"> • Core business growth project
Commercial Risk		<ul style="list-style-type: none"> • Regulated cost of service project • LTC application not approved as filed
Financial Reward		<ul style="list-style-type: none"> • Base case DCFROE 8.9%
Ability to Execute		<ul style="list-style-type: none"> • No expropriation included in schedule • Low complexity; rural terrain
ESG		<ul style="list-style-type: none"> • While the project will result in an emissions increase of ~5000 tCO2e annually (<0.7%), it does not have a material impact on the total GDS emissions intensity

Project aligned with core business model to drive growth in strategic greenhouse and power generation markets



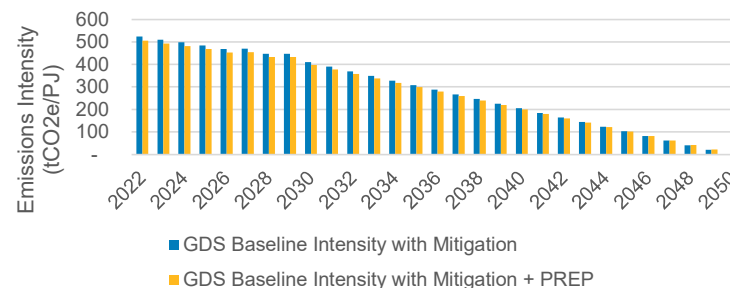
GHG Reduction Strategy

- Strategy to achieve GHG emission reductions includes:
 - The emission reduction initiatives identified in the GDS GHG Reductions strategy, assuming these will be funded and approved for implementation by 2030
 - Emission reduction initiatives included as part of the broader Dawn GHG solution, including modernization initiatives at the Dawn Compressor Station and RNG compressor fuel switching, will also reduce emissions related to the Panhandle project by ~4,650 tCO₂e (~93% of total project emissions) by 2030
- Residual emissions: At this time additional emission reduction opportunities would be required to reduce the remaining 7% of the total project emissions in order to achieve net-zero by 2050

Notes:

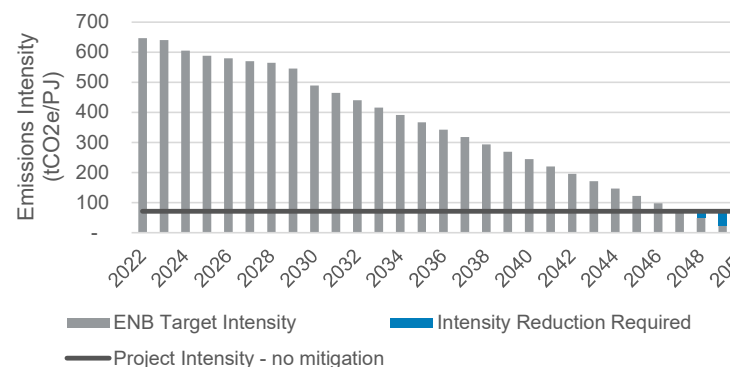
- The incremental emissions due to this project represent less than 0.7% of current baseline emissions and reduce overall carbon intensity for GDS
- A sensitivity with Day-One Net-Zero emission was also run and would decrease the project DCFROE by 0.3%

Emissions Intensity Comparison



Note: The GDS Emissions Intensity forecast above only goes out to 2030. A simplified approach with a linear decrease has been assumed for 2030 to 2050.

Emissions Intensity Reduction Required





Financial Evaluation

Project Description

- The revenue requirement for the total project is assumed as annual cost of service, with an allowed ROE of ~8.9% for 2023-2028 and ~8.8% for each subsequent period¹
- Negative EBITDA and the growing EBITDA pattern is driven by tax credits in 2023 and expenses afterward
 - EBITDA increase required to offset higher than average increase in annual tax expense due to high tax depreciation rate. EBITDA stabilize starting in 2031 once majority of tax pool has been used
- Negative equity cash flow in 2024 is due to 2024 ISD spending and regulatory deferral account
 - EGI expects to propose to flow the 2023 revenue requirement credit through the ICM deferral account in 2024 (vs. a rate rider in 2023). This treatment is subject to OEB approval²
- High D/EBITDA and EV/EBITDA multiples are due to lower tax expense in early years resulting in lower EBITDA
- Evaluation parameters include:
 - 40 year evaluation horizon
 - 64:36 debt to equity ratio; 4.0% cost of debt
 - 26.5% Tax Rate

Financial Outlook

in \$MM	2022-23	2024	2025	2026	2027	2028
Equity Cash Flow	(81.8)	(18.2)	10.6	12.0	11.7	11.5
EBITDA	(17.0)	12.3	21.3	22.3	22.8	23.2
Earnings	1.9	7.8	9.7	9.5	9.3	9.1
DCF	2.3	13.1	16.4	16.3	16.1	15.9
D/EBITDA		15.9x	9.1x	8.5x	8.1x	7.8x
Annual ROE		8.9%	8.9%	8.9%	8.9%	8.9%

DCFROE	8.9%
EV/EBITDA	14.8x
ROCE (5yr avg.)	5.4%

Investment realizes a strong return from low-risk cost of service investment

¹ Assumption reflects the current forecast of allowed ROE for 2024 and 2029 for EGI

² Rate rider methodology will have an unfavorable immaterial impact of 0.06% to the DCFROE when compared to the ICM deferral account treatment

Risk Summary



High Medium Low

Base Case DCFROE 8.9%

Risk	Mitigation	Assessment	Sensitivity	ΔDCFROE
<p>Capital Cost</p> <p>Increase in cost as construction and material contracts finalized, Geotech confirmed, and route secured</p> <p>Pre-Spend Capex of \$68MM for long lead materials prior to LTC Approval expected in February 2023</p>	<ul style="list-style-type: none"> 11% contingency is included in the cost estimate Develop logistics plan with supply chain to optimize long lead material commitments without increasing risk to planned ISD Assess other Enbridge projects that can use long lead material in the event PREP is not approved by the OEB Continue to assess cost commitment risk 		N/A	N/A
<p>Regulatory Return</p> <p>OEB may approve lower than forecasted Allowed ROE in future re-basing period</p>	<ul style="list-style-type: none"> A structured and documented rate application justifying the current ROE methodology supported by Enbridge's internal forecast of Canada long bond and Utility spreads 		~25bps reduction to allowed ROE	(0.3%)
<p>Regulatory Approval</p> <p>Project not obtaining Leave to Construct (LTC) approval</p>	<ul style="list-style-type: none"> File comprehensive evidence to support project need and importance to Ontario economy/industry and impact of project not moving forward LTC Application will include the following evidence to prove strong need for the project: <ul style="list-style-type: none"> A minimum of 50% capacity commitment as part of project need evidence to support a high probability of OEB approval Completed a binding reverse open season (turnback) and received no bids Customer commitment to the project is currently 67% of the total proposed project capacity and are continuing to pursue additional customer commitments 		N/A	N/A
<p>Lands/Schedule/Expropriation</p> <p>No expropriation included in schedule; maximum historical duration is 13 months; Supply Chain shortages affecting procurement of materials assume 1 year in-service delay</p>	<ul style="list-style-type: none"> Early engagement with landowners and municipal stakeholders to obtain access agreement for pipeline installation Successful negotiations with landowner groups (i.e. CAEPLA¹) Develop logistics plan with supply chain to manage long lead material Impacts to rate recovery accruing to in-service delay will be managed through approved regulatory mechanisms 		Project ISD delayed by 12 months	(0.3%)

¹ Canadian Association of Energy and Pipeline Landowner Associations

Next Steps



- Seeking Investment Review Committee approval on April 8, 2022
- Seeking Board of Directors Full Funding approval on May 3, 2022
- File Leave to Construct Application with Ontario Energy Board on June 10, 2022

Risk Matrix Signoffs



Team/Area	Analysis Undertaken	Responsibilities	Signoff
Project Execution	<ul style="list-style-type: none"> Risk: Global Supply Chain Shortages and Delays have been affecting the procurement of materials required for construction Mitigant: Advancing production of Early Order Bill of Materials to order long lead time items and general materials earlier to mitigate the effect of delays Risk: ISD could be delayed due to prolonged land negotiations, regulatory approval or permitting delays Mitigant: Early landowner engagement and agency outreach has been initiated to identify potential issues 	Andrew Harrington	
Integrity	<ul style="list-style-type: none"> Design, manufacturing, and/or construction related hazards reducing reliability of new asset Design reviews, PQMP, construction inspection, pressure test, post-commissioning ILI 	Wes Armstrong	
Asset Utilization	<ul style="list-style-type: none"> Customer demand forecast does not materialize The project is scoped to serve 5-6 years of system growth to minimize the forecast risk 	Tanya Mushynski & Jim Redford	
Operating Costs	<ul style="list-style-type: none"> Greater than anticipated operating costs that are not recoverable in customer charges Incremental operating costs included in overall project economics 	Wes Armstrong & Jim Sanders	
Operations	<ul style="list-style-type: none"> Injury or supply interruption due to improper operation as a result of incorrect project handoff EGI will follow proper procedures for documentation, handover and training 	Wes Armstrong & Jim Sanders	
Lands	<ul style="list-style-type: none"> Landowners may not grant land rights within the timelines requested Identify preferred fee purchase locations early and engage landowners early in case new locations need to be chosen 	Vik Kohli	
Environmental	<ul style="list-style-type: none"> Species at Risk permits and archaeological clearances are on the critical path Early access to lands will provide adequate time to complete all required archaeological surveys and receive clearance to meet the schedule 	Vik Kohli	
Stakeholder	<ul style="list-style-type: none"> Indigenous and stakeholder opposition to the project on various grounds Detailed outreach planning, engagement, and advocacy 	Malini Giridhar & Mike Fernandez	
Regulatory	<ul style="list-style-type: none"> OEB does not approve Leave to Construct Development of a clear and convincing application demonstrating need for the project and that the project is in the public interest 	Malini Giridhar	
Market Price Risk	<ul style="list-style-type: none"> The project does not have any direct exposure to changes in market prices Financing and power costs are passed on to the customer through the OEB approved cost-of-service rate base 	Jonathon Gould	
Credit	<ul style="list-style-type: none"> Risk of lost revenue, unrecovered capital investment or increased vendor costs Mitigated by anticipated approval for full cost of service recovery, as well as by established credit review processes 	Jonathon Gould	
Insurance	<ul style="list-style-type: none"> Risk of insurance costs exceeding original estimates; financial impact of corporate deductibles Sensitivities are incorporated into analysis of the financial model 	Cathy Ward	
Taxation	<ul style="list-style-type: none"> There are no significant tax risks 	Leslie O'Leary	
Accounting	<ul style="list-style-type: none"> Inappropriate capitalization of project expenditures and inappropriate revenue recognition Follow enterprise revenue recognition and capitalization policies 	Chris Johnston	
Treasury	<ul style="list-style-type: none"> Not earning a sufficient rate of return to justify the investment Treasury has reviewed the project and is comfortable with the regulated return for Enbridge Gas Inc. 	Jonathon Gould	
Investment Analysis	<ul style="list-style-type: none"> Risk: Structural error in the model or incorrect assumption used in the model Mitigant: Financial model audit performed and assumption in the model were review and confirmed by appropriate SME's 	Falyne Chave	
GHG Emissions	<ul style="list-style-type: none"> Greater than anticipated operating costs Mitigation assumes that the emission reduction initiatives identified in the 3+ year strategy will be funded and approved for implementation by 2030 	Wes Armstrong	

Panhandle Regional Expansion Project
 Alternatives Assessment – Summary

Why are incremental facilities required in Winter 2023/24?

Demand Forecast	Winter 22/23	Winter 23/24	Winter 24/25	Winter 25/26
Total System Demand	694	744	828	854
Incremental per Year	22	50	84	26
System Capacity (No Project)	713	713	713	713
Shortfall (No Project)	+20	-31	-114	-140

Based on hydraulic modelling without the proposed project a minimum 42 TJ/d incremental delivery at Ojibway (102 TJ/d Total) is required in Winter 2023/24.

The required Ojibway delivery (42 TJ/d) is larger than the forecast Panhandle System shortfall (31 TJ/d) because increasing deliveries at Ojibway will not efficiently serve the Leamington-Kingsville market demands (i.e. the Ojibway deliveries to area demand ratio is not 1:1)

Enhanced Target Energy Efficiency (ETEE)

Posterity report estimates a maximum peak hour reduction potential of 6,900 m³/hour (5.43 TJ/d) from general service customers could be obtained by Winter 2029/2030 and would cost approximately \$50 million.

A reduction of 83 TJ/day of capacity is required to eliminate or reduce the scope of the Leamington lateral interconnect. Therefore, there is insufficient peak demand and ETEE is not a viable alternative.

Trucked CNG

A CNG analysis indicated that approximately 550 loads per day would be required to meet the shortfall capacity of 192 TJ/d. This alternative poses issues both in terms of logistics and in terms of security of supply. This alternative is not a viable solution and was not pursued further.

New LNG Plant

In the PRP proceeding, Enbridge Gas evaluated constructing and operating an LNG storage facility as an alternative. The estimated cost was \$287 million (approximately \$390 million in today's dollars) with about \$5 million in annual operating expenses to address 106 TJ/d of system growth. This would only provide half the capacity of the proposed Project. This Alternative is financially infeasible compared to the proposed project and was not pursued further.

Analysis of PEPL Available Capacity

Annual	Winter
PEPL website at time of RFP showed 21 TJ/d 19 TJ/d was noted in Tenaska RFP bid Tenaska confirmed via follow-up that 21 TJ/d is available on a long term basis.	PEPL website does not show capacity for future years or winter No bids were received for Winter Only Service in the Enbridge RFP

Panhandle Regional Expansion Project
 Alternatives Assessment – Summary

Estimated Costs of Ojibway Deliveries

	Unit Cost (C/GJ/d)	Estimated Annual Costs (\$MM)	
		21 TJ/d Delivery	42 TJ/d Delivery**
RFP Bid	0.55	\$4.2	\$8.4
Gas Supply – 10 Year Landed Cost	0.76*	\$5.8	\$11.6
Gas Supply – 1-Year 2023/24	0.80*	\$6.1	\$12.3

*Gas Supply landed cost reflects premium to Dawn based on current PEPL tolls and ICF Q1-2022

**Assumes 42 TJ/d is available to be contracted at Unit Cost based on 365 days a \$0.55 C/GJ/d Annual price is the equivalent of a \$1.32 C/GJ/d Winter Only price ($\$0.55 \times 365 / 151$)

Why is a one-year deferral not a preferred Alternative?

Based on the results of the Expression of Interest and customer commitments to date – Enbridge Gas is expecting demands to continue, and Enbridge Gas has identified the potential need for a second phase of transmission expansion to meet all of the demands that are forecasted over the next 20 years. This second phase has also been identified within the Enbridge Gas 2021-2025 AMP with a forecasted 2028 in-service date.

Why is the NPS 36 in combination with NPS 16 the Preferred Alternative?

Loop and Interconnect Combinations (Equivalent Lengths)		Capacity (TJ/d)	Costs (\$ Million)	Cost per Unit of Capacity (\$/TJ/d)	NPV (\$ Million)
NPS 36	NPS 16	203	314.4	1.55	\$(66.9)
NPS 30	NPS 16	195	304.5	1.57	\$(56.2)
NPS 30	NPS 20	203	342.3	1.61	\$(85.7)
NPS 36	NPS 20	212	332.4	1.64	\$(74.9)

Hybrid Alternative	Capacity (TJ/d)	Facility Costs (\$ Million)	O&M Costs (\$ Million)*	Cost per Unit of Capacity (\$/TJ/d)	NPV (\$ Million)
21 TJ/d Supply-Side + 17.35 km NPS 36 Length	203	303.3	\$4.2 Annually 73.1 over a 40-year term	1.85	\$(129.7)

*The estimated O&M costs are based on the bid received in the RFP. The bid stated pricing is subject to refresh based on the market conditions at the time of contracting.

- Optimized pipeline design considering combinations of pipeline diameters to provide best cost per capacity

Panhandle Regional Expansion Project
Alternatives Assessment – Summary

- Proposed Project provides the lowest cost per capacity

Additional Benefits of NPS 36 Loop w/ NPS 16 Interconnect vs NPS 30 Loop w/ NPS 16 or 20 Interconnect

Extending the existing NPS 36 pipeline from Dawn through to Comber Transmission at the same diameter will reduce overall system costs for operations and maintenance. A common pipe size benefits a system from a maintenance perspective in the reduced costs associated with two separate pipeline inspection program and minimizes the number of overall facilities therefore minimizing impacts to Indigenous peoples, municipalities, and landowners, and environmental; and costs to build and operate.

The NPS 36 provides an additional 8 TJ/d compared to NPS 30 in the short term, and an incremental 46 TJ/d of capacity for the same pipe reinforcement path over the long-term plan as the NPS 36 loop is extended to Comber.

As the Loop is continued to Comber in the NPS 30 Loop and NPS 20 interconnect scenario the utilization of the NPS 20 will decrease and ultimately be oversized in comparison to the NPS 16 and therefore is not preferred compared to the proposed project.

Panhandle Regional Expansion Project

Enbridge Gas Inc. Board of Directors

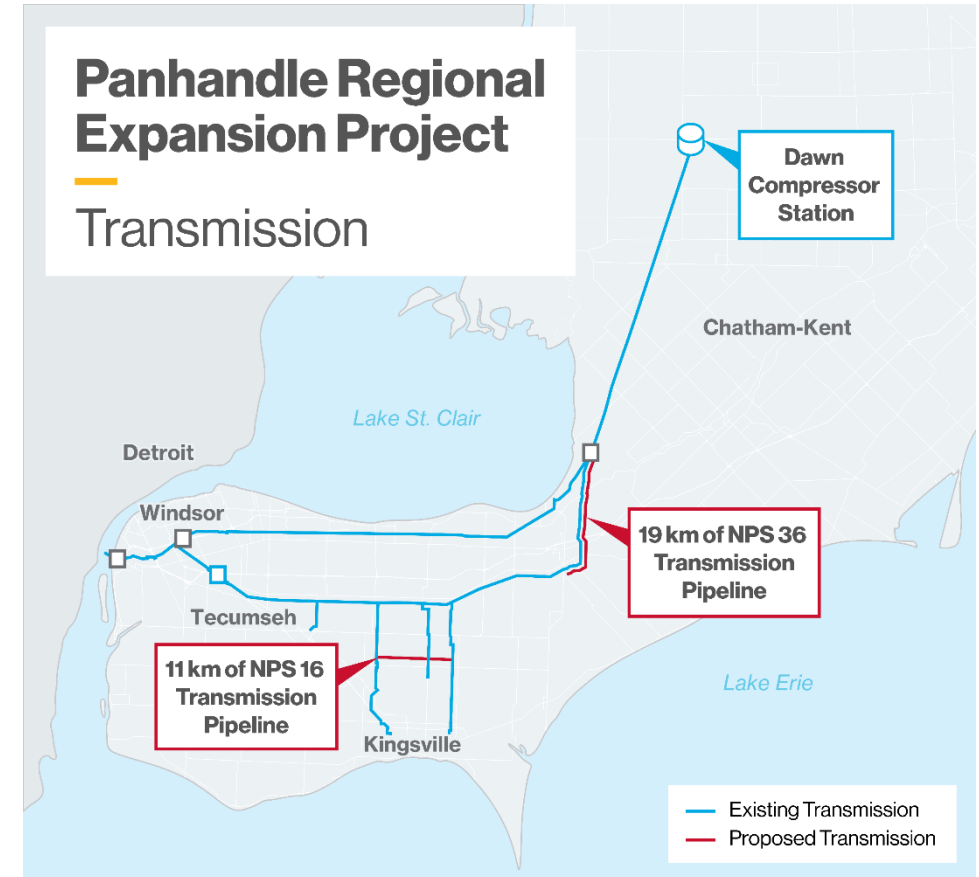
April 26, 2022



Background & Executive Summary

- The Panhandle Regional Expansion Project (PREP) would transport natural gas from the Dawn Hub to customers west of Dawn. The project consists of constructing two transmission pipelines and measurement facilities at Dawn Compressor Station
 - The transmission facilities will increase the system capacity by 203 TJ/d (182 MMscf/d)
 - Target in-service date is November 2023 and November 2024
- The project provides Ontario greenhouse, power generator, industrial and residential customers with increased access to natural gas
 - Demand for greenhouse grown vegetables has been continually growing over the past decade due to consumer preference and favourable market conditions
 - 97% of the capacity will serve commercial customers
 - Strong customer commitment with project currently 67% subscribed and GDS will continue to pursue customer commitments with forecast to be fully subscribed before 2028
- The project is estimated at \$314 MM with a commitment of \$68 MM for long lead materials required prior to Leave To Construct (LTC) Approval from the Ontario Energy Board (OEB) in February 2023
- The project is expected to receive a full cost-of-service regulated return
 - Costs will be recovered through rates supported by commercial agreements with contract customers and the remaining revenue requirement will be recovered from ratepayers

Project Map



Regulated project that supports significant Enbridge Gas Inc. customer growth

Strategic Rationale



- PREP is underpinned by strong demand in the greenhouse and power generation markets. OEB has approved previous projects that support greenhouse markets in Ontario with proposed commercial model
- Expansion of Panhandle Transmission System and Dawn Compressor Station under cost of service revenue model supports EGI's in-franchise growth with low-risk financial return
- Since 2017, the Panhandle Transmission System has been expanded by 173 TJ/d (155 MMscf/d) with demand exceeding design capacity in 2023

Project Scorecard



Key Attribute	Rank	Considerations
Strategic Fit		<ul style="list-style-type: none"> • Core business growth project
Commercial Risk		<ul style="list-style-type: none"> • Regulated cost of service project • Project not obtaining Leave to Construct (LTC) approval
Financial Reward		<ul style="list-style-type: none"> • Base case DCFROE 8.8%
Ability to Execute		<ul style="list-style-type: none"> • Low complexity; rural terrain • No expropriation included in schedule or expected¹
ESG		<ul style="list-style-type: none"> • Carbon intensity of PREP is ~70 tCO₂e/PJ with 5,000 tCO₂e annual emissions • \$21 MM of carbon offset costs required to achieve 2050 net zero included in project economics

Project aligned with core business model to drive growth in strategic greenhouse and power generation markets

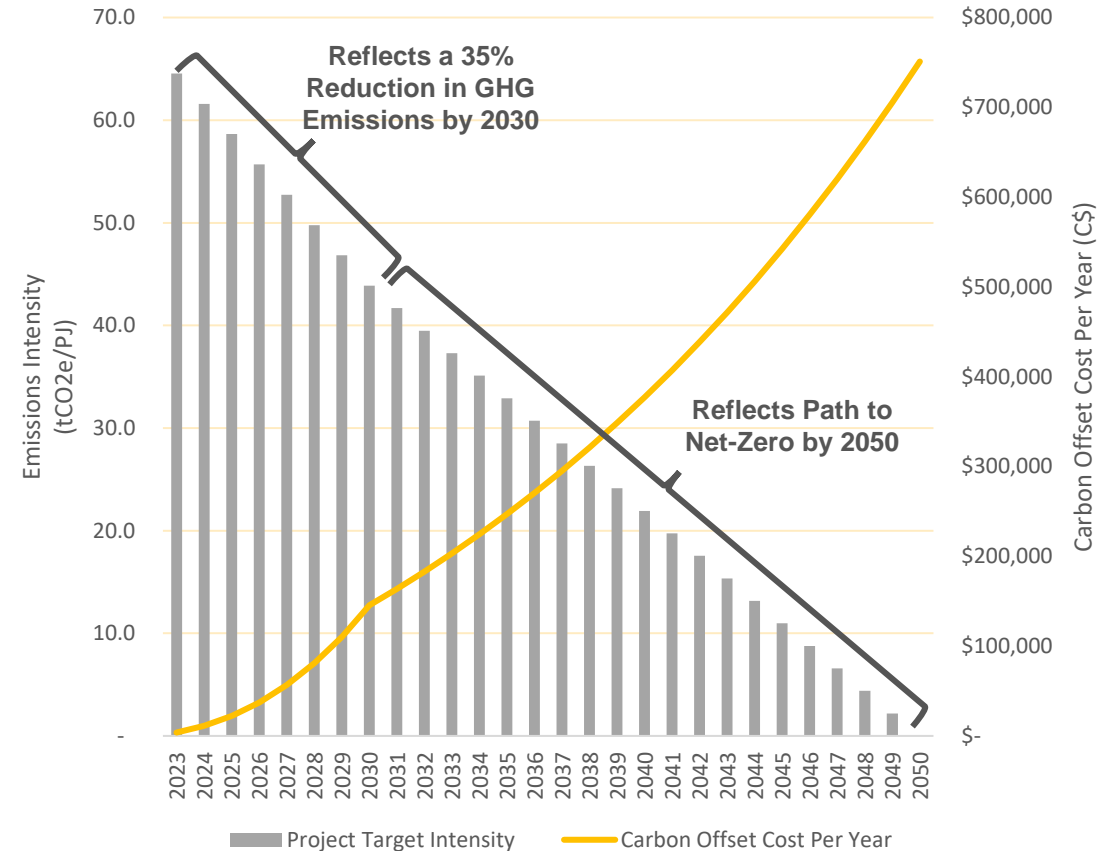
¹ Maximum historical expropriation duration is 13 months

GHG Reduction Strategy



- Enbridge has aligned its capital allocation and investment criteria to meet its 2030 emissions reduction target and net zero by 2050
- The methodology consist of demonstrating a plan to achieve the targets, including purchasing carbon offsets if required
- PREP path to **2050 net-zero** includes:
 - The addition of \$21 MM to the original investment based on the purchase of Carbon Offsets from 2023-2063¹
 - \$0.5 MM worth of carbon offset to reach the 35% GHG reduction target by 2030
 - \$20.5 MM worth of carbon offset from 2031 to 2063

Path to 2050 Net-Zero



¹ Reflects a 40-year evaluation horizon, with an average of ~\$500k/year of carbon offset expense

Financial Evaluation



Project Description

- The revenue requirement for the total project is assumed as annual cost of service, with an allowed ROE of ~8.9% for 2023-2028 and ~8.8% for each subsequent period¹
- Negative EBITDA in 2023 is driven by tax credits (utilization of a full year's worth of tax depreciation, while generating 2 months worth of revenue only)
- Negative equity cash flow in 2024 is due to 2024 ISD spending and regulatory deferral account
- High D/EBITDA and EV/EBITDA multiples are due to lower tax expense in the initial years resulting in lower EBITDA²
- Evaluation parameters include:
 - 40-year evaluation horizon
 - 64:36 debt to equity ratio; 4.0% cost of debt
 - 26.5% Tax Rate
 - Valuation includes cost of carbon to achieve 2050 net-zero
 - A sensitivity with **Day-One Net-Zero** emission would decrease the project DCFROE further by 0.2% (if not recovered within regulatory construct)

Financial Outlook

in \$MM	2022-23	2024	2025	2026	2027	2028
Equity Cash Flow	(81.8)	(18.2)	10.6	11.9	11.7	11.5
EBITDA	(17.0)	12.2	21.3	22.3	22.8	23.1
Earnings	1.9	7.8	9.7	9.5	9.3	9.0
DCF	2.3	13.1	16.4	16.3	16.1	15.9
D/EBITDA		15.9x	9.1x	8.5x	8.1x	7.8x
Annual ROE		8.9%	8.9%	8.8%	8.8%	8.8%

DCFROE (With Carbon Offset Costs) 8.8%

DCFROE (Without Carbon Offset Costs) 9.0%

EV/EBITDA³ 13.7x

ROCE (5yr avg.) 5.4%

Investment realizes a strong return from low-risk cost of service investment

¹ Assumption reflects the current forecast of allowed ROE for 2024 and 2029 for EGI

² The lower EBITDA in the initial years is mainly driven by station work of \$96 MM (inclusive of in-direct overheads) with a 20% CCA rate. As the Undepreciated Capital Cost (UCC) pool is utilized, the cash tax expense and the revenue requirement increases until the EBITDA stabilizes in 2031

³ Reflects the average EBITDA of 2025 – 2035

Risk Summary



High Medium Low

Base Case DCFROE 8.8%

Risk	Mitigation	Assessment	Sensitivity	ΔDCFROE
<p>Capital Cost Increase in cost as construction and material contracts finalized, Geotech confirmed, and route secured</p>	<ul style="list-style-type: none"> 11% contingency is included in the cost estimate Develop logistics plan with supply chain to optimize long lead material commitments without increasing risk to planned ISD 		N/A	N/A
<p>Regulatory Return OEB may approve lower than forecasted Allowed ROE in future re-basing period</p>	<ul style="list-style-type: none"> A structured and documented rate application justifying the current ROE methodology supported by Enbridge's internal forecast of Canada long bond and Utility spreads 		~25bps reduction to allowed ROE	(0.3%)
<p>Regulatory Approval Project not obtaining Leave to Construct (LTC) approval Pre-Spend Capex of \$68 MM for long lead materials prior to LTC Approval expected in February 2023</p>	<ul style="list-style-type: none"> LTC Application will include comprehensive evidence to support project need and importance to Ontario economy/industry and impact of project not moving forward Assess other Enbridge projects that can use long lead material in the event PREP is not approved by the OEB Continue to assess cost commitment risk 		N/A	N/A
<p>Lands/Schedule/Expropriation No expropriation included in schedule; maximum historical duration is 13 months; Supply Chain shortages affecting procurement of materials assume 1 year in-service delay</p>	<ul style="list-style-type: none"> Early engagement with landowners and municipal stakeholders to obtain access agreement for pipeline installation Successful negotiations with landowner groups (i.e. CAEPLA¹) Develop logistics plan with supply chain to manage long lead material Impacts to rate recovery accruing to in-service delay will be managed through approved regulatory mechanisms 		Project ISD delayed by 12 months	(0.3%)

¹ Canadian Association of Energy and Pipeline Landowner Associations

Recommendation



Management recommends that the Board of Directors of Enbridge Gas Inc. (the “Corporation”) approve the following (subject to any required approval of funding by the Board of Directors of Enbridge inc.):

- Panhandle Regional Expansion Project, as revised (the “Project”), including the authority of the Corporation and the officers of the Corporation to take all such action, and to cause the subsidiaries of the Corporation to take all such action, necessary or advisable to effectuate the Project consistent with the project materials provided to the Board (the “Project Memo”);
- A major capital appropriation of up to \$314 million for the Project, including AIDC;
- A corresponding increase to the applicable budgets, to the extent necessary or appropriate, including an increase of \$21 million to the applicable operating budgets, consistent with the Project Memo; and
- Entry by the Corporation or its subsidiaries into such funding arrangements as may be required on terms as approved by the Vice President, Finance or Treasurer of the Corporation.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe (“PP”)

INTERROGATORY

Reference:

“The proposed Project provides many benefits and is the best alternative for meeting the identified needs for the following reasons” [C/1/1 Pg. 24]

Question:

Please provide a table identifying each option/alternative considered and indicate what the relative impact/rating was for each of the following criteria used by Enbridge for decision making.

- Lowest cost per unit of capacity
- Meets required November 1, 2023 in-service date
- Provides market assurance in meeting the growing firm demands along the Panhandle System for the next five year
- Increases Ontario customers access to diverse supply, storage, and price transparency of the Dawn Hub
- Provides load balancing between existing laterals to reduce the pressure drop between the NPS 20 Panhandle Line and the Leamington-Kingsville market, which also allows for incremental growth throughout the entire Panhandle Market.
- Scalable with system growth.
- Directly feeds area of growth.
- Contains the lowest risk relative to other alternatives assessed.
- Contains the lowest environmental and socio-economic impacts relative to all viable alternatives assessed.

Response

Please see the response to Exhibit I.STAFF.7, Attachments 1 and 2. Enbridge Gas did not rank each item listed in the response at Exhibit I.STAFF.7, as many items listed are binary (pass/fail) criteria, such as: “Meets required November 1, 2023 in-service date”.

In addition, once an alternative was deemed not to be viable, Enbridge Gas did not continue assessing further criteria for the option.

Enbridge Gas's approach in this regard was guided by prior OEB direction from its Decision and Order on the Company's Panhandle Reinforcement Project (EB-2016-0186), at page 16:

Union is required to explore alternatives, but once an alternative is assessed to be less appropriate, Union is not required to go further. The preferred option needs to be as good as, or better, than the alternatives analyzed.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe ("PP")

INTERROGATORY

Reference:

Posterity Report [C/1/1, Attachment 2]

Question:

- a) Please provide the RFP (if applicable), statement of work and contract with Posterity Group for the IRP analysis and report.
- b) Is the 2 page report filed the only material received from Posterity Group related to this project? If no, please provide all other materials (reports, presentations, emails, etc.).

Response

- a) Please see Attachment 1 to this response for the scoping document between Posterity Group and Enbridge Gas. Enbridge Gas has redacted commercially sensitive information within Attachment 1 pertaining to the negotiated price for Posterity's services.
- b) Please see the response at Exhibit I.ED.7 for additional materials and communications between Posterity and Enbridge Gas in relation to the Project.



POSTERITY
GROUP

Scoping Document: Leamington IRPA

Date: March 8, 2022

Amrit Kuner
Enbridge Gas Inc.
500 Consumers Road
North York, M2J 1P8

Posterity Group
140 Yonge Street, Unit 200
Toronto, ON M5C 6S3



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1 Background and Objectives

Context

Enbridge Gas Inc. (EGI) requires integrated resource planning alternatives (IRPA) analysis support for the Leamington Interconnect transmission component of the upcoming Panhandle Regional Expansion Project (PREP) leave to construct (LTC) application.

The IRPA being assessed are enhanced targeted energy efficiency (ETEE), and demand response (DR).

Priorities for Posterity Group's Support

- ✓ Develop scaled version of IRPA model to support Leamington Interconnect ETEE and DR analysis.
- ✓ Deliver analysis output in Excel and draft a memo highlighting findings.

2 Support Activities

Work Package 1 – Leamington Interconnect IRPA Analysis

Value and outcomes for Enbridge:

- Scaling the IRPA model will allow EGI to develop location (sub-region) specific estimates of ETEE and DR IRPAs.
- This scaled model approach will be faster and more defensible than trying to derive estimates from rate-zone level outputs; it will also be more cost effective than developing a unique model for LTC impacted customers.

Activities:

This work package involves scaling down the legacy Union South rate-zone region in the IRPA model to enable ETEE and DR analysis on the subset of customers associated with the Leamington Interconnect:

- Receive data on customers impacted in the Leamington Interconnect sub-region [see Section 5 for a checklist of information we need from EGI]
- Identify the corresponding 'legacy Union South rate-zone + IESO Zone' sub-region, and scale down this sub-region to align with customer data
- Update reference case growth rates to align with Enbridge's updated data for the applicable rate classes and segments.
- Run model to develop ETEE and DR outputs and QC model outputs
- Post outputs to Excel and present the following information:
 - Peak hour reduction (m³/hr): by measure, end-use, customer type, and sector
 - Cost: program spending by year and by measure
 - Report peak reduction and cost for both ETEE and DR combined and separately
- Draft a memo highlighting findings





3 Timeline

- Project Start Date: As soon as possible.
- Project Completion: Target 6 weeks after initiation [We plan to reduce this timeline for future analyses. We need more elapsed time for this assignment to facilitate development of a process to update reference case growth rates as part of the IRPA analysis].

4 Estimated Level of Effort

The table below presents a level of effort estimate for the proposed work.

[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Similar to previous engagements with EGI, we propose undertaking work on an hourly basis with a monthly billing cycle for fees incurred in the preceding month.

5 Checklist of Information we need from Enbridge

The checklist below presents the information we need from EGI as inputs for the ETEE and DR analysis.

- Normalized annual volume by customer
 - Year should be clearly specified so that we can scale customer segments using the appropriate year in the IRPA model
 - It likely makes sense for EGI to select the most recent calendar year for which it has a complete set of normalized annual volume data
- Hourly Peak by customer
 - Data from DOE (coincident system hourly peak on design day)
- Rate class, Sector, Segment data by customer
 - We ideally need to map EGI data to the rate, sector, and segment data schema we have in the IRPA model [See tables below for a list of rate classes, sectors, and segments that are in the model]
 - If segment data doesn't perfectly match the options present in the IRPA model data schema, we may be able to make assumptions about how to characterize customer information (provided there are alternate segment descriptions to work with).
- Location by customer
 - Only needed if customers span more than one IESO zone or legacy gas utility rate zone.
 - If needed, we would require postal code data by customer
- Direction on hourly peak reduction target(s)
- Direction on timelines associated with peak reduction targets (e.g., Are there milestone years that are important?)





- Direction on which customers should be excluded from IRPAs (i.e., IRPA will not be applied to these customers)
 - The hourly peak for these customers will show up in the forecast period, but IRPA measures will not be applied to this subset of customers (i.e., they will not contribute to peak reduction potential)
 - e.g., if there are contract customers in the dataset provided and these should be excluded, specifically identify the relevant rate class, sector and segments that should be excluded from IRPA measures
- Direction on whether Posterity should calibrate load shapes to customer subset.
- Direction on whether Posterity should update reference case growth rates. If yes, we need:
 - Direction on the specific rate classes/segments that are departing from the IRPA model's reference case (currently, this is the same reference case which is being used for ETSA analysis and is based on EGI's 2020 10-year forecast)
 - Updated growth rates for these rate classes/segments: account (customer) and consumption forecasts by rate class and segment
 - Direction on how to extend growth rates out to 2038 (the final year in the forecast period): e.g., take annual growth rate for each rate class from 2022-2032, and extend the trend of annual changes in year-over-year growth out to 2038

Exhibit 1: Rate classes by Sector in IRPA Model

Residential	Commercial	Industrial
• E1	• 1	• 1
• U1	• 10	• 10
• 10	• 100	• 100
• 110	• 110	• 110
• 6	• 115	• 115
• M1	• 135	• 135
• M2	• 145	• 145
• M4	• 170	• 170
	• 6	• 6
	• 9	• M1
	• M1	• M10
	• M2	• M2
	• M4	• M4
	• M5A	• M5
	• M7	• M5A
	• R20	• M7
	• T1	• M9
	• T2	• R10
		• R100
		• R20
		• R25
		• T1
		• T2





Exhibit 2: Segments by Sector in the IRPA Model

Residential	Commercial	Industrial
<ul style="list-style-type: none"> • Detached House • Attached or Row House • Multi-Res_High Rise • Multi-Res_Low Rise • Low Income_SF • Low Income_MF • Large House • Other Residential 	<ul style="list-style-type: none"> • Data Centre • Food Retail • Hospital • Large Hotel • Large Non-Food Retail • Large Office • Long Term Care • Other Commercial • Other Hotel_Motel • Other Non-Food Retail • Other Office • Restaurant • School • University_College • Warehouse • Street Lighting 	<ul style="list-style-type: none"> • Agriculture • Chemicals Mfg • Fabricated Metals Mfg • Food and Beverage Mfg • Mining; Quarrying and Oil & Gas Extraction • Non-metallic Minerals Product Mfg • Other Industrial • Petroleum Mfg • Plastic and Rubber Mfg • Primary Metals Mfg • Pulp; Paper; and Wood Products Mfg • Transportation • Transportation and Machinery Mfg • Utility • Water & Wastewater Treatment • Hydrogen Production



ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe ("PP")

INTERROGATORY

Reference:

"The total gross cost of the approximately 6,900 m³/hr of potential reduction that could be obtained by winter 2029/2030 would be approximately \$50 million". [Posterity Report C/1/1, Attachment 2, Page 1]

Question:

Please provide a similar model reduction estimate for the following DSM cost ranges.

- \$100 million
- \$200 million
- \$300 million

Response

Please see the response at Exhibit I.ED.7, part g).

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe (“PP”)

INTERROGATORY

Question:

Enbridge is currently coordinating its rebasing application for 2024. Please explain how this project relates (if at all) with rebasing.

Response

Please see the responses at Exhibit I.STAFF.14 and Exhibit I.OGVG.1.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe (“PP”)

INTERROGATORY

Question:

Please confirm that the Environmental Report only assessed the proposed pipeline option selected by Enbridge and did not compare the other alternatives identified in the Leave to Construct application. If that is incorrect, please provide the references to where all project alternatives were compared from an Environmental and Socio-economic perspective.

Response

Confirmed.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe (“PP”)

INTERROGATORY

Question:

Has Enbridge received the final review and approval letter from TSSA? If not, please indicate when it is expected.

Response

Yes, the TSSA completed their review of the design for the Project and provided its final review letter on July 26, 2022. Please also see the response to Exhibit I.STAFF.16.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe (“PP”)

INTERROGATORY

Question:

Please provide an updated project schedule including major milestones including permits and approvals.

Response

Please see Figure 1 below for an updated Project schedule.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group (“TFG”)

INTERROGATORY

References:

Exhibit A, Tab 2, Schedule 2, p. 1

Preamble:

EGI requests leave to construct (i) approximately 19 km of NPS 36 natural gas existing Enbridge Gas Dover Transmission Station in the Municipality of Chatham-Kent to a new valve site in the Municipality of Lakeshore, (ii) approximately 12 km of NPS 16 natural gas pipeline in the Municipality of Lakeshore, the Town of Kingsville, and the Municipality of Leamington, and (iii) ancillary measurement, pressure regulation, and station facilities within the Township of Dawn Euphemia, in the Municipality of Chatham-Kent, and valve-site station facilities within the Town of Kingsville and the Municipality of Leamington (the “Project”).

EGI indicates that the Project is “designed to reliably serve increased demands for firm service in the Panhandle Market, including, in particular, incremental demands from the greenhouse, automotive, and power generation sectors” as identified in EGI’s addendum to its Asset Management Plan.¹

Question:

- a) Please provide a detailed outline of EGI’s consultation with First Nations and Indigenous Communities on the alternatives to the Project that were studied and considered.
- b) Please indicate whether EGI has or will consider equity participation of First Nations, including Chippewas of Kettle and Stony Point First Nation (“CKSPFN”) and Caldwell First Nation (“CFN”) (together, the “Three Fires First Nations”), in relation to the Project. If yes, please discuss what equity participation means to EGI and how First Nations may participate. If no, please explain why not.

¹ EB-2021-0148, EGI Asset Management Plan Addendum – 2022, Exhibit B, Tab 2, Schedule 3, p. 8.

Response

- a) Please see Exhibit C, Tab 1, Schedule 1 for Enbridge Gas's assessment of Project alternatives. The discussion of alternatives has not been the focus of Enbridge Gas's consultation with Indigenous communities to date as Enbridge Gas is not pursuing the alternatives given the determination that the assessed alternatives are not viable. Rather, discussions with First Nations and Indigenous Communities have focused upon, among other things, environmental and socio-economic impacts of the proposed Project. Nevertheless, the Company remains open to discussing concerns that any potentially affected Indigenous groups might have with respect to the Project, including alternatives.
- b) Given the nature of this Project, which is both brownfield and regulated, there will be no equity participation opportunities for Indigenous groups.

At this time, there are no clear mechanisms for revenue sharing under the current OEB regulatory framework for regulated assets such as this one. However, Enbridge Gas is meeting with and discussing the interests and priorities of Indigenous groups, including representatives of TFG, in an effort to explore opportunities to advance innovative partnerships and economic inclusion.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

- Exhibit C, Tab 1, Schedule 1, p. 5
- Exhibit F, Tab 1, Schedule 1, Attachment 1, "Environmental Report, Panhandle Regional Expansion Project" (the "Environmental Report")

Preamble:

EGL has assessed the following facility alternatives:

- (i) Upsizing of the existing NPS 16 Panhandle Line or NPS 20 Panhandle Line west of Dover Transmission;
- (ii) Looping the existing NPS 20 Panhandle Line West of Dover Transmission and installing a Leamington lateral interconnect (ie. the Project); and
- (iii) A new liquified natural gas (LNG) Plant.

EGL identified and assessed the following Integrated Resource Planning Alternatives ("IRPA"):

- (i) Firm exchange between Dawn and Gateway;
- (ii) Firm exchange between Dawn and Ojibway, in combination with looping the NPS 20 Panhandle line west of Dover Transmission and installing a Leamington lateral interconnect;
- (iii) Trucked CNG deliveries to the Panhandle system; and
- (iv) Enhanced Targeted Energy Efficiency (ETEE).

Question:

- a) Please explain why only two facility alternatives, an upsize of existing pipelines and the construction of a new LNG plant, were considered and assessed, as opposed to other non-natural gas-based options?
- b) Please indicate whether EGL has considered hybrid solutions for the Project and the expansion of the Panhandle System. If yes, please provide details and indicate why these solutions were considered with respect to financial impacts on ratepayers, and why/how they were ruled out of inclusion for further consideration. If not, please explain.

- c) Has Enbridge sought any opportunities to work with IESO or any other electricity distributors to facilitate electricity-based energy solutions as part of the IRPA for the benefit of both electricity and gas ratepayers, and if not, why was this not done?
- d) Has Enbridge assessed the need for the project in relation to any rapid expansion of electricity infrastructure in the region, and overall impacts on both electricity and gas ratepayers?
- e) Would Enbridge expect any rapid expansion of electricity infrastructure in the region to impact the need for the proposed project?
- f) How does Enbridge determine whether the alternatives it has chosen to assess represent a complete picture of the viable alternatives to the Project? What criteria are used by EGI when selecting and assessing potential project alternatives and IRP's?
- g) Please explain how Enbridge assessed alternatives to the project with respect to short-term and generational financial impacts on ratepayers
- h) Please explain how Enbridge assessed alternatives to the project, specifically as they relate to impacts on each of the Three Fires First Nations.
- i) Please explain what project alternatives, including financial impacts on ratepayers, including First Nation ratepayers, were presented to each of the Three Fires First Nations.

Response

- a) Through Enbridge Gas's assessment of facility alternatives, no additional alternatives were identified to meet customer demand. Please see Exhibit C, Tab 1, Schedule 1 for Enbridge Gas's assessment of project alternatives. Please also see the response to Exhibit I.STAFF.7 for more information on all alternatives assessed, including various facility alternatives.

Enhanced Targeted Energy Efficiency were also assessed under IRPAs (see Exhibit C, Tab 1, Schedule 1, Pages 14-24) and deemed not to be viable (please also see the response to Exhibit I.STAFF.7 Attachment 2).

- b) Yes, hybrid alternatives were considered, including the IRPA described at Exhibit C, Tab 1, Schedule 1, Pages 20-22. For more information on the assessment of alternatives, please see the response to Exhibit I.STAFF.7.
- c) No, Enbridge Gas did not identify viable electricity-based alternatives for the Project. However, Enbridge Gas did assess Enhanced Targeted Energy Efficiency ("ETEE") programming, but this alternative was deemed to be non-viable. For more information on the assessment of alternatives, please see the response at Exhibit I.STAFF.7.

The need for the proposed Project is underpinned by customer demands for natural gas specifically (as per the EOI process), which is used by natural gas-powered electricity generators as a supply input, to power their facilities, and by agricultural customers for heating and carbon dioxide (to feed plants). Electricity is typically used by agricultural customers for lighting and ventilation only.

d) No.

Customers in the Panhandle Area of Benefit were invited to share their new/incremental gas needs through the EOI process. They were also invited to share any plans to turnback or reduce current contract demands. The EOI was used to generate an informed forecast for net new expected demands in the Panhandle Market.

e) No.

As per the IESO reports (2021 APO & 2022 AAR), the rapid expansion of electricity infrastructure in the region is in response to growing demands and does not make reference to existing customers in the region converting their existing energy needs currently met by natural gas to electricity.

f) Enbridge Gas conducts an assessment to identify potential alternatives, including facility and non-facility alternatives, to provide a complete picture of options to meet customer demand. For the criteria used to assess alternatives, please refer to Exhibit C, Tab 1, Schedule 1, Pages 3-4.

g) Enbridge Gas assessed alternatives for economic feasibility (Exhibit C, Tab 1, Schedule 1, Pages 3-4). This included an assessment of Net Present Value and cost per unit of capacity created, to assess long-term impacts. For more information on the assessment of alternatives, please see the response to Exhibit I.STAFF.7.

h) Enbridge Gas assessed alternatives for environmental and socio-economic impact (Exhibit C, Tab 1, Schedule 1, Page 4), recognizing that the chosen alternative should minimize impacts to Indigenous peoples, municipalities, landowners, and the environment relative to other viable alternatives. For more information on the assessment of alternatives, please see the response to Exhibit I.STAFF.7.

i) Please see the response to Exhibit I.TFG.1 part a).

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Environmental Report, Integrated Resource Planning (IRP), PDF p. 310

Preamble:

IRP is a framework through which Enbridge Gas reviews alternative approaches to meeting energy needs, before building new infrastructure such as:

- (i) Delivering more energy without adding new pipelines using liquefied or compressed natural gas;
- (ii) Lowering energy use through effective energy efficiency programs; and
- (iii) Displacing conventional natural gas with carbon-neutral renewable natural gas and hydrogen.

Question:

- a) Has EGI considered whether the existing system could deliver more energy without adding new pipelines? If so, please explain and include reasons for why this alternative is not feasible.
- b) Has EGI considered whether energy efficiency programs could meet regional energy needs and possibly provide better financial cases for ratepayers? Please explain.
- c) Will alternative fuels like renewable natural gas and hydrogen blends be transported in the existing loop and new pipeline? If so, how has EGI considered the impacts on ratepayers for those alternative fuels?
- d) If alternative fuels will be transported, please comment on the measures taken to ensure pipeline integrity, and related integrity management costs to ratepayers. Please include short- and long-term measures.

Response

- a) Yes, alternatives that deliver more energy without incremental pipeline facilities were considered. The alternative assessment evaluation included Liquefied Natural Gas, Compressed Natural Gas and incremental third-party supplies. These alternatives

were determined to be non-viable mitigation for the forecast Panhandle System capacity shortfall (please see the response to Exhibit I.STAFF.7 Attachment 2).

- b) Yes, as noted at Exhibit C, Tab 1, Schedule 1, Pages 23-25, Enbridge Gas assessed whether energy efficiency programs could meet the regional energy needs compared to the capacity created by the proposed Project. The assessment found there is insufficient demand reduction potential from the general service customer base in the Leamington/Kingsville market area downstream of the Leamington Lateral Interconnect to eliminate or reduce the scope of the proposed Project's facility requirements to meet the identified Panhandle System need.
- c) and d)
Enbridge Gas believes that the natural gas system could be leveraged to reduce GHG emissions in Ontario by transitioning the system over time to deliver renewable natural gas ("RNG") and hydrogen. However, Enbridge Gas has no immediate plans to blend RNG or hydrogen into the Panhandle System.

RNG is composed of mostly methane, as is natural gas, and is currently injected by various producers into some of Enbridge Gas's systems. This RNG is blended within the natural gas stream. RNG is a one for one replacement of natural gas by volume and therefore would not have an impact on the proposed Project. Pipeline integrity measures for RNG are similar to those for traditional natural gas.

Enbridge Gas intends to evaluate the compatibility of its pipeline facilities with hydrogen gas in the future.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Exhibit C, Tab 1, Schedule 1, pp. 12, 24-25

Preamble:

EGI notes that the Project provides many benefits and is the best alternative for meeting the identified needs as it, among other reasons, contains the lowest environmental and socio-economic impacts relative to all viable alternatives assessed.

Question:

- a) Please discuss whether EGI evaluated the proposed project as well as project alternatives using the social cost of carbon. For reference, the social cost of carbon is the cost of the damages created by one extra ton of carbon dioxide emissions. In principle, it includes the value of all climate change impacts, including (but not limited to) changes in net agricultural productivity, human health effects, property damage from increased flood risk, natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services.²
- b) Has EGI modeled the socio-economic costs by the proposed project, and compared these costs with proposed alternatives? If not, please explain.
- c) Has EGI considered how the proposed project will impact Indigenous economies and micro-economies including guided fishing tours and hunting in the project area? If yes, please provide documents associated with this economic analysis. If no, will EGI undertake to perform and provide this analysis?
- d) Has EGI considered the economic impacts of crossing waterbeds and the potential of contamination to disrupt local economies (specifically Indigenous economies)?

² Resources for the Future, "Social Cost of Carbon 101", online at:
<https://www.rff.org/publications/explainers/social-cost-carbon-101/>

Response

- a) Enbridge Gas has not evaluated the proposed Project or alternatives using a social cost of carbon. However, carbon emissions using the cost of carbon in the Greenhouse Gas Pollution Pricing Act are considered in stage 2 of the Project economic evaluation (Exhibit E, Tab 1, Schedules 1 and 6).

Regarding scope 1 emissions (emissions from Enbridge Gas's own operations) please see the response to Exhibit I.TFG.9 part a).

- b) The socio-economic costs of the proposed project and proposed alternatives were not modeled. Please see the response to Exhibit I.PP.17.

Potential impacts on socio-economic features are outlined in Section 5.3.3 of the ER and align to the OEB's Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario (2016).

- c) The proposed Project will seek to support Indigenous economies through supply chain management inclusion and supporting the local economy. Guided fishing tour and hunting businesses did not express concerns during the two Virtual Open House processes or during any of the consultation process. Additionally, the water crossings that currently are used for, or could be used for, guided fishing tours are being Horizontal Directionally Drilled ("HDD") which is designed to reduce impact and therefore will not affect the ability to undertake guided fishing tours or hunting.

Economic impacts were assessed as part of the ER (Section 5.3.3) and net negative effects on the local economy, Indigenous economy and/or employment are not anticipated.

- d) Economic impacts were assessed as part of the ER, please see the response to part c) above. With respect to the concern regarding contamination, no contaminated sites were identified within the vicinity of the Project Study Areas ("PSAs") through review of major landfill locations, Provincial Registry ([Ministry of the Environment, Conservation and Parks] MECP Record of Site Condition ("RSC") filings) and Federal Contaminated Sites Inventory, and therefore, no significant adverse residual effects from Landfills and Contaminated Sites are anticipated. Additional mitigation measures related to contamination identified in Tables 5-3, 5-5, 5-7 and Section 7.2.2 of the ER will be implemented during the construction of the Project. These mitigation measures will be part of the Environmental Protection Plan for construction.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

- Environmental Report
- Ontario Energy Board: Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario (the "Environmental Guidelines"), Section 4.3.13 Social Impacts

Preamble:

The Environmental Guidelines provides that Social Impact Assessment ("SIA") is an integral component of environmental analysis and ensures that the extent and distribution of the Project's social impacts are considered in an explicit and systematic way.

The Environmental Guidelines further note that pipeline construction is associated with both real and perceived health and safety risks which may affect people's lives and how they feel about their homes and communities.

Question:

- a) Please discuss whether EGI has considered the social impacts of the proposed project on the Three Fires First Nations. If yes, please provide details and all related reports, presentations, or other documents specific to the Three Fires First Nations. If no, please explain why not.
- b) Please discuss whether EGI has considered the cultural heritage impacts of the proposed project on the Three Fires First Nations. If yes, please provide details and all related reports, presentations or other documents specific to each of the Three Fires First Nations. If no, please explain why not.
- c) Please discuss whether the required SIA considered the Project's impacts on systemic social inequalities, including gender, gender diverse people, race, ethnicity, religion, age, mental or physical disability. If not, please explain why these identified types of social impacts were not considered as part of the SIA.
- d) Please discuss whether EGI has considered the safety risks of the expected construction workforce on the surrounding communities and vulnerable individuals, including the Three Fires First Nations, including as it relates to

safety risks such as potential substance abuse, disproportionate impacts on women in communities, and impacts on the sex trade. If yes, please explain how EGI intends to mitigate the identified safety risks. If no, please explain why not and discuss how EGI intends to mitigate these types of safety risks of the Project in the surrounding communities.

Response

- a) Yes, Enbridge Gas considered social impacts to the Three Fires First Nations. Potential impacts to Indigenous communities, including the Three Fires First Nations, are outlined in Section 5.3.3 of the ER.
- b) Yes, Enbridge Gas considered the cultural heritage impacts of the Project. A Cultural Heritage Report was completed for the entire Project (Panhandle Loop and Leamington Interconnect) and was provided as part of the ER in Appendix F. The report concluded that there are no anticipated impacts to cultural heritage resources.
- c) Potential impacts on socio-economic features are outlined in Section 5.3.3 of the ER and align with the OEB's Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario (2016).

There would be no anticipated residual effects on systemic social inequalities due to the Project scope, anticipated existing local tradesperson workforce, and short duration of active construction timeline of approximately six months, coupled with the requirements of Enbridge Gas's Supplier Code of Conduct.

Enbridge Gas's suppliers, which includes its contractors and subcontractors, are required to follow Enbridge Inc.'s policies including the Supplier Code of Conduct, which states:

Enbridge believes that each individual with whom we come in contact deserves to be treated fairly, honestly, and with dignity. We do not condone any form of harassment, discrimination, or inappropriate actions or language of any kind.

Drug and Alcohol Programs, Respectful Workplace Training and Indigenous Peoples Awareness Training are specific to the Construction Contractor(s) that will construct the projects, which haven't been selected yet.

- d) The Panhandle Environmental Report was prepared with consideration of the Ontario Energy Board's (OEB) *Environmental Guidelines for the Location,*

Construction and Operation of Hydrocarbon Pipelines and facilities in Ontario, 7th Edition (2016) (“Guidelines”). Guidance on the consideration of Social Impacts is provided in Section 4.3.13 of the OEB Environmental Guidelines. The Guidelines discuss “both real and perceived health and safety risks” at pages 41 and 42, which in the Panhandle Environmental Report are addressed through mitigation recommendations such as safety fencing and a Traffic Management Plan.

In addition, to mitigate additional safety risks (e.g., harassment, substance abuse) within the community, Enbridge Gas’s general contractors are required to follow Enbridge policies including the Supplier Code of Conduct, as described in part c) above.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

- Environmental Report
- Environmental Guidelines, section 4.3.14 Cumulative Effects
- CKSPFN Declaration to the Waterways and Lakebeds within its Traditional Territory (see Appendix A)

Preamble:

The Environmental Guidelines state that “[i]n many situations, individual projects produce impacts that are insignificant. However, when these are combined with the impacts of other existing or approved projects, they become important.”

Further, the Environmental Guidelines state: “[p]articular attention should be paid to environments of known sensitivity and high eco-value (as defined by provincial policies and public input), to situations where opportunities exist to remedy past negative impacts, and to situations in which a combination of actions may result in identifiable environmental impacts that are different from the impacts of the actions by themselves”.

The Environmental Guidelines also indicate that, “[c]umulative impacts may result from pipeline projects which loop existing systems and should be addressed. This may include an examination of areas of known soil erosion, soil compaction or soil productivity problems. It may mean the examination of impacts associated with continued loss of hedgerows and woodlots in the same area. As well, it could mean the increased loss of enjoyment of property because of disruptions caused by the construction of successive pipelines on a landowner's property. There may also be heightened sensitivities as a result of improper or ineffective practices and mitigation measures in the past.”

Question:

- a) Please outline what steps EGI has taken to address outstanding concerns from the Three Fires First Nations about the cumulative effects of gas infrastructure and expansion across each of their respective territory as it relates to the Project.

- b) Please provide and discuss EGI's instructions to its environmental consultants for assessing cumulative effects for this Project.
- c) Please discuss whether EGI has considered all past, present, and future conditions in the cumulative effects assessment, including existing projects, the current project, and any future projects.
- d) Does EGI agree that non-provincially significant wetlands should be included in the Environmental Report methodology alongside "Provincially Significant Wetlands" and unevaluated wetlands? If not, please explain why not considering CKSPFN's water assertion and the cultural significance of wetlands other than those deemed "Provincially Significant Wetlands".

Response

- a) Enbridge Gas continues to provide the Three Fires Group with information regarding its projects that may potentially impact the Nations represented, as well as the opportunity to meet with Enbridge Gas representatives to discuss the impact of its projects on the rights and interests of the Nations represented by the Three Fires Group. During such meetings, specific concerns regarding projects and their associated cumulative effects can be discussed. In addition, the Three Fires Group and the Nations it represents have the opportunity to comment on the related Environmental Reports, including the cumulative effects assessment. Enbridge Gas considers such comments to determine whether concerns have been appropriately addressed through, for example, project design or the implementation of mitigation measures.

Enbridge Gas met with CKSPFN representatives on May 30, 2022, and the parties discussed cumulative effects within their traditional territory. CKSPFN expressed that cumulative effects would be a multi-party discussion and CKSPFN would be engaging with the provincial government in this regard. Enbridge Gas expressed support for the ongoing discussion on cumulative impacts within the traditional territory with government and industry. Enbridge Gas is committed to continuing to engage with the Three Fires Group and the Nations it represents regarding cumulative effects.

- b) Enbridge Gas instructs and relies upon its environmental consultants to conduct environmental studies of proposed projects, including assessments of cumulative effects, in consideration of the guidance outlined in the OEB's *Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario (2016)* (the "Guidelines"). The Company provides the environmental consultants with relevant supporting information as necessary/appropriate in support of the completion of any assessment of cumulative effects.

- c) The Project inclusion list for the cumulative effects assessment is provided in Section 6.3, Project Inclusion List of the Environmental Report. Infrastructure already in place are assessed as existing conditions, which is provided in Section 4, Environmental and Socio-economic Features of the Environmental Report. Where residual effects from impacts on these existing conditions remain after mitigation, they are carried forward to the cumulative effect assessment. The current Project and any known future projects within the spatial study boundary were considered in the cumulative effects assessment.

- d) Yes. Non-provincially significant wetlands were included in the ER in Section 4.3 with mitigation outlined in Section 5.3.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Exhibit F, Tab 1, Schedule 1, pp.3-4

Preamble:

EGI notes that it will comply with all mitigation measures recommended in the Environmental Report, including the development of an Environmental Protection Plan ("EPP") prior to construction" and that the EPP will incorporate recommended mitigation measures contained within the Environmental Report and those recommended by permitting agencies

Question:

- a) Will EGI's EPP consider mitigation measures recommended by Indigenous communities including the Three Fires First Nations? If yes, please provide details of how these mitigation measures will be communicated to EGI and how they will be incorporated into the EPP.

Response

- a) Yes, mitigation measures recommended by Indigenous communities will be considered and can be communicated to Enbridge Gas through ongoing consultation. Any additional mitigation measures identified and agreed upon will be included in the Environmental Protection Plan by Enbridge Gas.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Exhibit B, Tab 1, Schedule 1, p. 10

Preamble:

EGI notes that it "is aware of, has reviewed, and is working in conjunction with the municipalities within the Panhandle Market to determine whether the expansion of the Panhandle System impacts their ability to achieve the greenhouse gas emissions (GHG) reduction goals."

Question:

- a) Please indicate whether EGI has considered whether the Project and the expansion of the Panhandle System will impact the ability for Indigenous communities to achieve a reduction in GHG emissions across the treaty territory. If yes, please provide details and indicate why this was not included in the Application. If not, please explain the difference in treatment between Municipalities and Indigenous Communities.
- b) To what extent does the proposed project align with the energy plans brought forward by municipalities and counties? Please identify which municipal energy plans were considered and indicate whether this Project aligns with municipality and county energy plans. If not, please explain.
- c) How does EGI plan to incorporate best practices to support the 35% efficiency gain in emissions sought by all municipalities in the Windsor-Essex region?

Response

- a) While Enbridge Gas has not specifically considered whether the Project impacts the ability for Indigenous communities to achieve a reduction in GHG emissions across the treaty territory, Enbridge Gas would be open to learning more about Indigenous communities' plans to achieve GHG reductions in order to better understand how the Project may impact GHG emissions reduction goals.

- b) Please see the response at Exhibit I.EP.2 for the energy plans that were considered by Enbridge Gas.

The Project is supported by the City of Windsor, the County of Essex, and the Municipality of Chatham-Kent. Please see Exhibit B, Tab 1, Schedule 1, Attachment 3.

- c) Enbridge Gas will continue to deliver Demand Side Management (“DSM”) programs to all major customer groups in the region (Residential, Commercial, Industrial, Low Income) to support local energy efficiency goals.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group (“TFG”)

INTERROGATORY

References:

Enbridge Inc. “Net Zero by 2050: Pathways to reducing our emissions”³ (The “Net Zero Plan”), pp. 2 and 9-11

Preamble:

EGL notes that it “is aware of, has reviewed, and is working in conjunction with the municipalities within the Panhandle Market to determine whether the expansion of the Panhandle System impacts their ability to achieve the greenhouse gas emissions (GHG) reduction goals.”

In March 2022, EGL published the Net Zero Plan which includes targets of reducing the intensity of GHG emissions from their operations by 35% by 2030 and achieving net zero greenhouse gas (“GHG”) emissions from their business by 2050 (the “Commitments”).

Question:

- a) Please indicate and provide details of how Enbridge Inc. and EGL intend to reach the Commitments as it relates to the Project. Please comment on, and file any and all analysis EGL has performed in connection with, how the shipping and burning of methane gas across the traditional territories of the Three Fires First Nations will, or is anticipated to, affect the Commitments.
- b) Has EGL modelled the fugitive methane emissions that will be released by the proposed Project? If yes, please describe the modelling that was undertaken and provide all related results. If not, please explain.
- c) Please provide information on EGL’s leak detection, repair and reporting protocol for related infrastructure, including accounting for fugitive emissions.
- d) Canada has committed to developing a plan to reducing oil and gas methane emissions by at least 75 percent below 2012 levels by 2030, pursuant to the

³ Enbridge Inc. “Net Zero by 2050: Pathways to reducing our emission” (March 2022), available online at: https://www.enbridge.com/~/_media/Enb/Documents/About%20Us/Net_Zero_by_2050.pdf?la=en.

Global Methane Pledge (see Appendix B).⁴ Please explain EGI's understanding of and describe how the Project contributes to or detracts from Canada's commitments under the Global Methane Pledge.

- e) Please file any and all analysis EGI has performed to assess GHG emissions over the lifespan of the Project. If EGI has not undertaken any such analysis, please explain why no such analysis has been undertaken, in light of the Commitments.

Response

- a) Enbridge Gas's assessment of the Project included calculating its incremental GHG emissions and demonstrating a plan to mitigate these emissions to support its commitment of achieving its 2030 emissions intensity reduction target and its 2050 net zero target.

The incremental GHG emissions associated with the proposed Project are 5,000 tCO₂e annual emissions, primarily from incremental compressor fuel use. The incremental emissions due to this Project represent less than 1% of current emissions.

The Project's scope 1 mitigation costs are currently based on the cost of purchasing carbon offsets. However, an assessment will be completed to determine the most appropriate emission reduction option.

- b) Yes, Enbridge Gas has estimated the fugitive emissions for the project. Calculations were undertaken following the methodologies prescribed by provincial and federal GHG reporting programs, including the use of emission factors and engineering estimates, as well as company-specific emission factors based on direct measurement of fugitive emissions.

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

- c) Enbridge Gas currently manages its fugitive emissions, in accordance with industry accepted best management practices (CSA Z620.1) and government regulations including the *Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds (Upstream Oil and Gas Sector)*, to reduce

⁴ Government of Canada, News Release, "Canada confirms its support for the Global Methane Pledge and announces ambitious domestic actions to slash methane emissions" (October 11, 2021), available online at: <https://www.canada.ca/en/environment-climate-change/news/2021/10/canada-confirms-its-support-for-the-global-methane-pledge-and-announces-ambitious-domestic-actions-to-slash-methaneemissions.html>

emissions from its operations. In July 2020, Enbridge Gas implemented a harmonized leak operating standard, which includes:

- (i) increased traceability and tracking of leak repairs,
- (ii) increased monitoring frequencies,
- (iii) harmonized repair timelines for above ground leaks, and
- (iv) initiation of a station leak survey program.

Pipelines are inspected annually by way of a foot patrol, during which a leak survey is conducted. A flame ionization gas detector is utilized during the foot patrol in order to detect leaks, if present. The results of these surveys are tracked and applied to the appropriate fugitive emission calculations within Enbridge Gas's federal and provincial emissions regulatory reporting.

- d) The Global Methane Pledge aims to reduce methane emissions by 30 percent below 2020 levels by 2030. Canada has committed to developing a plan to reduce methane emissions from oil and gas by at least 75 percent below 2012 levels by 2030.

As indicated in part a) above, the proposed project would result in an increase in emissions of up to 5,000 tCO₂e/year over current emissions levels (methane accounting for approximately 350 tCO₂e/year). In support of Canada's commitments, Enbridge Gas will continue to comply with the Federal Methane Regulation, which was implemented in order to support Canada's methane reduction targets.

- e) As discussed in response at a), Enbridge Gas has assessed emissions associated with the Project (operational only) and has determined that construction of the Project will result in an overall increase of up to 5,000 tCO₂e/year compared to baseline emissions (please see Table 1 for further breakdown of this increase).

Table 1

Emissions Source	Emissions (tCO₂e)
Stationary Combustion	4760
Fugitives	140
Vented	100
TOTAL	5,000

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Environmental Report, Section 3.6.1, p. 19

Preamble:

The Environmental Report notes that four additional comments were received from the public via the interactive mapping tool noting concerns over a species sighting (Western Chorus Frog [*Pseudacris triseriata*]) near the Leamington Interconnect.

Question:

- a) Is EGI aware that the habitat of the Western Chorus Frog is protected in Ontario by the Provincial Policy Statement (PPS) under the Planning Act?
- b) Please comment on the habitat surveys (conducted to date) on the Western Chorus Frog?
- c) Will future surveys (conducted by Enbridge and/or third-party contractor(s)) attempt to identify Western Chorus Frog and its associated habitat?
- d) Please comment on the measures taken (throughout the project's lifecycle) to ensure the protection of the Western Chorus Frog and its associated habitat

Response

- a) Yes, as stated in Section 4.3.3.1 of the Environmental Report the Western Chorus frog is listed provincially and federally as a species at risk for the Great Lakes/ St. Lawrence population. The Carolinian population, however, is not considered at risk, nor is it considered rare in Ontario with an S-rank of S4. However, Enbridge Gas recognizes that the species may be afforded protection under the PPS under significant wildlife habitat in terms of significant amphibian breeding habitat.
- b) and c)
Ecological land classification and significant wildlife habitat screening were conducted to identify candidate habitat for amphibian breeding. Targeted surveys specific to the Western Chorus Frog were not completed as all suitable habitat was

considered potentially significant amphibian breeding habitat. Consequently, mitigation measures were developed to protect potential amphibian habitat and have been included in the ER in Section 5.3.2 for application during construction.

- d) The mitigation measures proposed in Table 5-9 of the ER will be employed to avoid impacts to candidate amphibian breeding habitat. Some of these mitigation measures include installing and maintaining sediment and erosion controls, such as silt fence barriers, obeying site speed limits etc.

It is possible that further integrity maintenance activities may be required in the future which have the potential to impact amphibian habitat. In those instances, Enbridge Gas may need to undertake further ground disturbance. Such maintenance activities will go through a separate environmental review and permitting process, if required, outside of the scope of the Project ER.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Environmental Report, Section 4.2.3, p. 23

Preamble:

The Environmental Report notes that a segment north of Jeannettes Creek, approximately 5km in length, and the north end of the Panhandle Route lies within a Significant Groundwater Recharge Area and a Highly Vulnerable Aquifer.

Question:

- a) Please indicate and provide details of how EGI intends to protect the segment north of Jeannette's Creek (i.e., Significant Groundwater Recharge Area and Highly Vulnerable Aquifer), and the associated costs for this protection. Please comment on, and file any and all analysis EGI has performed in connection with, how the construction and operation of the pipeline will, or is anticipated to, affect the above-mentioned segment.
- b) Please explain how the integrity of the Significant Groundwater Recharge Area and Highly Vulnerable Aquifer will be protected and provide an assessment of associated costs.
- c) Please include relevant mitigation measures that will be taken (throughout the project's lifecycle) to ensure the longevity of the aquifer and its recharge zones and provide an assessment of associated costs.
- d) Please provide Three Fires with the permits EGI has obtained to construct nearby a Significant Groundwater Recharge Area and a Highly Vulnerable Aquifer. If these permits have not yet been obtained, please outline EGI's application timeline.

Response

a) - c)

Enbridge Gas has received confirmation from the Conservation and Source Protection Branch (CSPB) of MECP stating that

[n]atural gas pipelines are not identified as a threat to drinking water sources under the Clean Water Act, 2006. However, certain activities related to the construction of pipelines may pose a risk to sources of drinking water.

Consequently, potential effects and mitigation measures to groundwater resources are summarized in ER Table 5-1. Through the implementation of mitigation measures, including the presence of a full-time environmental inspector, no significant adverse residual effects on groundwater are anticipated. This includes the Significant Groundwater Recharge Area and Highly Vulnerable Aquifer identified in ER Section 4.2.3.

There are no additional costs required to mitigate impacts to groundwater resources. Enbridge Gas has required contractors to include the costs of implementing all relevant mitigation measures in their construction estimates. To ensure the contractor adheres to the ER and EPP mitigation measures, Enbridge Gas will employ a full-time environmental inspector to monitor construction.

- d) No specific permit is required for work near a Significant Groundwater Recharge Area and a Highly Vulnerable Aquifer. However, the project will be applying for either a Permit to Take Water or will be registered on the Environmental Activity and Sector Registry related to construction dewatering and discharge. The permit application is anticipated for late October 2022. Further, Enbridge Gas will obtain permits from the Lower Thames Conservation Authority for work within the area related to floodplain and shoreline protection.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Environmental Report, Section 4.3.1.1, p. 25

Preamble:

The Environmental Report notes that there are twenty-nine watercourses that are crossed by the Panhandle Loop based on a desktop review of relevant aerial imagery and watercourse mapping. They include 11 named drains, 15 unnamed drains, Jeannettes Creek, Baptiste Creek, and the Thames River. Ultimately, these watercourses drain to the Thames River or Lake St. Clair.

Question:

- a) Please outline in table format, crossing methods for each of the twenty-nine watercourses impacted by the proposed project, and provide the associated costs for accommodating the crossing methods.
- b) Please outline in table format, how direct impacts to each of the twenty-nine watercourses will be mitigated, and the associated costs of this mitigation.
- c) Please explain whether EGI will seek consent of CKSPFN to cross each of the twenty-nine watercourses, in light of the CKSPFN Declaration to the Waterways and Lakebeds within its Traditional Territory (Appendix A).

Response

- a) Since the completion of the ER, detailed field surveys have confirmed the need for 42 watercourse crossings for the Panhandle Loop. A table outlining the watercourse crossings as well as the proposed crossing method can be found at Attachment 1 to this response.

Watercourses on the Panhandle Project vary significantly, from small streams to rivers, which, in order to meet environmental and municipal compliances, can vary

significantly in costs. Enbridge Gas does not have an estimate of costs per crossing at this time.

- b) Please refer to ER Section 5.3.2.1 for mitigation measures related to watercourses. Furthermore, Enbridge Gas has provided the Three Fires Group with the generic sediment and control plans for watercourse crossings (e.g., horizontal direction drill, dam and pump and temporary vehicle crossings). Mitigation costs are included within crossing costs. Refer to part a) above.
- c) Enbridge Gas appreciates that CKFPSN has a declaration and asserts authority to the Waterways and Lakebeds within its Traditional Territory. Enbridge Gas also understand that CKSFPN may be in conversations with various levels of government on this matter. Enbridge Gas currently understands that formal consent of the CKFPSN is not legally required. Nevertheless, a goal of Enbridge Gas's engagement is to aim to secure consent and avoid or mitigate any potential impacts the Project may have on CKSPFN's rights, including its asserted rights to the Waterways and Lakebeds within its Traditional Territory.

Watercourse Name	Watercourse Crossing ID	Proposed Pipeline Crossing Method
Boucher Drain	SC1A	Dam & Pump
Unnamed Trib to Boucher Drain 001 (1)	SC1	Dam & Pump
Thilbert Drain (2)	SC2	Dam & Pump
Tremblay Creek Drain (2) / Tilbury Creek (3)	SC3	Dam & Pump
Unnamed Non-Flowing Waterbody 001 (1)	SC4	Dam & Pump
Unnamed Trib to Malott Diversion Drain 001 (1)	SC5	Trenchless
Unnamed Trib to Malott Diversion Drain 002 (1)	SC6	Trenchless
Unnamed Non-Flowing Waterbody 002 (1)	SC7	Dam & Pump
Unnamed Non-Flowing Waterbody 003 (1)	SC8	Dam & Pump
Thompson-Paulus Drain (4)	SC9	Dam & Pump
King and Whittle Drain (2)(4)	SC10	Dam & Pump
Gagnier Drain (2)(4)	SC11	Dam & Pump
Powell Drain (2)(4)	SC12	Dam & Pump
Unnamed Trib to King and Whittle Drain 001 (1)	SC13	Dam & Pump
Ivison Drain (2)(4)	SC14	Dam & Pump
King and Whittle Drain (2)(4)	SC15	Access Only
Anesser Drain (2)(4)	SC16	Trenchless
Unnamed Trib to King and Whittle Drain 002 (1)	SC17	Access Only
King and Whittle Drain (2)(4)	SC18	Access Only
Baptiste Creek (2)(4)	SC19	Trenchless
Unnamed Trib to Johnston Drain 001 (1)	SC20	Trenchless
Unnamed Trib to Johnston Drain 002 (1)	SC21	Trenchless
Unnamed Trib to Johnston Drain 003 (1)	SC22	Trenchless
Olds Drain (2)(4)	SC23	Dam & Pump
Unnamed Trib to Olds Drain 001 (1)	SC24	Dam & Pump
Forbes Internal Drain (4)	SC25	Dam & Pump
Unnamed Non-Flowing Waterbody 004 (1)	SC26	Trenchless
Jeannettes Creek (2)(4)	SC27	Trenchless
Peltier Drain (4)	SC28	Dam & Pump
Thames River (2)(4)	SC29	Trenchless
Unnamed Trib to Thames River 001 (1)	SC30	Trenchless
Unnamed Non-Flowing Waterbody 005 (1)	SC31	Dam & Pump
Myers Pump Works Drain (2)(4)	SC32	Dam & Pump
Myers Pump Works Drain (2)(4)	SC33	Dam & Pump
Unnamed Trib to Myers Pump Works Drain 001 (1)	SC34	Dam & Pump
Unnamed Trib to Myers Pump Works Drain 002 (1)	SC35	Dam & Pump
Unnamed Trib to Myers Pump Works Drain 003 (1)	SC36	Dam & Pump
Unnamed Trib to Myers Pump Works Drain 004 (1)	SC37	Dam & Pump
Unnamed Trib to Myers Pump Works Drain 005 (1)	SC38	Dam & Pump
Unnamed Trib to Myers Pump Works Drain 006 (1)	SC39	Dam & Pump
Unnamed Trib to Jack's Creek Drain (1) / McFarlane Relief Drain (5)	SC40	Trenchless
McFarlane Relief Drain (4) / Unnamed Trib to McFarlane Relief Drain (5)	SC41	Trenchless

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Environmental Report, Section 4.3.1.3, pp. 26-30

Preamble:

The Environmental Report notes that Jack's Creek Drain 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. The drain was categorized in 2019 as containing Lake Chubsucker (*Erimyzon sucetta* – Endangered (END) under SARA, Threatened (THR) under Endangered Species Act (ESA)) and the recently downlisted Special Concern Mapleleaf mussel (*Quadrula quadrula* – Special Concern (SC) under SARA and ESA). The drain flows North-West for 2.5 km from the crossing before it meets another drain, merges, and then flows into Lake St. Clair. The following fish community is known as Jacks Creek from the LIO dataset (MNDMNR, 2022). Jacks Creek provides habitat to an assemblage of 28 warmwater and coolwater fish species (Table 4-2) several species of mussels and is characterized overall as having a warmwater thermal regime.

Question:

- a) Please file any and all analysis EGI has performed to assess SAR fish and mussel species within Jack's Creek Drain over the lifespan of the Project. If EGI has not undertaken any such analysis, please explain why no such analysis has been undertaken.
- b) Please provide information on EGI's protection plan for related sensitive and SAR fish and mussel species within Jack's Creek Drain, and the associated costs of this plan. If EGI has not developed a protection plan, please explain why no such plan has been developed, in light of the sensitive ecosystem.
- c) Please provide TFG with all records, protection plans, and associated costs for sensitive or SAR fish and mussel species within the following:
 - i. Jack's Creek Drain (PSC28);
 - ii. Unnamed Agricultural Drains (PSC25, PSC24, PSC23) and Myers Pump Works Drain (PSC21);
 - iii. Thames River (PSC19);

- iv. Jeanette's Creek (PSC14);
- v. Unnamed Agricultural Drain and Olds Drain (PSC13, PSC12);
- vi. Baptiste Creek (PSC11); and
- vii. Leamington Interconnect – Aquatic SAR.

Response

- a) Ecological field surveys have been completed in 2022 to enhance the understanding of watercourse crossings and their potential for fish and mussel SAR and SAR habitat. Enbridge Gas has completed a Natural Heritage Background Review and Field Investigations Technical Memorandum and provided a copy to Three Fires Group on September 7, 2022 which outlined the surveys completed and the findings. The Technical Memorandum can be found at Attachment 1 to this response.
- b) Enbridge Gas intends to use trenchless crossing methods and will implement best management practices which will avoid impacts to any SAR species within the Jack's Creek Drain. In addition, a full-time Environmental Inspector will be present on-site to monitor for any inadvertent fluid releases or erosion and sediment control issues in relation to the drain. Any additional mitigation may be identified and included in the Environmental Protection Plan through continued consultation with the Ministry of Environment Conservation and Parks and the Department Fisheries and Oceans.
- c) Details on the surveys completed at the identified crossings can be found in the Natural Heritage Background Review and Field Investigations Technical Memorandum which has been completed and was provided to the Three Fires Group on September 7, 2022 and can be found at Attachment 1 to this response. A request for review has been submitted to the Department of Fisheries and Oceans (DFO) and any authorization or mitigation requirements identified by the DFO will be incorporated into the Environmental Protection Plan. Currently, Enbridge Gas is not aware of any additional costs required to mitigate impacts to SAR fish and mussel species within noted watercourses.



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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-especies/sara-lep/map-carte/index-eng.html	February 2, 2022
Ministry of Natural Resources and Forestry (MNR) Fish Online	https://www.livestockapplications.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 Jeannettes 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 (km²) 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 (MNR, 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 (*Erismyzon 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.



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	<i>Ameiurus melas</i>	-	-	warmwater	-	-	X	-	-	-	-	-	-	-	X
Black Crappie	<i>Pomoxis nigromaculatus</i>	-	-	coolwater	-	X	-	-	-	-	-	-	-	-	X
Black Redhorse	<i>Moxostoma duquesnei</i>	THR	THR	warmwater	-	-	-	X	-	-	-	-	-	-	-
Blackchin Shiner	<i>Notropis heterodon</i>	NAR	NAR	coolwater	-	-	-	X	-	-	-	-	-	-	-
Blackside Darter	<i>Percina maculata</i>	-	-	coolwater	-	-	X	X	-	-	-	-	-	-	-
Bluegill	<i>Lepomis macrochirus</i>	-	-	warmwater	-	X	-	X	-	-	-	-	-	-	X
Bluntnose Minnow	<i>Pimephales notatus</i>	NAR	NAR	warmwater	-	-	X	X	-	-	-	-	-	-	-
Bowfin	<i>Amia calva</i>	-	-	warmwater	-	-	-	-	-	-	-	-	-	-	X
Brook Silverside	<i>Labidesthes sicculus</i>	NAR	NAR	warmwater	-	-	-	-	-	-	-	-	-	-	X
Brook Stickleback	<i>Culaea inconstans</i>	-	-	coolwater	-	-	-	X	-	-	-	-	-	-	-
Brown Bullhead	<i>Ameiurus nebulosus</i>	-	-	warmwater	-	-	-	-	-	-	-	-	-	-	X
Central Mudminnow	<i>Umbra limi</i>	-	-	coolwater	-	-	-	X	-	-	-	-	-	-	-
Central Stoneroller	<i>Campostoma anomalum</i>	NAR	NAR	coolwater	-	-	-	X	-	-	-	-	-	-	-
Channel Catfish	<i>Ictalurus punctatus</i>	-	-	warmwater	-	-	-	X	-	-	-	-	-	-	X
Common Carp	<i>Cyprinus carpio</i>	-	-	warmwater	-	-	X	X	-	-	-	-	-	-	X
Common Shiner	<i>Luxilus cornutus</i>	-	-	coolwater	-	-	-	X	-	-	-	-	-	-	-
Creek Chub	<i>Semotilus atromaculatus</i>	-	-	coolwater	-	-	X	X	-	-	-	-	-	-	-
Eastern Sand Darter	<i>Ammocrypta pellucida</i>	THR	THR	-	-	-	-	X	-	-	-	-	-	-	-
Emerald Shiner	<i>Notropis atherinoides</i>	-	-	coolwater	-	-	-	X	-	-	-	-	-	-	X
Fallfish	<i>Semotilus corporalis</i>	-	-	coolwater	-	-	-	X	-	-	-	-	-	-	-



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	<i>Etheostoma flabellare</i>	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Freshwater Drum	<i>Aplodinotus grunniens</i>	-	-	warmwater	-	-	-	x	-	-	-	-	-	-	x
Gizzard Shad	<i>Dorosoma cepedianum</i>	-	-	coolwater	-	x	x	x	-	-	-	-	-	-	x
Goldfish	<i>Carassius auratus</i>	-	-	warmwater	x	-	-	-	-	-	-	-	-	-	-
Golden Redhorse	<i>Moxostoma erythrurum</i>	NAR	NAR	warmwater	-	-	-	x	-	-	-	-	-	-	-
Gravel Chub	<i>Erimystax x-punctatus</i>	EXP	EXP	-	-	-	-	x	-	-	-	-	-	-	-
Green Sunfish	<i>Lepomis cyanellus</i>	NAR	NAR	warmwater	-	-	x	x	-	-	-	-	-	-	x
Greenside Darter	<i>Etheostoma blennioides</i>	NAR	NAR	warmwater	-	-	-	x	-	-	-	-	-	-	-
Hornyhead Chub	<i>Nocomis biguttatus</i>	NAR	NAR	coolwater	-	-	-	x	-	-	-	-	-	-	-
Iowa Darter	<i>Etheostoma exile</i>	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Johnny Darter	<i>Etheostoma nigrum</i>	-	-	coolwater	-	-	x	x	-	-	-	-	-	-	-
Lake Sturgeon	<i>Acipenser fulvescens</i>	END	END	coldwater	-	-	x	x	-	-	-	-	-	-	-
Lake Chubsucker	<i>Erimyzon sucetta</i>	END	THR	warmwater	-	-	-	x	x	x	-	x	x	x	x
Lake Whitefish	<i>Coregonus clupeaformis</i>	DD	-	coldwater	-	-	-	-	-	-	-	-	-	-	x
Largemouth Bass	<i>Micropterus salmoides</i>	-	-	warmwater	-	x	x	x	-	-	-	-	-	-	x
Logperch	<i>Percina caprodes</i>	-	-	warmwater	-	-	-	x	-	-	-	-	-	-	x
Longnose Dace	<i>Rhinichthys cataractae</i>	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Longnose Gar	<i>Lepisosteus osseus</i>	-	-	warmwater	-	-	-	-	-	-	-	-	-	-	x
Mimic Shiner	<i>Notropis volucellus</i>	-	-	warmwater	-	x	-	x	-	-	-	-	-	-	-
Mooneye	<i>Hiodon tergisus</i>	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Mottled Sculpin	<i>Cottus bairdii</i>	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Muskellunge (muskie)	<i>Esox masquinongy</i>	-	-	warmwater	-	-	-	x	-	-	-	-	-	-	-



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	<i>Hypentelium nigricans</i>	-	-	warmwater	-	-	-	x	-	-	-	-	-	-	-
Northern Madtom	<i>Noturus stigmosus</i>	END	END	-	-	-	-	x	-	-	-	-	-	-	-
Northern Pike	<i>Esox lucius</i>	-	-	coolwater	-	-	x	-	-	-	-	-	-	-	x
Northern Sunfish	<i>Lepomis peltastes</i>	SC	SC	-	-	-	-	x	-	-	-	-	-	-	-
Pugnose Minnow	<i>Opsopoeodus emiliae</i>	THR	THR	-	-	-	-	x	-	-	-	-	-	-	-
Pumpkinseed	<i>Lepomis gibbosus</i>	-	-	warmwater	-	x	x	x	-	-	-	-	-	-	x
Quillback	<i>Carpiodes cyprinus</i>	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	x
Rainbow Darter	<i>Etheostoma caeruleum</i>	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Redfin Shiner	<i>Lythrurus umbratilis</i>	NAR	NAR	-	-	-	x	-	-	-	-	-	-	-	-
River Chub	<i>Nocomis micropogon</i>	NAR	NAR	coolwater	-	-	-	x	-	-	-	-	-	-	-
River Redhorse	<i>Moxostoma carinatum</i>	SC	SC	-	-	-	-	x	-	-	-	-	-	-	-
Rock Bass	<i>Ambloplites rupestris</i>	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	x
Rosyface Shiner	<i>Notropis rubellus</i>	NAR	NAR	warmwater	-	-	-	x	-	-	-	-	-	-	-
Sand Shiner	<i>Notropis stramineus</i>	-	-	warmwater	-	-	-	-	-	-	-	-	-	-	x
Shorthead Redhorse	<i>Moxostoma macrolepidotum</i>	-	-	warmwater	-	-	-	x	-	-	-	-	-	-	-
Silver Lamprey	<i>Ichthyomyzon unicuspis</i>	SC	SC	-	-	-	x	x	-	-	-	-	-	-	-
Silver Redhorse	<i>Moxostoma anisurum</i>	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Smallmouth Bass	<i>Micropterus dolomieu</i>	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Silver Chub	<i>Macrhybopsis storeriana</i>	END	THR	-	-	-	-	x	-	-	-	-	-	-	-
Silver Shiner	<i>Notropis photogenis</i>	THR	THR	-	-	-	-	x	-	-	-	-	-	-	-
Spotfin Shiner	<i>Cyprinella spiloptera</i>	-	-	warmwater	-	-	x	x	-	-	-	-	-	-	-
Spottail Shiner	<i>Notropis hudsonius</i>	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	x



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	<i>Minytrema melanops</i>	SC	SC	-	-	x	x	x	-	-	-	-	-	-	-
Stonecat	<i>Noturus flavus</i>	-	-	warmwater	-	-	-	x	-	-	-	-	-	-	-
Walleye	<i>Stizostedion vitreum</i>	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	x
White Bass	<i>Morone chrysops</i>	-	-	warmwater	-	x	-	x	-	-	-	-	-	-	x
White Crappie	<i>Pomoxis annularis</i>	-	-	warmwater	-	x	-	x	-	-	-	-	-	-	x
White Perch	<i>Morone americana</i>	-	-	warmwater	-	-	-	x	-	-	-	-	-	-	x
White Sucker	<i>Catostomus commersonii</i>	-	-	coolwater	-	-	x	x	-	-	-	-	-	-	x
Yellow Bullhead	<i>Ameiurus natalis</i>	-	-	warmwater	-	-	x	x	-	-	-	-	-	-	-
Yellow Perch	<i>Perca flavescens</i>	-	-	coolwater	-	-	-	x	-	-	-	-	-	-	-
Fawnsfoot	<i>Truncilla donaciformis</i>	END	END	N/A	-	-	-	x	-	-	-	-	-	-	-
Hickorynut	<i>Obovaria olivaria</i>	END	END	N/A	-	-	-	x	-	-	-	-	-	-	-
Lilliput	<i>Toxolasma parvum</i>	END	THR	N/A	x	x	-	-	-	-	-	-	-	-	-
Mapleleaf	<i>Quadrula quadrula</i>	SC	SC	N/A	-	-	-	x	-	x	x	-	-	-	x
Round Hickornut	<i>Obovaria subrotunda</i>	END	END	N/A	-	-	-	x	-	-	-	-	-	-	-
Threehorn Wartyback	<i>Obliquaria reflexa</i>	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	<i>Pseudacris maculata</i>	Amphibian	S4	THR ⁶	-	L, P	ORAA
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Bird	S4	NAR	SC	P	NHIC
Black Tern	<i>Chlidonia niger</i>	Bird	S3B, S4M	NAR	SC	P	OBBA, NHIC
Common Nighthawk	<i>Chordeiles minor</i>	Bird	S4B	THR	SC	L	OBBA
Dickcissel	<i>Spiza americana</i>	Bird	S2M	N/A	N/A	L	OBBA
Eastern Wood-pewee	<i>Contopus virens</i>	Bird	S4B	SC	SC	L, P	OBBA
Purple Martin	<i>Progne subis</i>	Bird	S3B	N/A	N/A	L, P	OBBA
Short-eared Owl	<i>Asio flammeus</i>	Bird	S4?B, S2S3N	SC	SC	P	NHIC
Wood Thrush	<i>Hylocichla mustelina</i>	Bird	S4B	THR	SC	L, P	OBBA
American Lotus	<i>Nelumbo lutea</i>	Insect	S2S3	N/A	N/A	P	NHIC
Duke's Skipper	<i>Euphyes dukesi</i>	Insect	S2	N/A	N/A	L, P	OBA
Monarch	<i>Danaus plexippus</i>	Insect	S2N, S4B	SC	SC	L, P	OBA
Short-winged Green Grasshopper	<i>Dichromopha viridis</i>	Insect	S2	-	-	P	NHIC
Midland Painted Turtle	<i>Chrysemys picta marginata</i>	Reptile	S4	SC	N/A	L, P	NHIC, ORAA
Northern Map Turtle	<i>Graptemys geographica</i>	Reptile	S3	SC	SC	P	NHIC, ORAA
Snapping Turtle	<i>Chelydra serpentina</i>	Reptile	S3	SC	SC	P	NHIC, ORAA
Climbing Prairie Rose	<i>Rosa setigera</i>	Vascular Plant	S2S3	SC	SC	L	NHIC
Crowned Beggarticks	<i>Bidens trichosperma</i>	Vascular Plant	S2	-	-	P	NHIC
Cup Plant	<i>Silphium perfoliatum</i>	Vascular Plant	S2	-	-	P	NHIC
Field Thistle	<i>Cirsium arvense</i>	Vascular Plant	S3	-	-	P	NHIC
Giant Ironweed	<i>Vernonia gigantea</i>	Vascular Plant	S1?	-	-	P	NHIC
Grey-headed Prairie Coneflower	<i>Ratibida pinnata</i>	Vascular Plant	S3	-	-	P	NHIC
Mead's Sedge	<i>Carex meadii</i>	Vascular Plant	S2	-	-	P	NHIC
Shellback Hickory	<i>Carya laciniosa</i>	Vascular Plant	S3	-	-	L	NHIC
Swamp Rose-mallow	<i>Hibiscus moscheutos</i>	Vascular Plant	S3	SC	SC	P	NHIC
Walter's Barnyard Grass	<i>Echinochloa walteri</i>	Vascular Plant	S3	-	-	P	NHIC
Wingstem	<i>Verbesina alternifolia</i>	Vascular Plant	S3	-	-	P	NHIC

Notes: ¹S-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).

- ²COSEWIC 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.
- ³ESA 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.
- ⁴Study Area: L: Leamington Interconnect
 P: Panhandle Loop
- ⁵ Data Source: NHIC: Record obtained from MNR'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	<i>Riparia riparia</i>	Bird	S4B	THR	THR	P, L	OBBA
Barn Owl	<i>Tyto alba</i>	Bird	S1	END	END	P	OBBA
Barn Swallow	<i>Hirundo rustica</i>	Bird	S4B	THR	THR	P, L	NHIC, OBBA
Bobolink	<i>Dolichonyx oryzivorus</i>	Bird	S4B	THR	THR	P, L	NHIC, OBBA
Chimney Swift	<i>Chaetura pelagica</i>	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	<i>Sturnella magna</i>	Bird	S4B, S3N	THR	THR	P, L	NHIC, OBBA
Henslow's Sparrow	<i>Centronyx henslowii</i>	Bird	S1B	END	END	P	NHIC
King Rail	<i>Rallus elegans</i>	Bird	S1B	END	END	P	NHIC, OBBA
Least Bittern	<i>Ixobrychus exilis</i>	Bird	S4B	THR	THR	P	NHIC, OBBA
Prothonotary Warbler	<i>Protonotaria citrea</i>	Bird	S1B	END	END	P	NHIC, OBBA
Eastern Small-footed Myotis	<i>Myotis leibii</i>	Mammal	S2S3	N/A	END	P, L	BCI
Little Brown Myotis	<i>Myotis lucifugus</i>	Mammal	S3	END	END	P, L	BCI
Northern Myotis	<i>Myotis septentrionalis</i>	Mammal	S3	END	END	P, L	BCI, MECP
Tri-colored Bat	<i>Perimyotis subflavus</i>	Mammal	S3?	END	END	P, L	BCI
Dense Blazing Star	<i>Liatrix spicata</i>	Plant	S2	THR	THR	P, L	NHIC
Blanding's Turtle (Great Lakes / St. Lawrence population)	<i>Emydidea blandingii</i>	Reptile	S3	END	THR	P	NHIC, ORAA
Common Five-lined Skink (Five-lined Skink; Carolinian population)	<i>Plestiodon fasciatus</i>	Reptile	S2	END	END	P	NHIC, ORAA
Eastern Foxsnake (Carolinian population)	<i>Pantherophis gloydi</i>	Reptile	S2	END	END	P, L	ORAA
Massasauga (Carolinian Population)	<i>Sistrurus catenatus</i>	Reptile	S1	END	END	P	ORAA
Queensnake	<i>Regina septemvittata</i>	Reptile	S2	END	END	P	ORAA
Spiny Softshell	<i>Apalone spinifera</i>	Reptile	S2	END	END	P	NHIC
Timber Rattlesnake	<i>Crotalus horridus</i>	Reptile	SX	EXP	EXP	P	NHIC

¹S-rank: As noted in the footnote to Table 2-4

²SARA Status: As noted in the footnote in Table 2-4

³ESA Status: As noted in the footnote in Table 2-4

⁴Study Area: L: Leamington Interconnect
P: Panhandle Loop

⁵Data 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 investigations 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* (MNR, 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* (MNR, 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* (MNRFP, 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* (MNRFP, 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 (<i>Truncilla donaciformis</i> , 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 (*Liatrix 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 Foxsnake 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.

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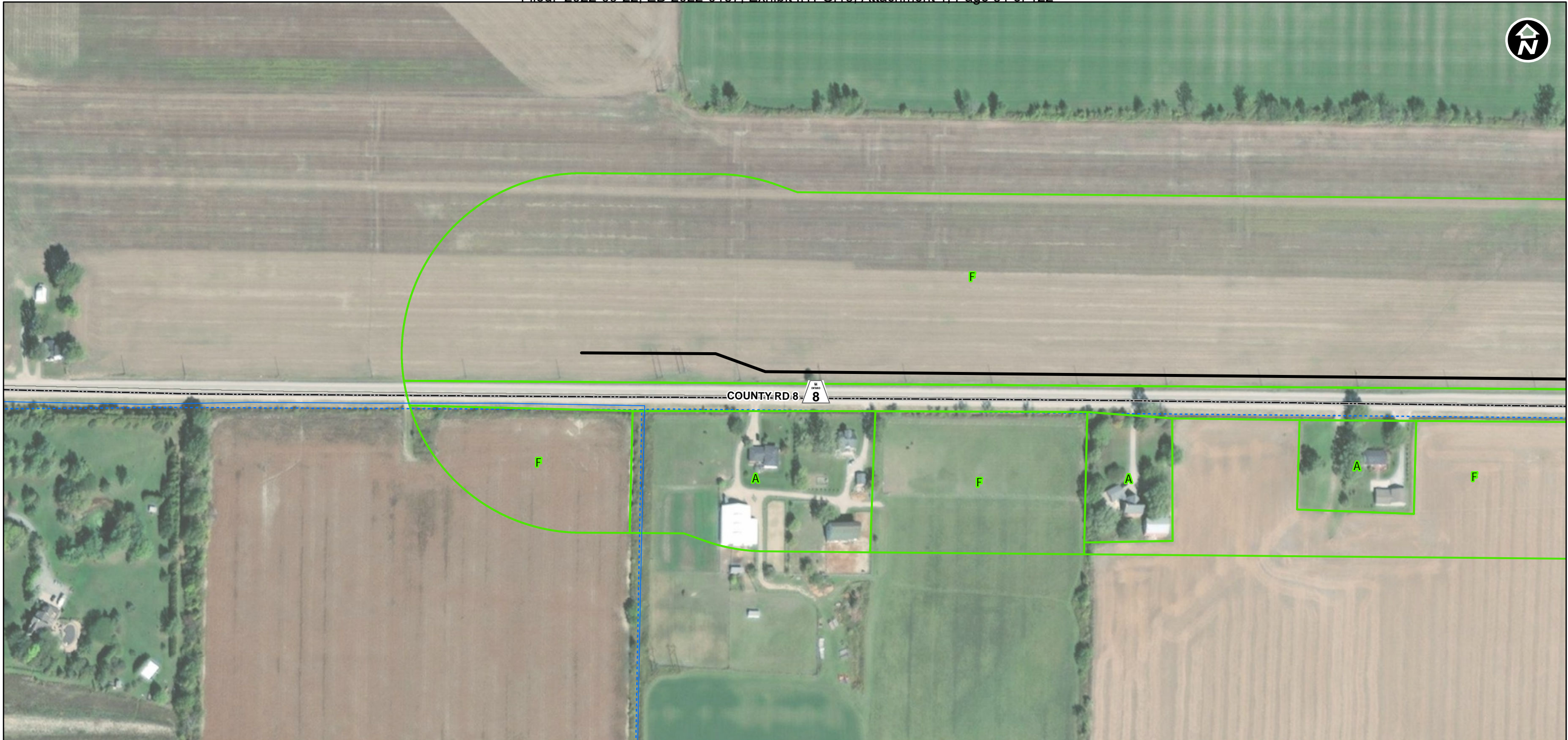
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[https://thamesriver.on.ca/wp-content/uploads/Watershed ReportCards/UTRwatershedreportcard-summary2018.pdf](https://thamesriver.on.ca/wp-content/uploads/Watershed_ReportCards/UTRwatershedreportcard-summary2018.pdf). Accessed February 2022.

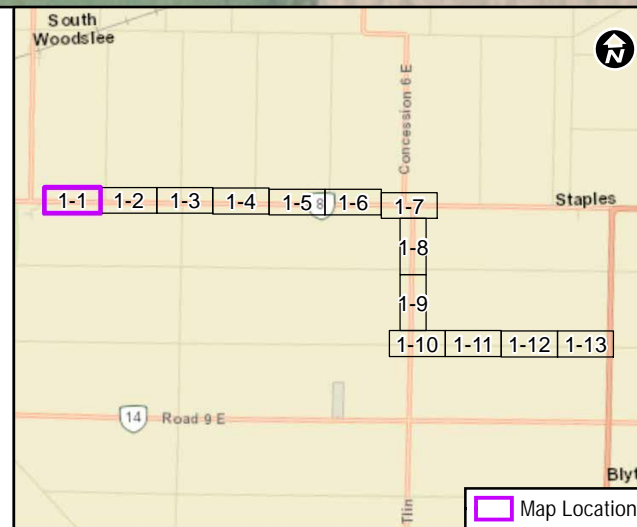
Figures



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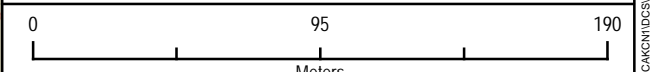
-  Preferred Route
-  Constructed Drain
-  Permanent Stream
-  Municipal Boundaries
-  ELC

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**



July 2022	1:2,500 <i>* when printed 11"x17"</i>	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#:	



Figure 1-1

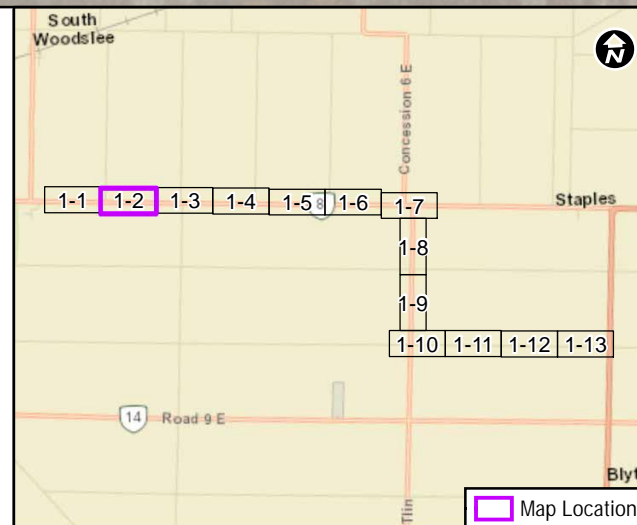
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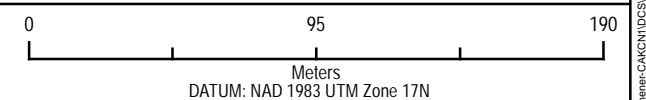
- Turtle Survey Location
- Preferred Route
- Constructed Drain
- Permanent Stream
- Municipal Boundaries
- ELC

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



Panhandle Regional Expansion Project

**Leamington Interconnect
ELC**



July 2022 1:2,500
* when printed 11"x17"

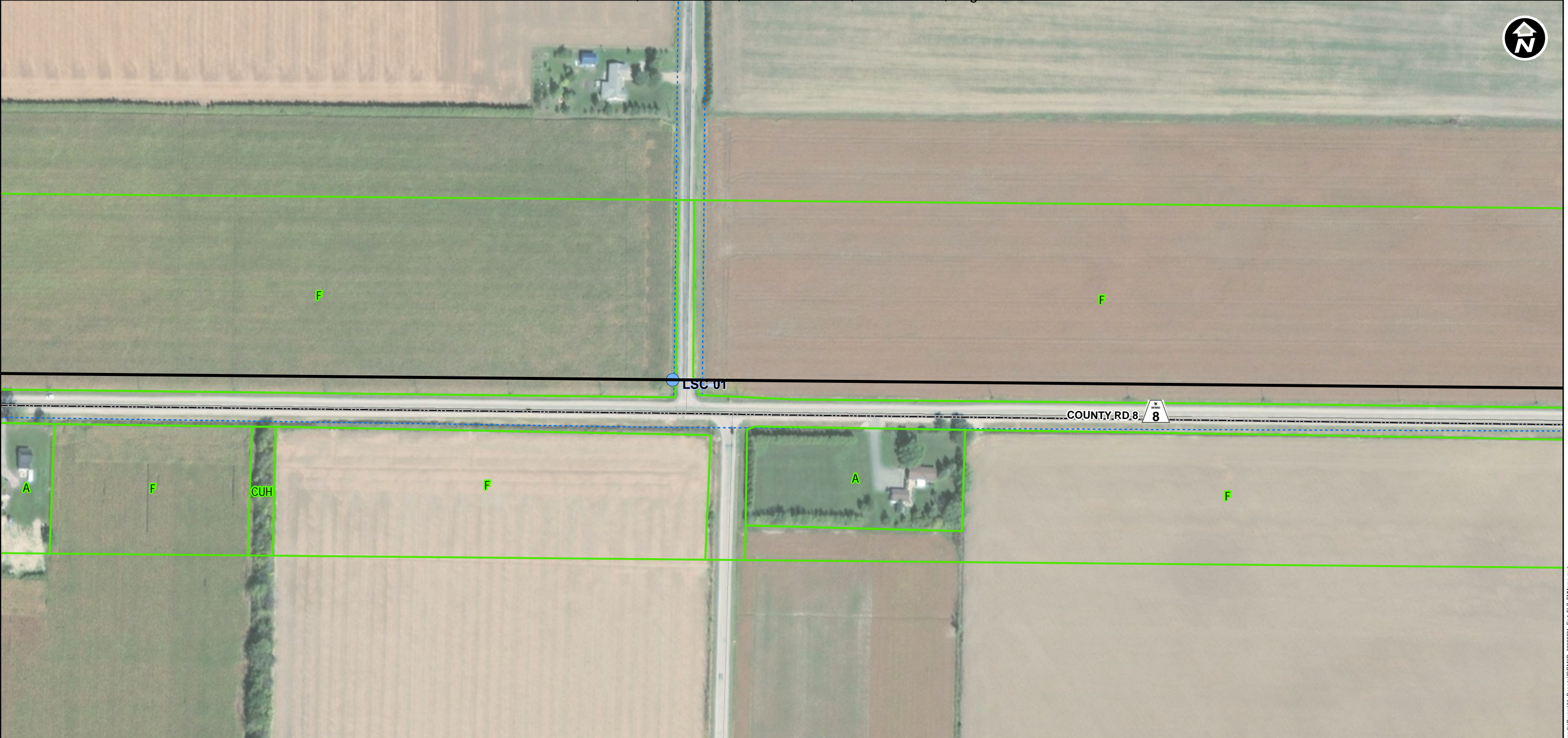
P#:60665521 V#:

Source: MNR 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



Figure 1-2

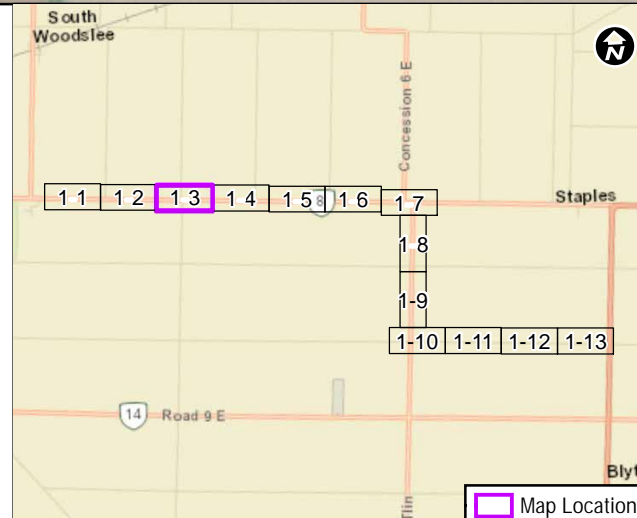
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Legend

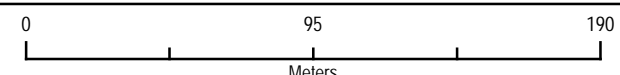
- Watercourse Crossing
- Preferred Route
- Constructed Drain
- Municipal Boundaries
- ELC

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



Panhandle Regional Expansion Project

**Leamington Interconnect
ELC**



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
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Figure 1-3

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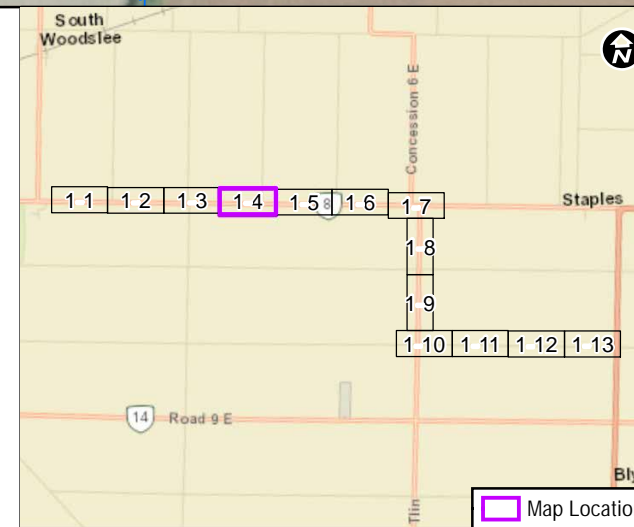
Map Location



Legend

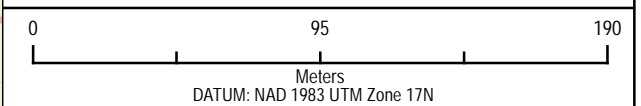
- Acoustic Monitoring Location
- Watercourse Crossing
- Preferred Route
- Constructed Drain
- Permanent Stream
- Intermittent Stream
- Municipal Boundaries
- ELC

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



Panhandle Regional Expansion Project

**Leamington Interconnect
ELC**

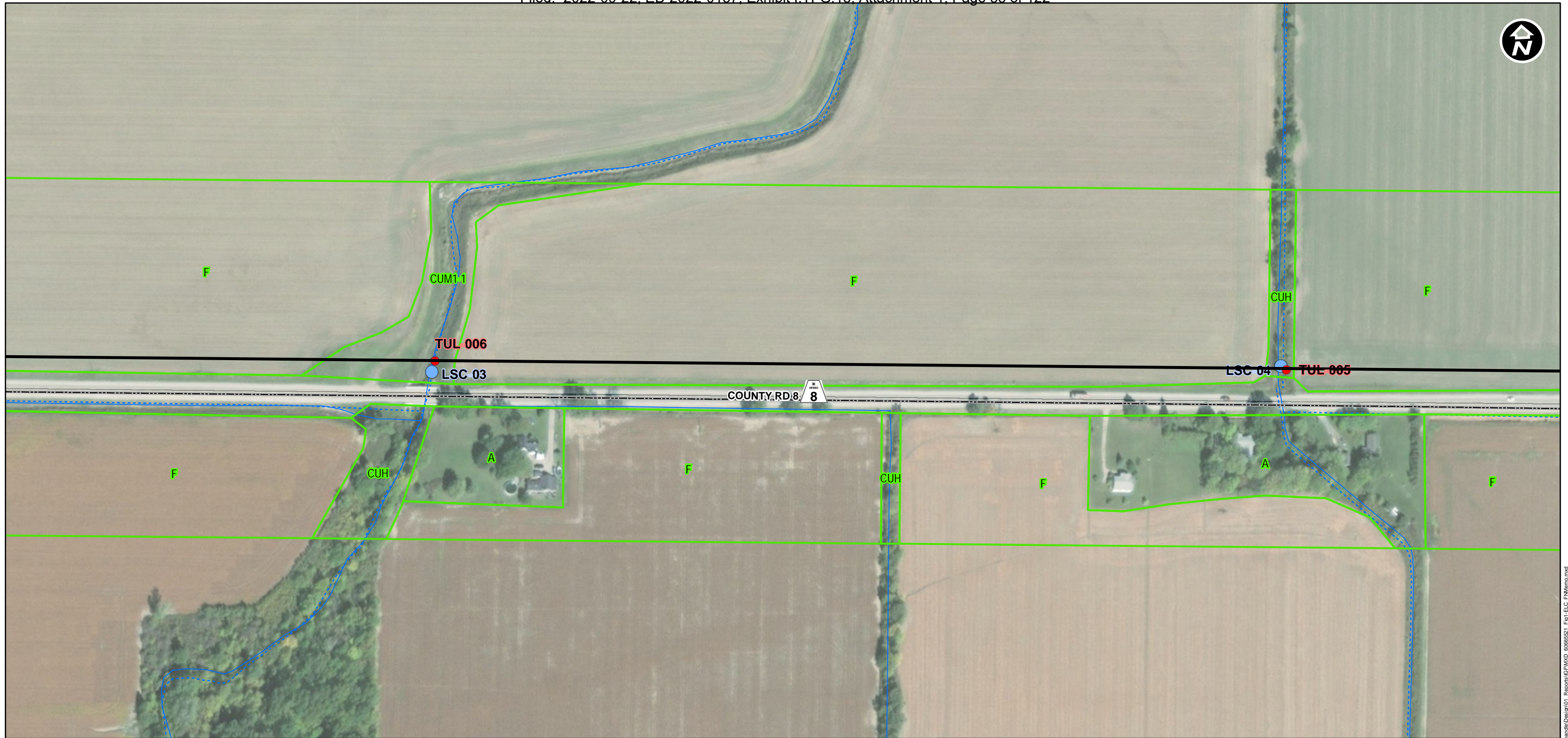


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Figure 1-4

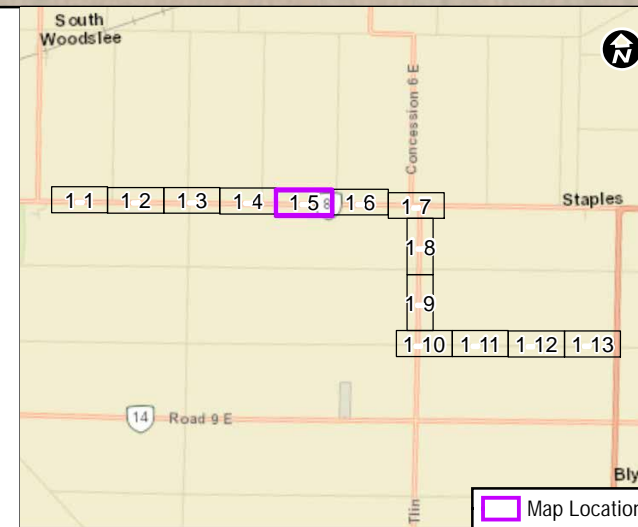
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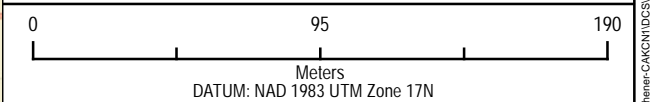
- Turtle Survey Location
- Watercourse Crossing
- Preferred Route
- - -** Constructed Drain
- Permanent Stream
- ▭** Municipal Boundaries
- ▭** ELC

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



Panhandle Regional Expansion Project

**Leamington Interconnect
ELC**



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
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Figure 1-5

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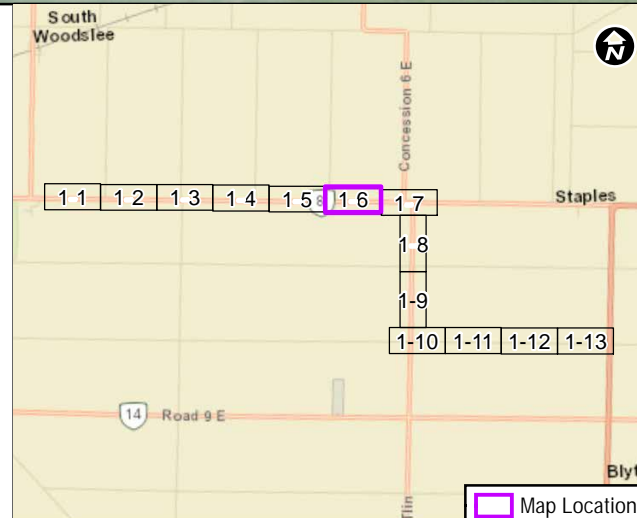
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Legend

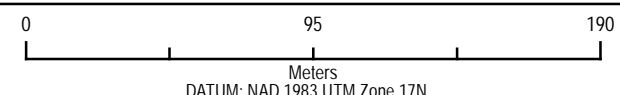
- Watercourse Crossing
- Preferred Route
- Constructed Drain
- Permanent Stream
- Municipal Boundaries
- ELC

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



Panhandle Regional Expansion Project

**Leamington Interconnect
ELC**



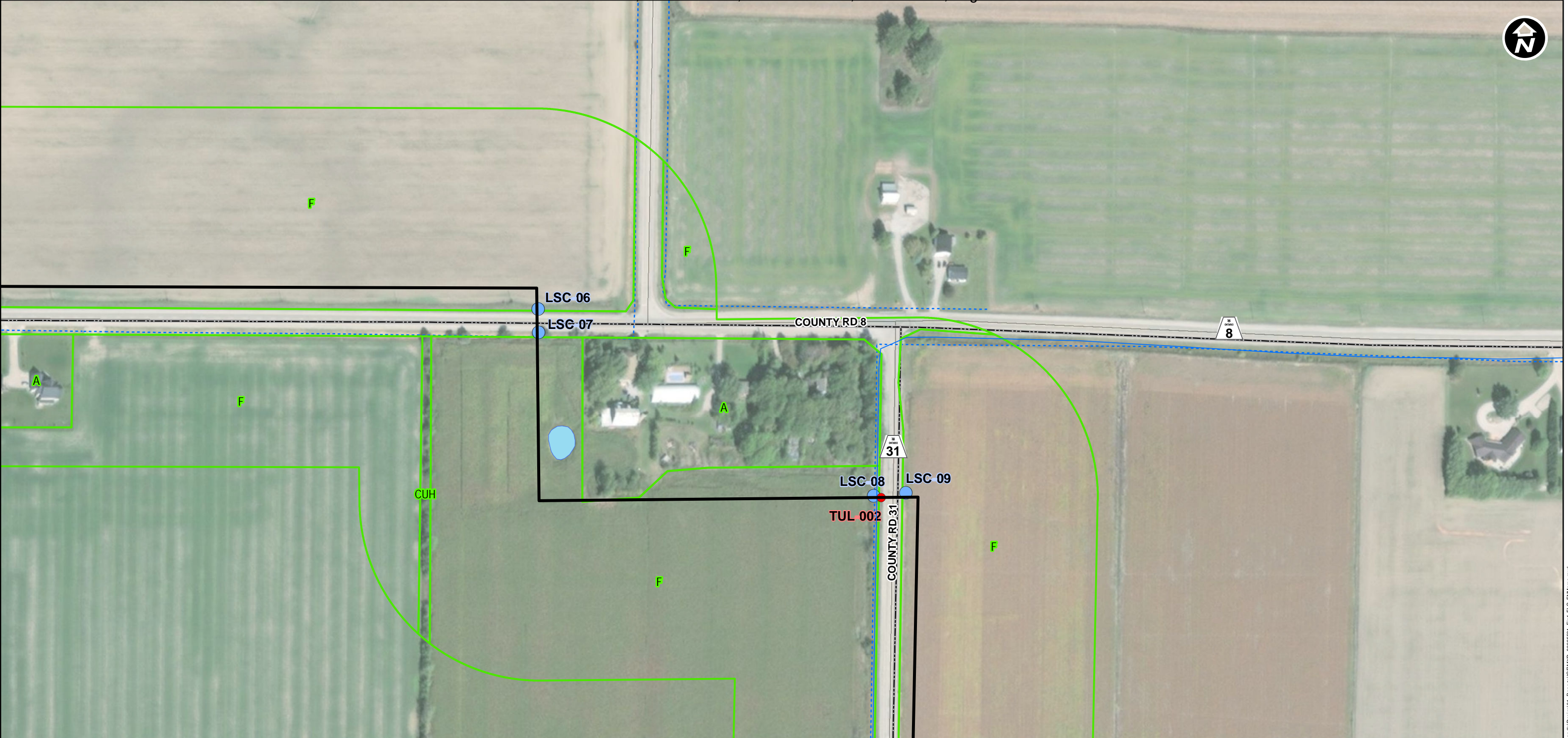
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Figure 1-6

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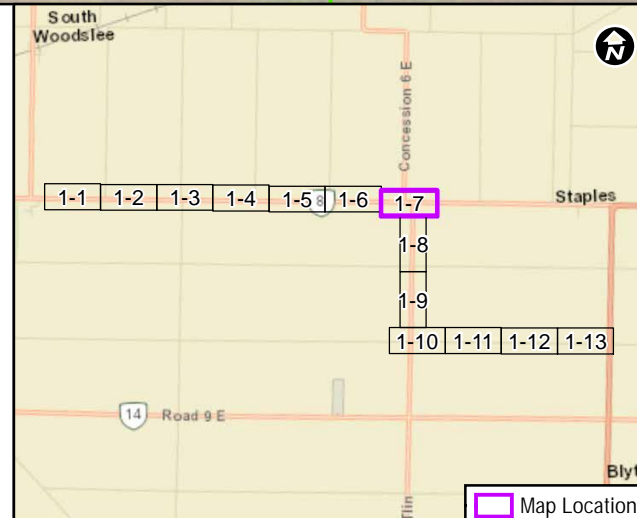
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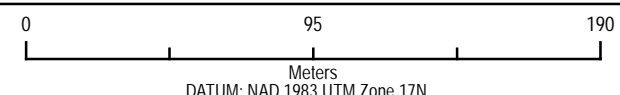
- Turtle Survey Location
- Watercourse Crossing
- Preferred Route
- Constructed Drain
- Permanent Stream
- Waterbody
- Municipal Boundaries
- ELC

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



Panhandle Regional Expansion Project

**Leamington Interconnect
ELC**

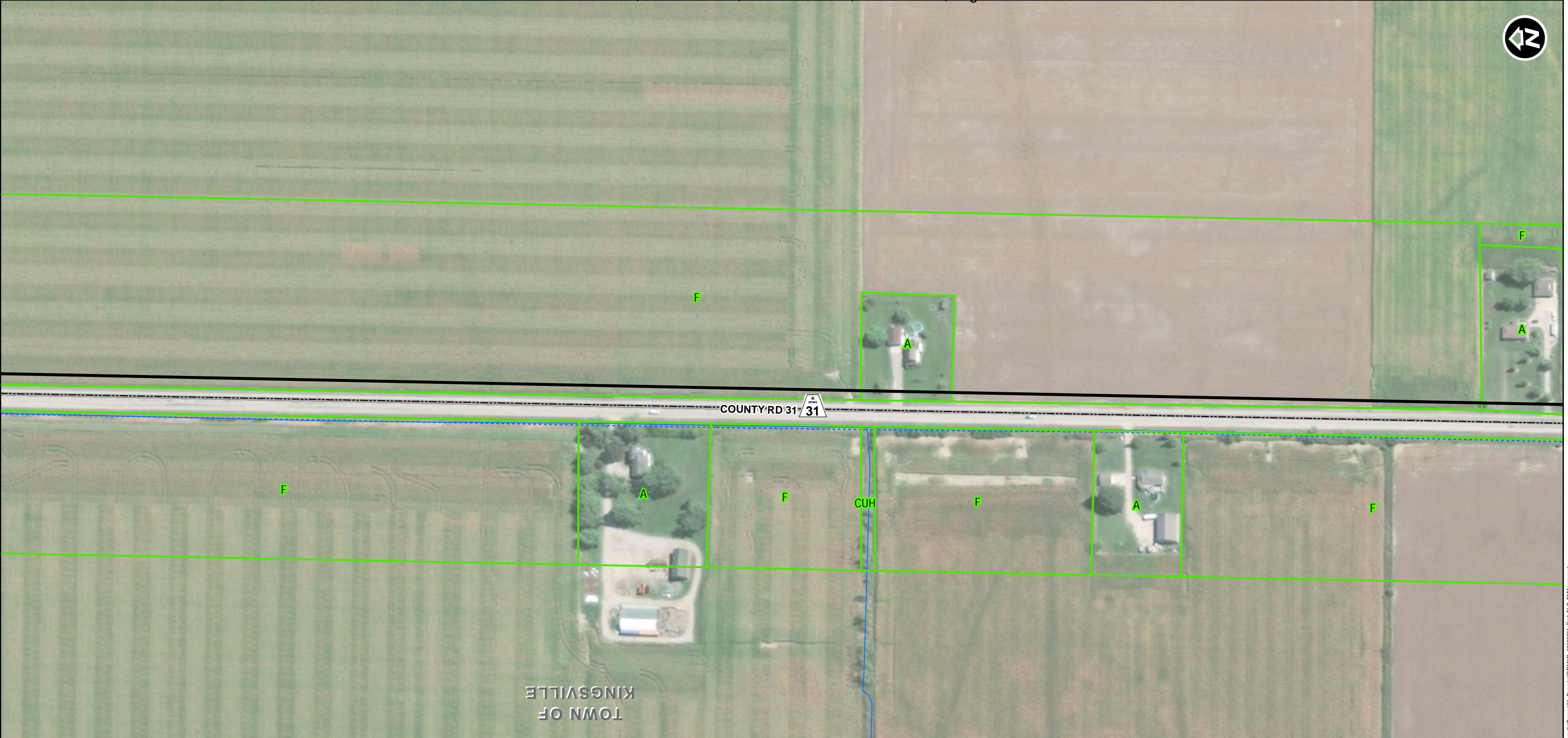


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AECOM **Figure 1-7**

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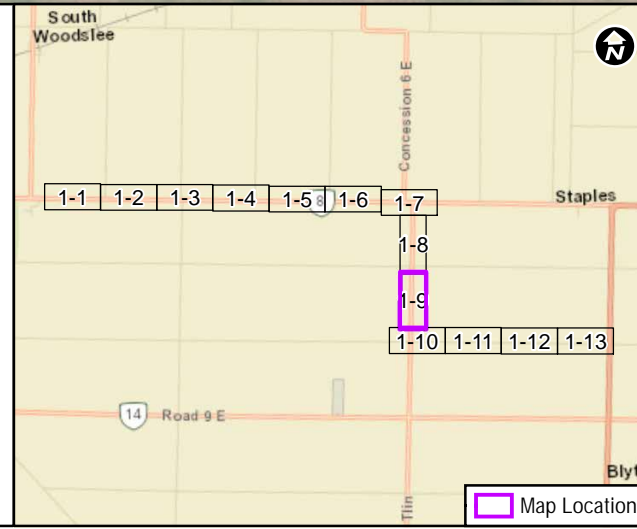
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Legend

- 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

Meters
DATUM: NAD 1983 UTM Zone 17N

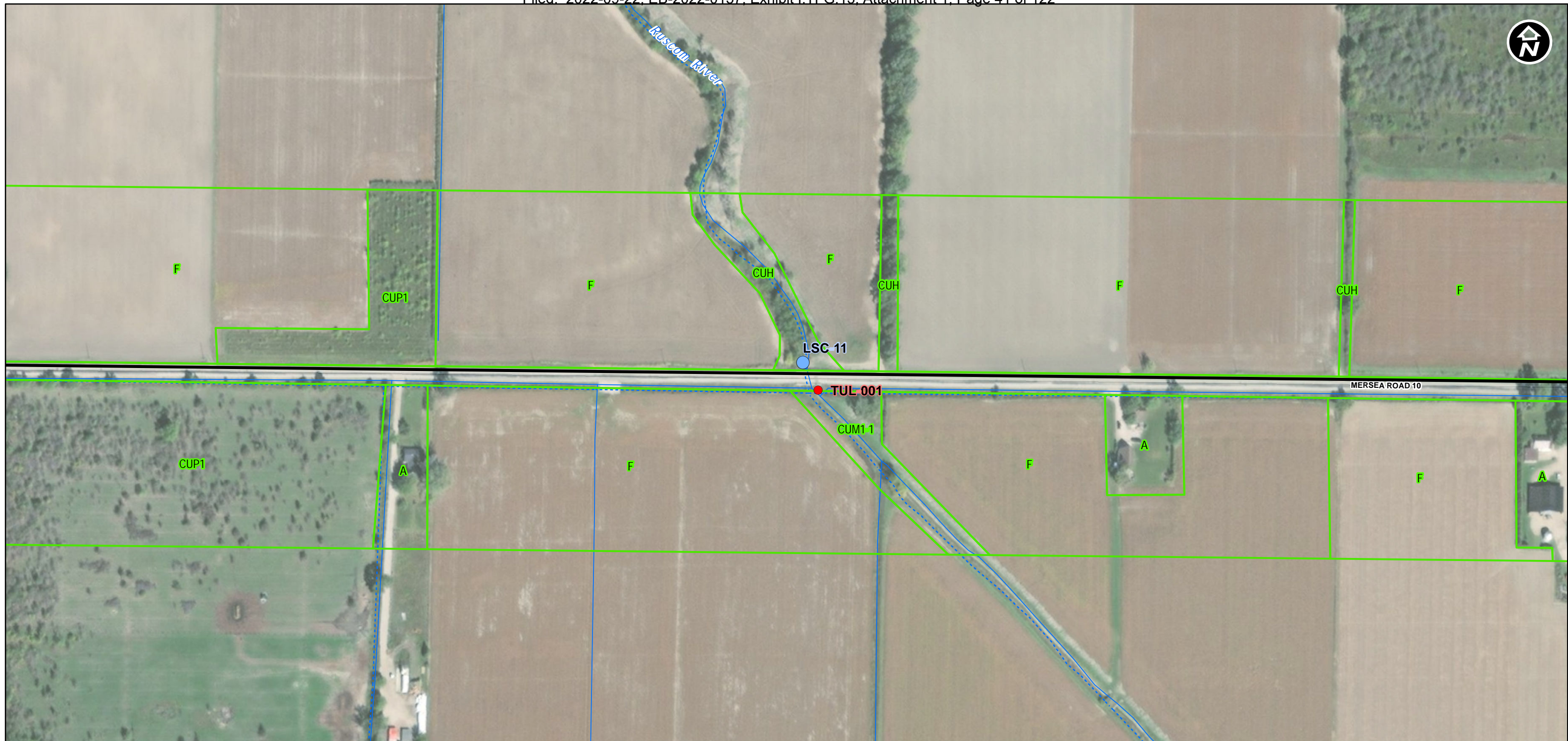
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P#:60665521	V#:	

AECOM

Figure 1-9

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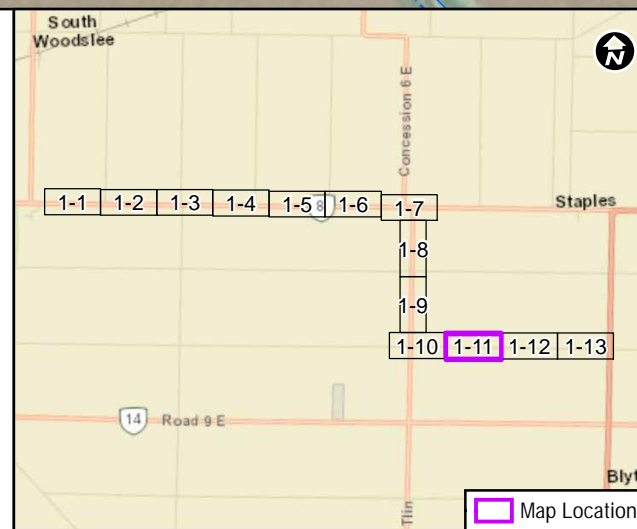
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Legend

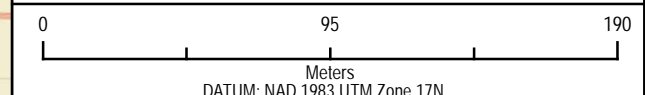
- Turtle Survey Location
- Watercourse Crossing
- Preferred Route
- Constructed Drain
- Permanent Stream
- Municipal Boundaries
- ELC

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



Panhandle Regional Expansion Project

Leamington Interconnect
ELC



July 2022	1:2,500 <small>* when printed 11"x17"</small>	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#:	

AECOM **Figure 1-11**

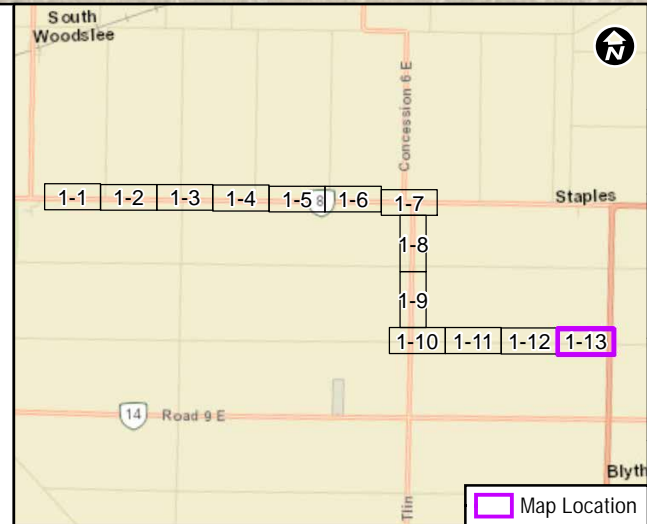
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Legend

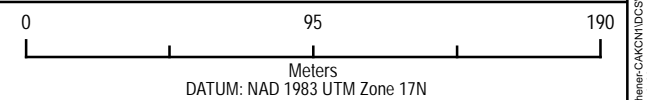
- Preferred Route
- - - - - Constructed Drain
- Permanent Stream
- ▭ Municipal Boundaries
- ▭ ELC

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**

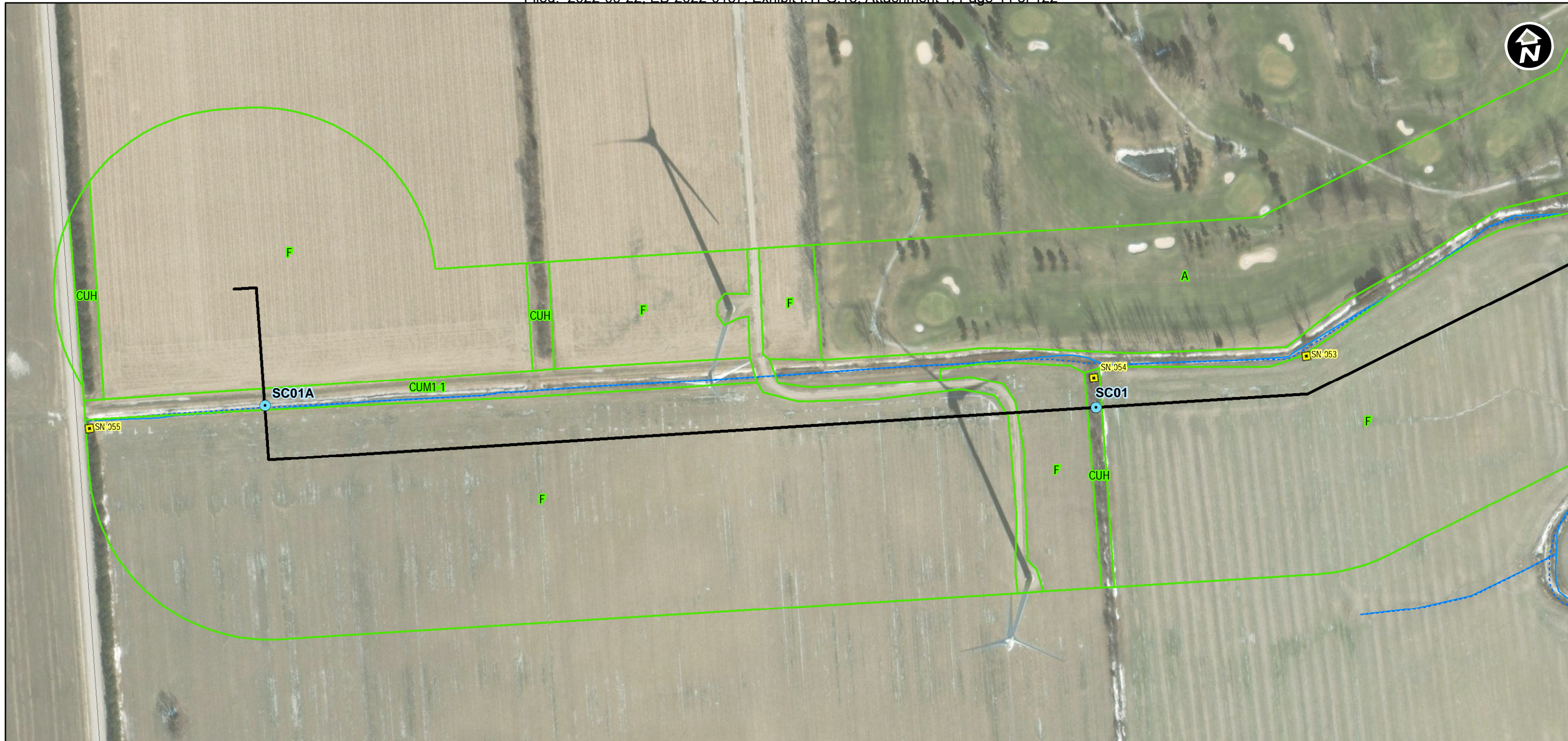


July 2022	1:2,500 * when printed 11"x17"	Source: MNR 2020 Image: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
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AECOM **Figure 1-13**

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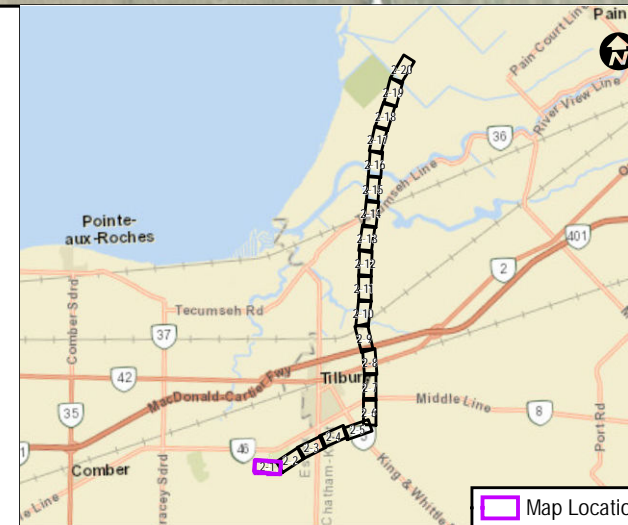
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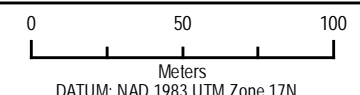
- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

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



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#:	



Figure 2-1

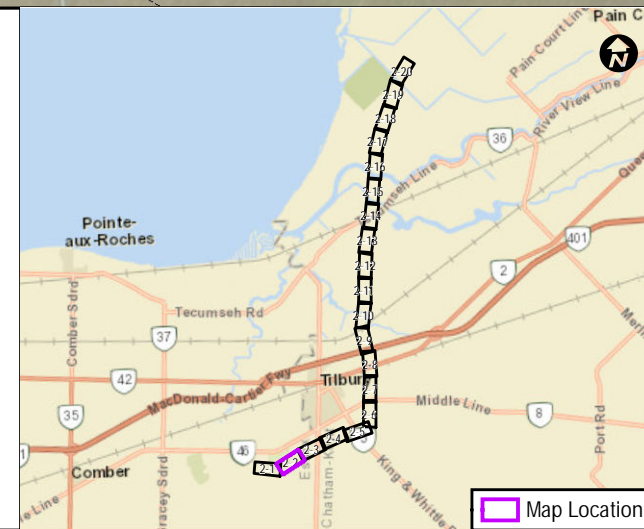
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Legend

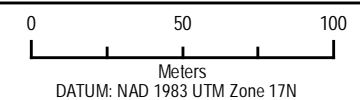
- Turtle Survey Locations
- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

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



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#:	



Figure 2-2

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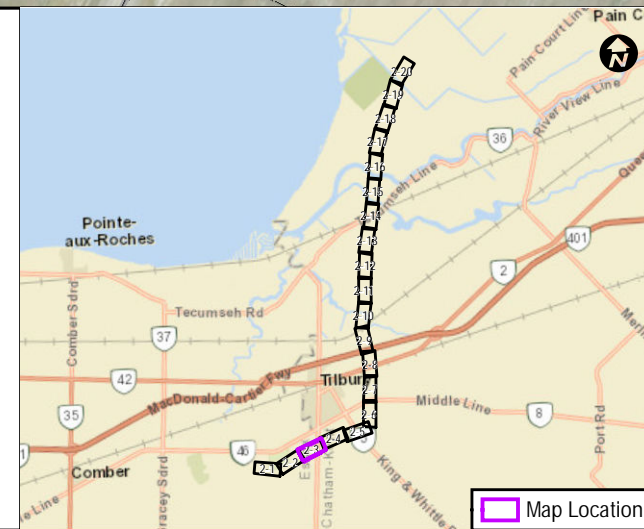
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Legend

- 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

July 2022	1:2,500 * when printed 11"x17"	Source: MNRF 2020 Image: Sources: Esri, HERE, Garmin, USCS, 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#:	

AECOM **Figure 2-3**

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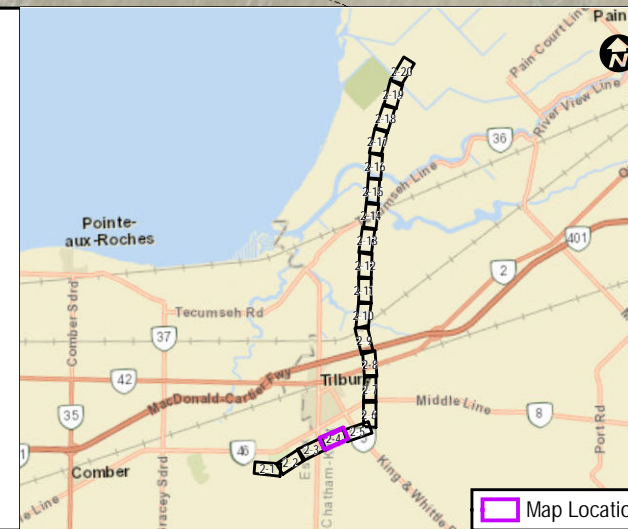
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Legend

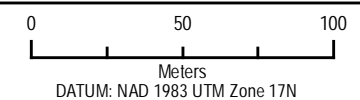
- Turtle Survey Locations
- Snake Survey Locations
- ⊙ Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

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

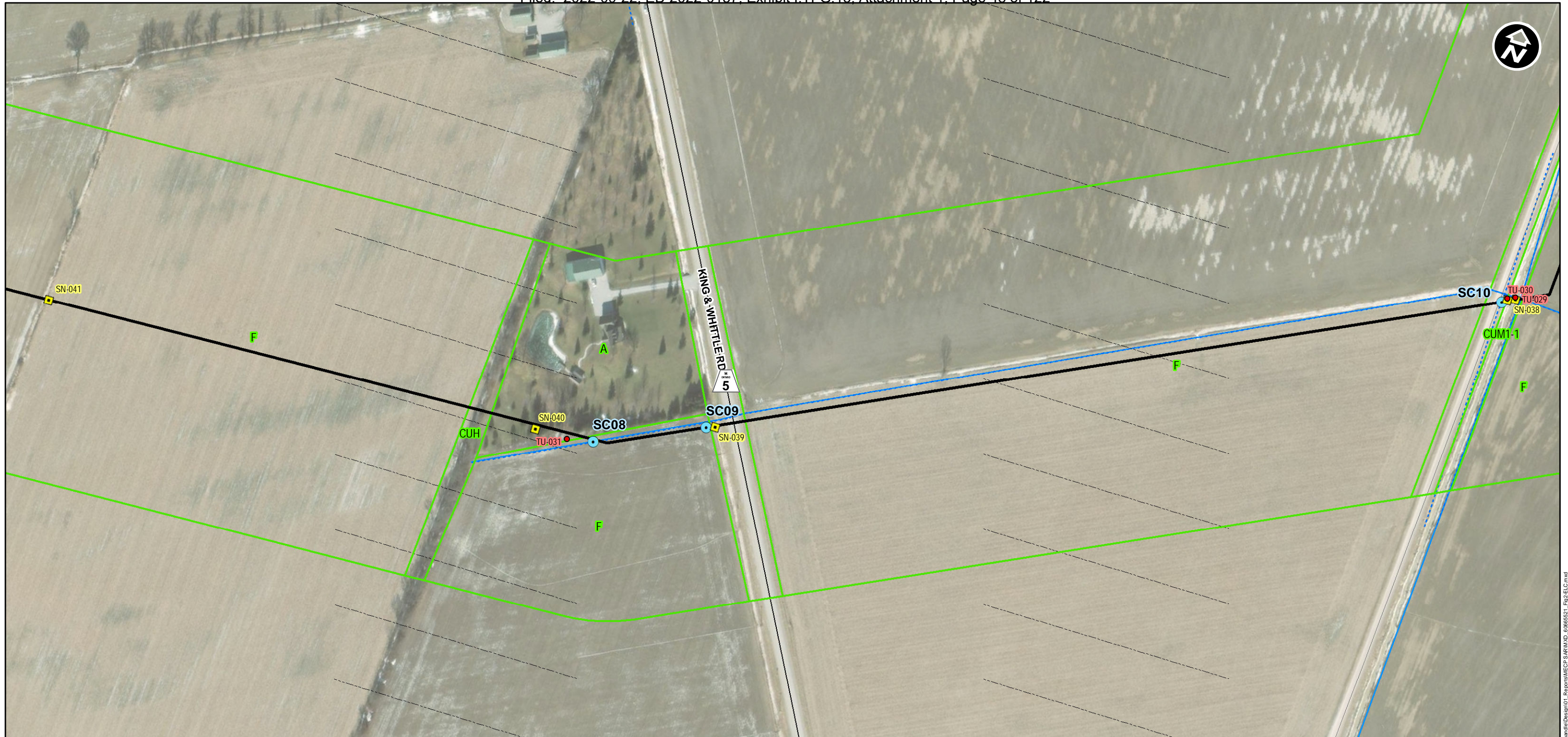


July 2022	1:2,500 * when printed 11"x17"	Source: MNRF 2020 Image: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
P#:60665521	V#:	



Figure 2-4

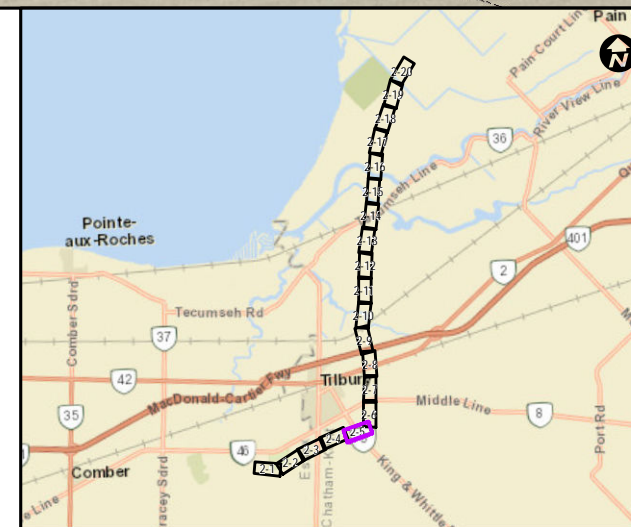
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Legend

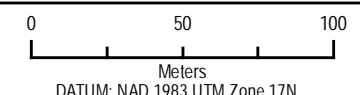
- Turtle Survey Locations
- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

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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P#: 60665521	V#:	

AECOM **Figure 2-5**

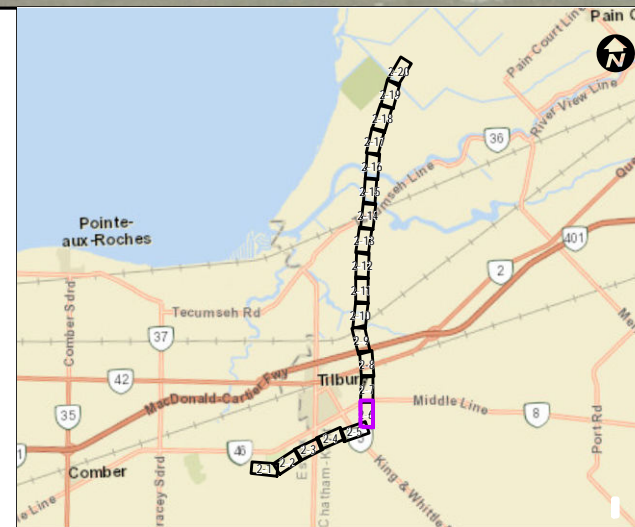
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Legend

- Turtle Survey Locations
- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC
- Category 3 Habitat
- Category 2 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

0 50 100
Meters

DATUM: NAD 1983 UTM Zone 17N

July 2022 1:2,500
* when printed 11"x17"

P#: 60665521 V#:

AECOM **Figure 2-6**

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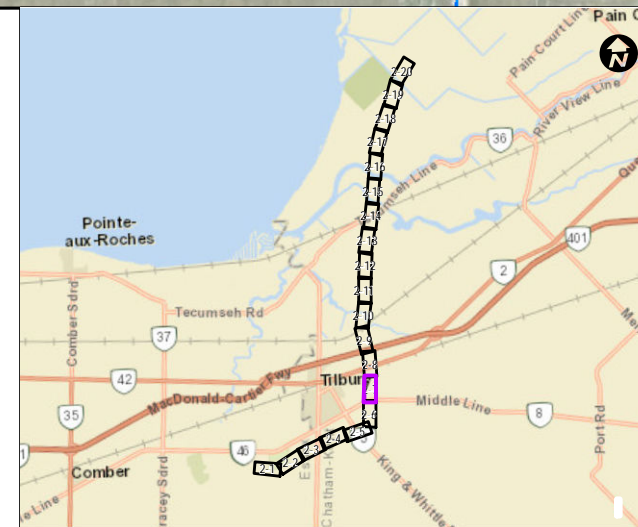
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Legend

- 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
Panhandle

Meters
DATUM: NAD 1983 UTM Zone 17N

July 2022

P#: 60665521

1:2,500
*when printed 11"x17"

V#:

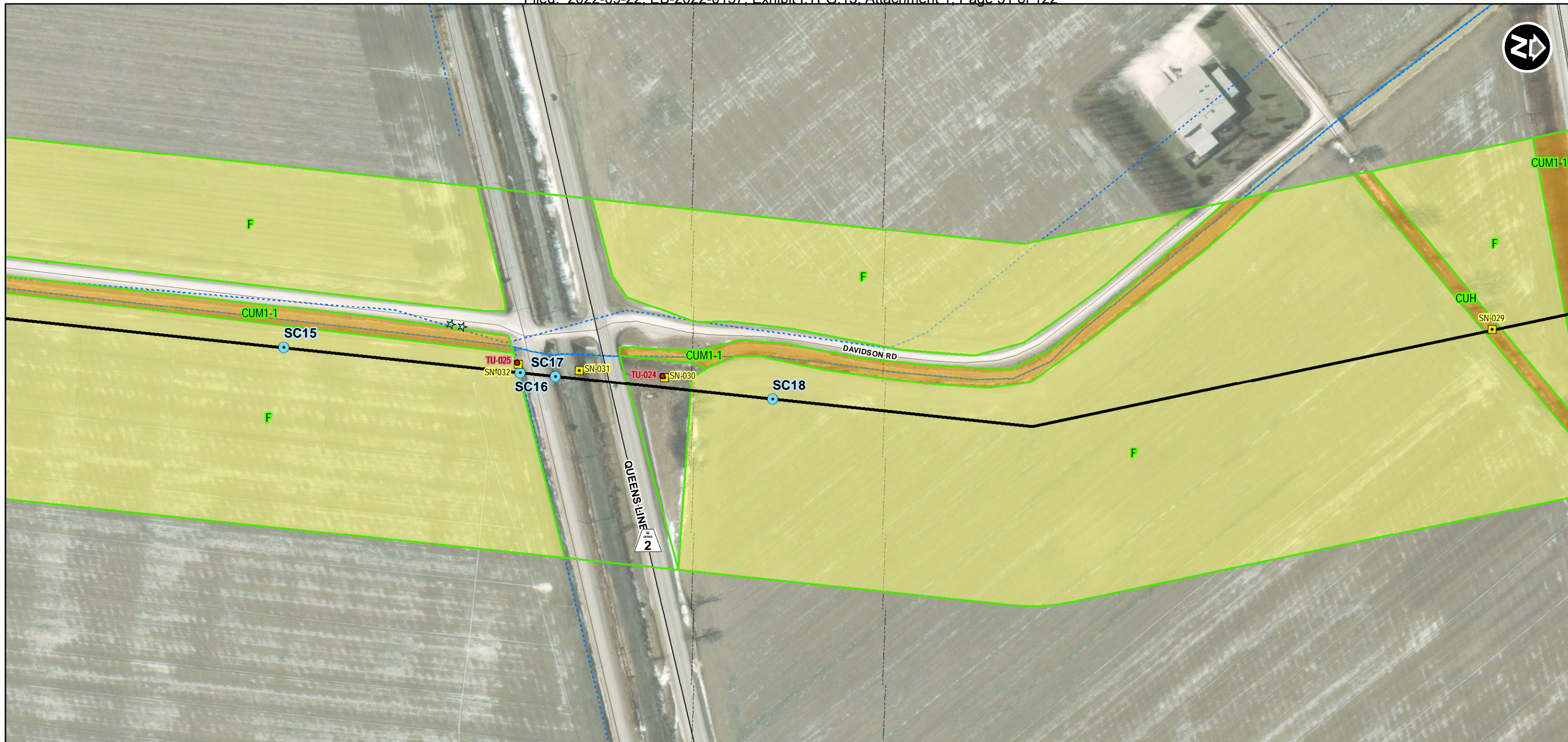
Source: MNRF 2020
Image: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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Figure 2-7

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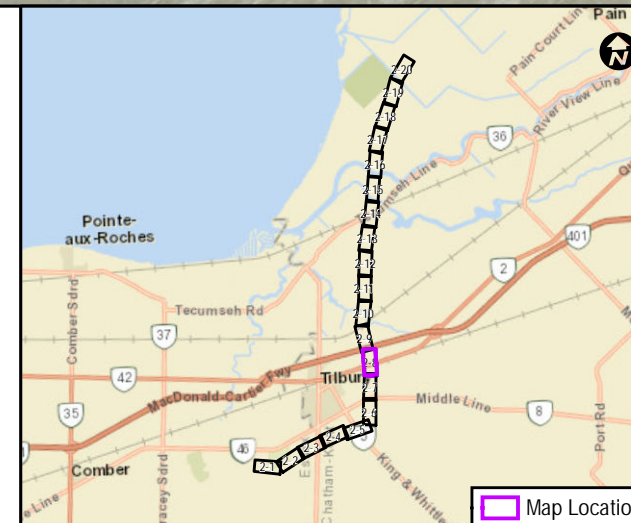
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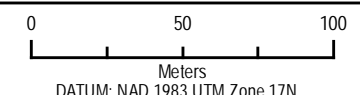
- Turtle Survey Locations
- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC
- Eastern Foxsnake Habitat**
- Category 2 Habitat
- Category 3 Habitat

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
Panhandle



July 2022
P#: 60665521

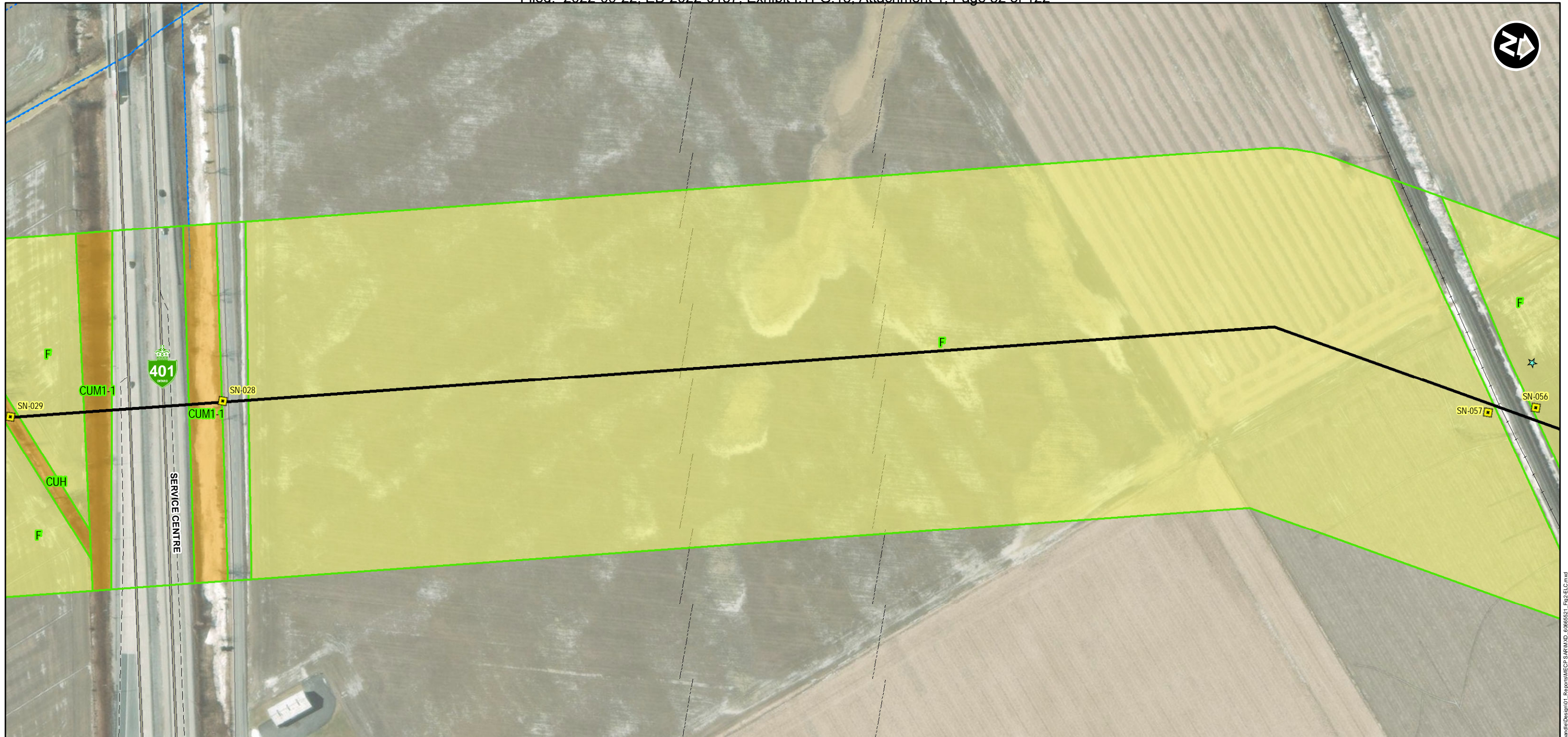
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Source: MNRF 2020
Image: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community



Figure 2-8

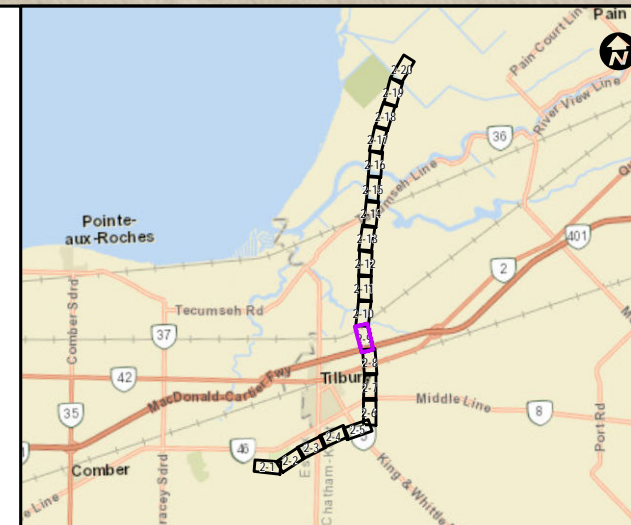
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Legend

- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC
- Eastern Foxsnake Habitat**
- Category 2 Habitat
- Category 3 Habitat

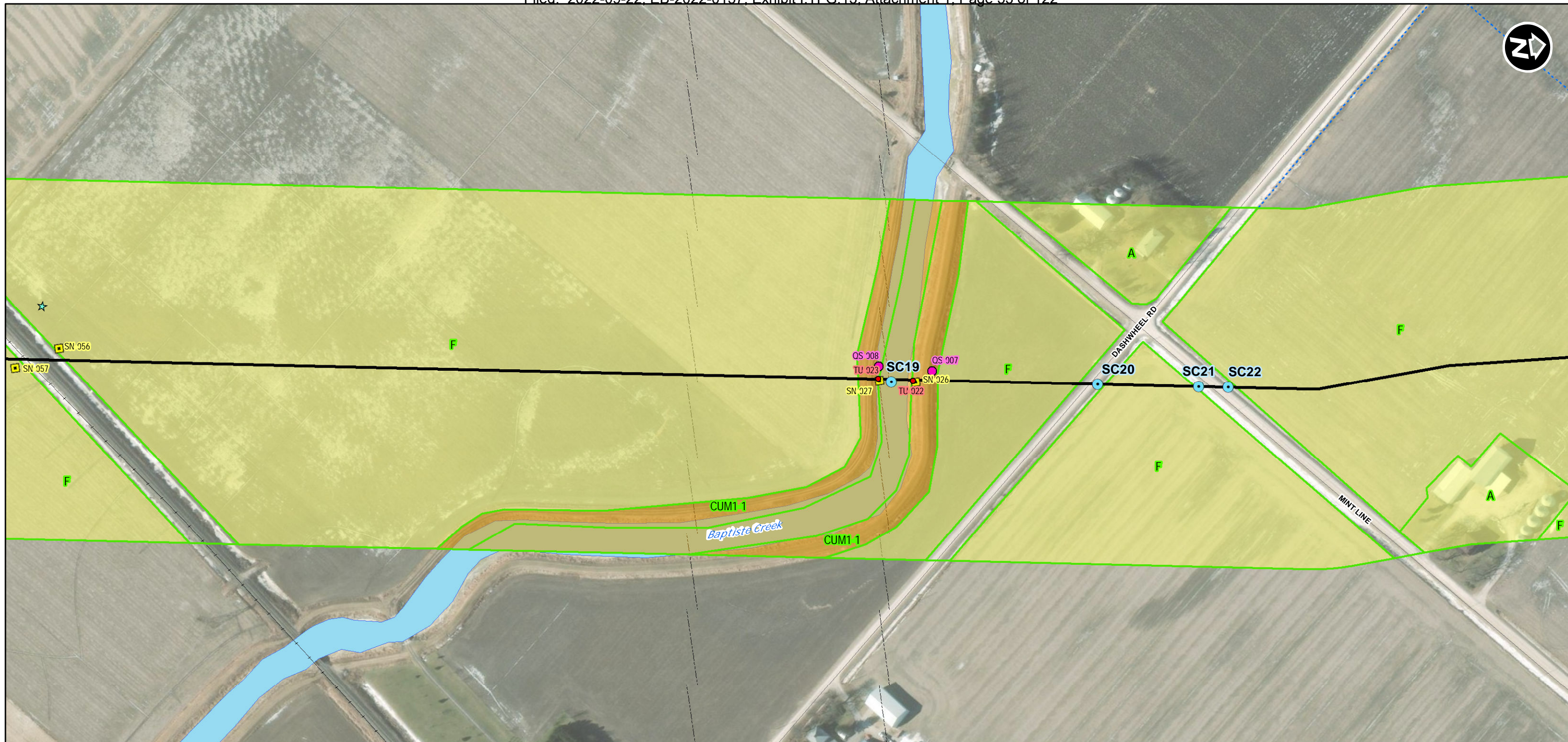
Label	ELC Description
A	Anthropogenic
CUM1-1	Dry – Moist Old Field Meadow Type
CUH	Cultural Hedgerow
F	Agricultural Field
FOD8-1	Fresh – Moist Poplar Deciduous Forest Type
MAS2-9	Forb Mineral Shallow Marsh Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

ELC	
Panhandle	
DATUM: NAD 1983 UTM Zone 17N	
July 2022	1:2,500 <small>* when printed 11"x17"</small>
P#: 60665521	V#:
Figure 2-9	
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Map location: \\sawana2022\mrs.com\GIS\MapServer\workspace\CHK\CD\US\GIS\Projects\60665521_Erldg\Panhandle\Design\01_Report\MAPS\SUP\MXD_06665521_Fig2-9.ELC.mxd Date Saved: 2022-09-22 4:10:53 PM User Name: mrs.com



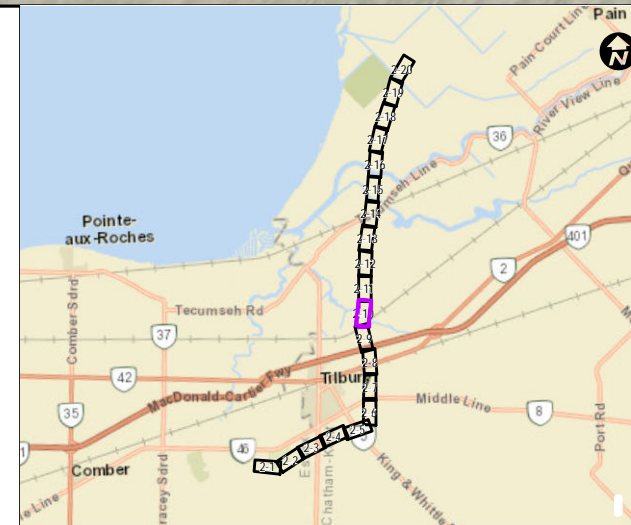
Legend

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

Eastern Foxsnake Habitat

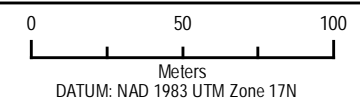
- Category 2 Habitat
- Category 3 Habitat

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
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P#:60665521	V#:	









Figure 2-10

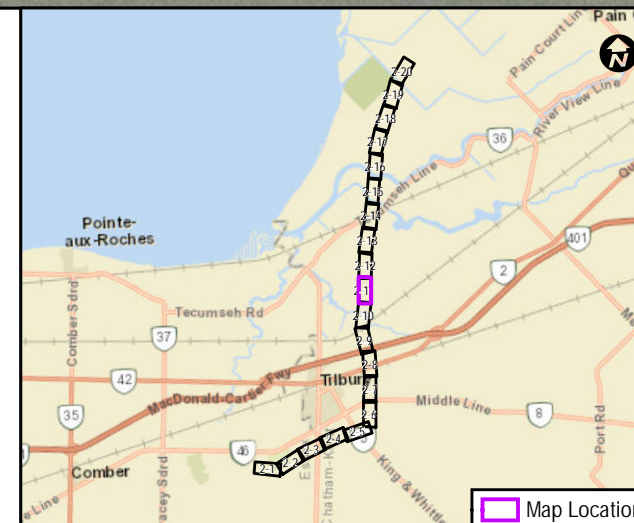
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Legend

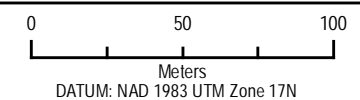
-  Watercourse Crossing
-  Preferred Route 2022-06-03
-  Constructed Drain
-  Watercourse
-  ELC
- Eastern Foxsnake Habitat**
-  Category 3 Habitat

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

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P#:60665521	V#:	



Figure 2-11

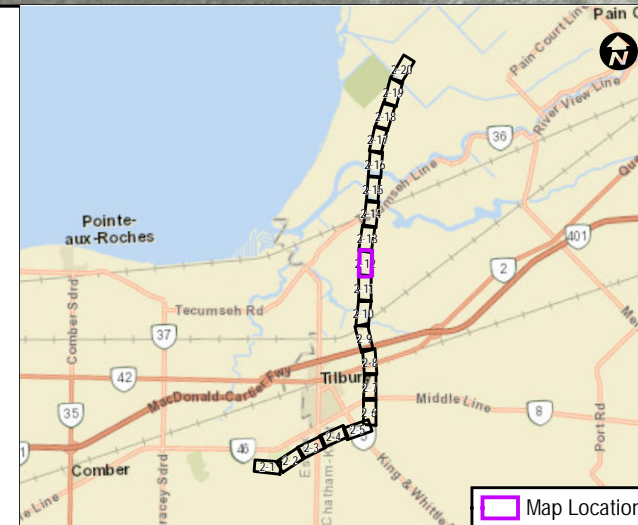
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Legend

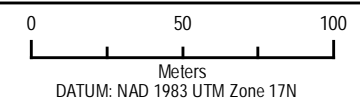
- Turtle Survey Locations
- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

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



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P#:60665521	V#:	



Figure 2-12

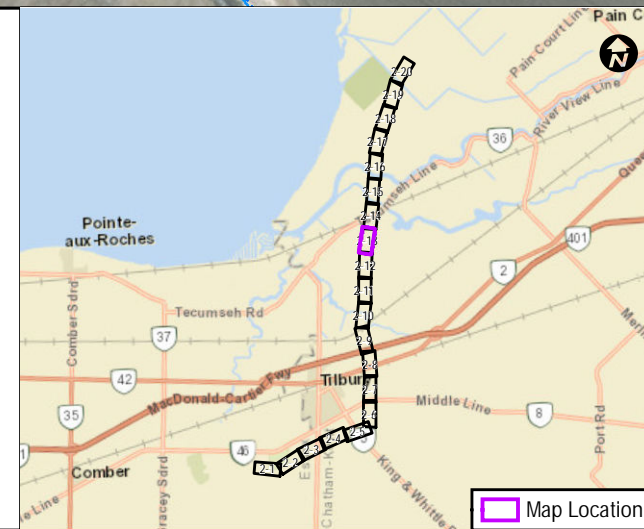
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Legend

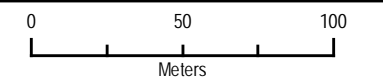
- Turtle Survey Locations
- Snake Survey Locations
- Queen Snake Survey
- Watercourse Crossing
- Preferred Route 2022-06-03
- - - - Constructed Drain
- Watercourse
- ELC

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

**ELC
Panhandle**



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#:	



Figure 2-13

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Legend

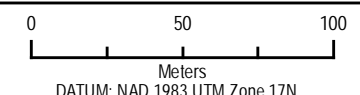
- Turtle Survey Locations
- Snake Survey Locations
- Queen Snake Survey
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

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

ELC
Panhandle



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#:	

AECOM **Figure 2-14**

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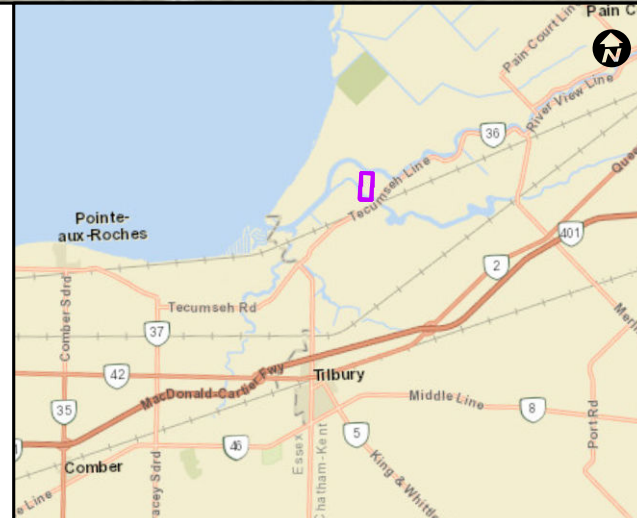
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Legend

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

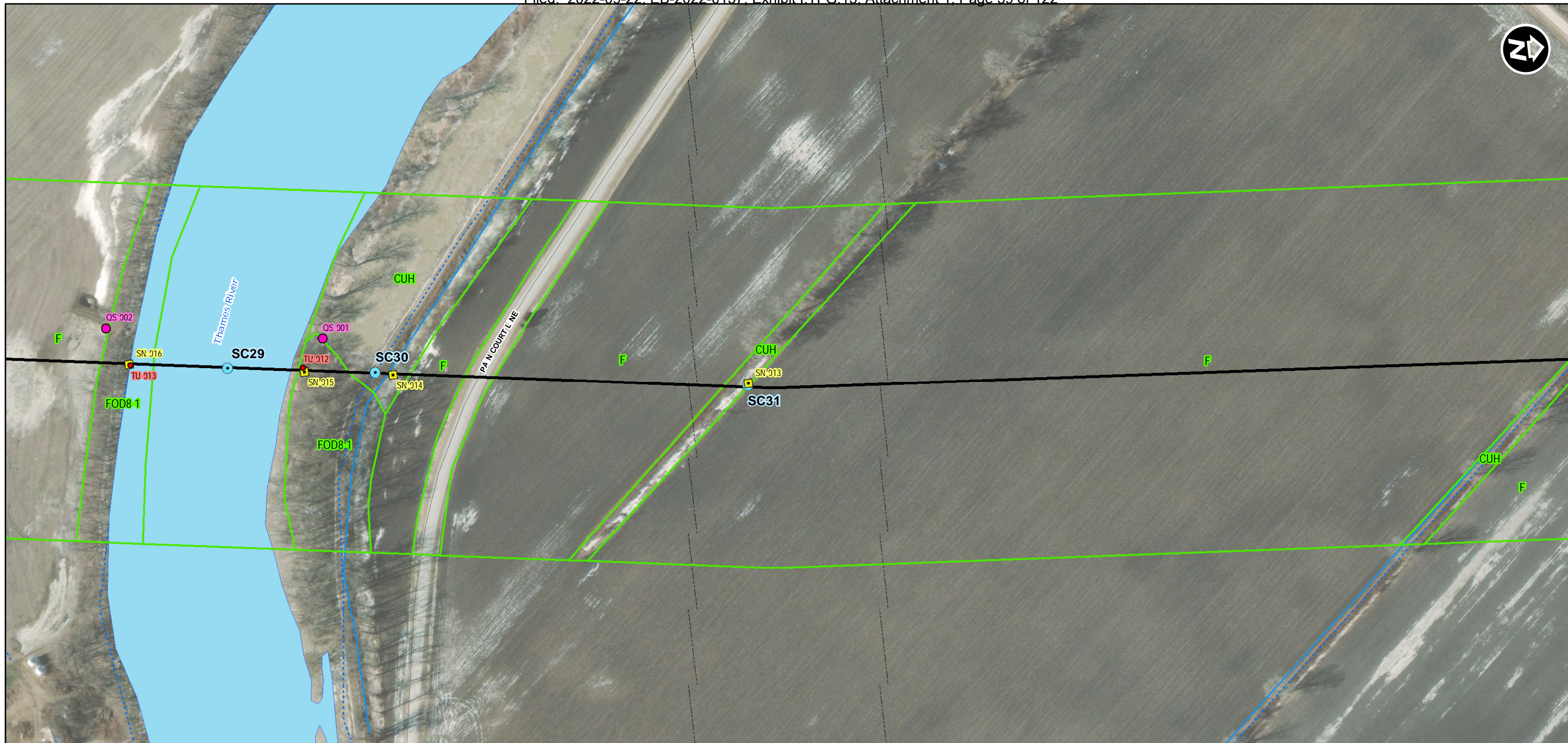
Label	ELC Description
A	Anthropogenic
CUM1-1	Dry – Moist Old Field Meadow Type
CUH	Cultural Hedgerow
F	Agricultural Field
FOD8-1	Fresh – Moist Poplar Deciduous Forest Type
MAS2-9	Forb Mineral Shallow Marsh Type
OAO	Open Aquatic



Panhandle Regional Expansion Project

ELC Panhandle	
<p>Meters DATUM: NAD 1983 UTM Zone 17N</p>	
July 2022	1:2,500 <small>* when printed 11"x17"</small>
P#:60665521	V#:
Figure 2-15	
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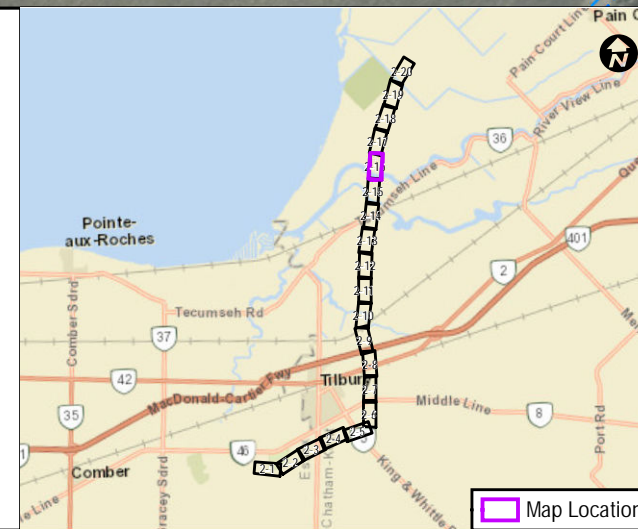
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Legend

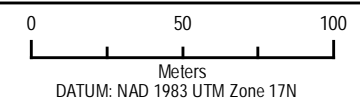
- Turtle Survey Locations
- Snake Survey Locations
- Queen Snake Survey
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

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

ELC
Panhandle



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#:	



Figure 2-16

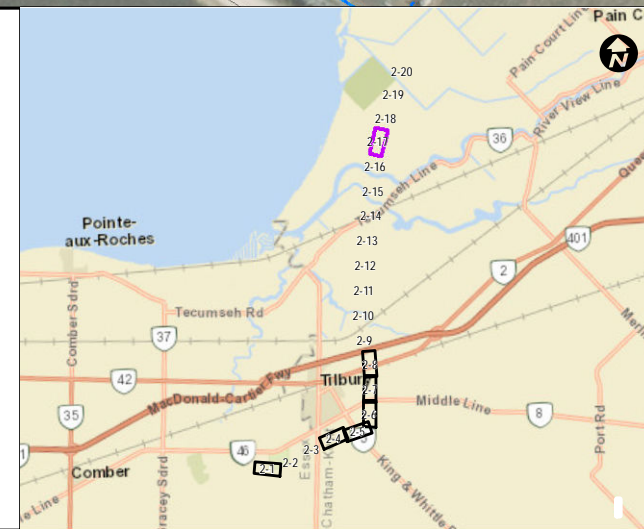
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Legend

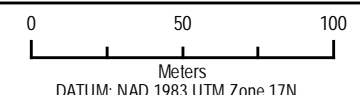
- Turtle Survey Locations
- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- Provincially Significant Wetland
- ELC

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



July 2022	1:2,500 * when printed 11"x17"	Source: MNRF 2020 Image: Sources: Esri, HERE, Garmin, USCS, 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#:	

AECOM **Figure 2-17**

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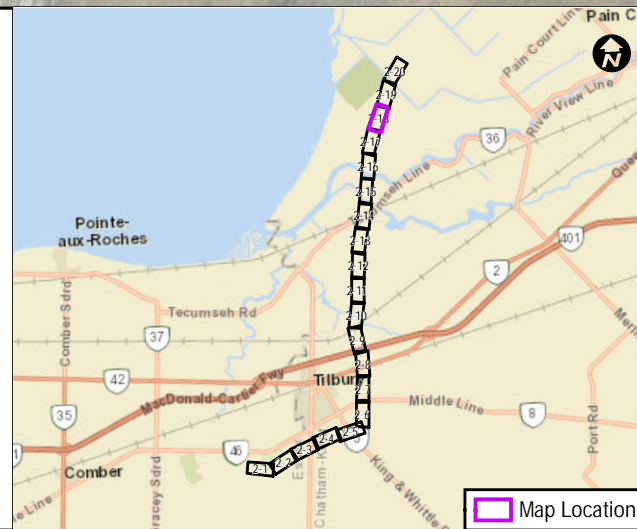
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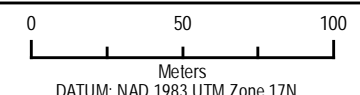
- Turtle Survey Locations
- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- ELC

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Panhandle Regional Expansion Project

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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#:	

AECOM **Figure 2-18**

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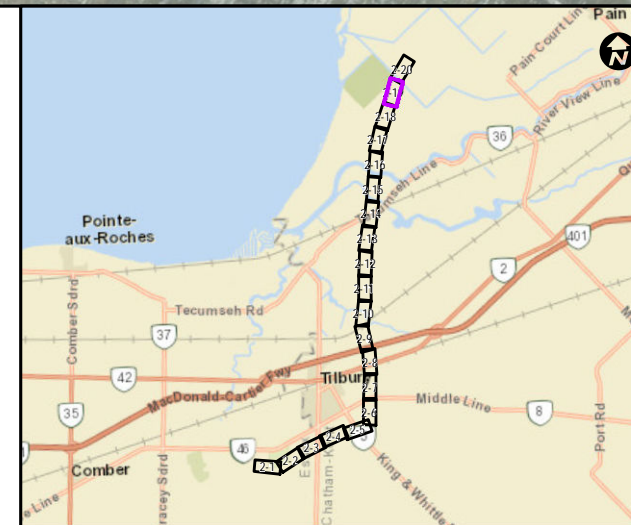
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Legend

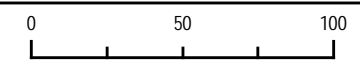
- Turtle Survey Locations
- Snake Survey Locations
- Watercourse Crossing
- Preferred Route 2022-06-03
- Constructed Drain
- Watercourse
- Provincially Significant Wetland
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DATUM: NAD 1983 UTM Zone 17N

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
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AECOM **Figure 2-19**

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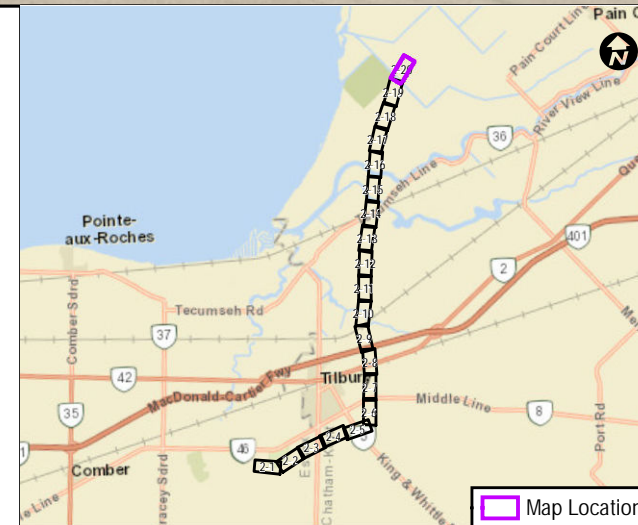
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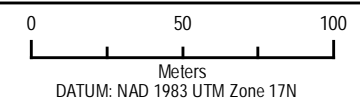
- Turtle Survey Locations
- Snake Survey Locations
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- Preferred Route 2022-06-03
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Panhandle Regional Expansion Project

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Panhandle



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#:	



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 Iverson 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.

¹NDMNRF, 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.

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 Slope Stability	None	Creek Chub (34) Fathead Minnow (21) Bluntnose Minnow (18) Spotfin Shiner (7) Bluegill (1) Round Goby (2) Johnny Darter (1)

* 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.

¹NDMNRF, 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.

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																		
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										
Grey Dogwood	Cornus racemosa	Cornaceae	2	0	N	N	S5		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									
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									
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	Mellilotus 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.	Oenothera 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	
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 euixina)	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	X	
Goldenrod sp.	Solidago sp.	Asteraceae										X				X	X	X
Sow-thistle sp.	Sonchus sp.	Asteraceae															X	
New England Aster	Symphotrichum novae-angliae	Asteraceae	2	-3	N	N	S5		X								X	
Aster sp.	Symphotrichum 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 Specie:	0	5	0	1	2	0	18	13	
ESA Status									
END	0	0	0	0	0	0	0	0	0
THR	0	0	0	0	0	0	0	0	0
SC	0	0	0	1	0	0	0	0	0
COSEWIC Status									
END	0	0	0	0	0	0	0	0	0
THR	0	0	0	0	0	0	0	0	0
SC	0	0	0	1	0	0	0	0	0
Provincially Rare (S rank of S1-S3)									
S1	0	0	0	0	0	0	0	0	0
S1?	0	0	0	0	0	0	0	0	0
S1S2	0	0	0	0	0	0	0	0	0
S1S3	0	0	0	0	0	0	0	0	0
S2	0	0	0	0	0	0	0	0	0
S2?	0	0	0	0	0	0	0	1	0
S2S3	0	0	0	0	0	0	0	0	0
S2S4	0	0	0	0	0	0	0	0	0
S3	0	1	0	1	0	0	0	0	0
S3?	0	0	0	0	0	0	0	0	0
S3S4	0	0	0	0	0	0	0	0	0
Total S1-S3:	0	1	0	1	0	0	1	0	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	5.166666667	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.

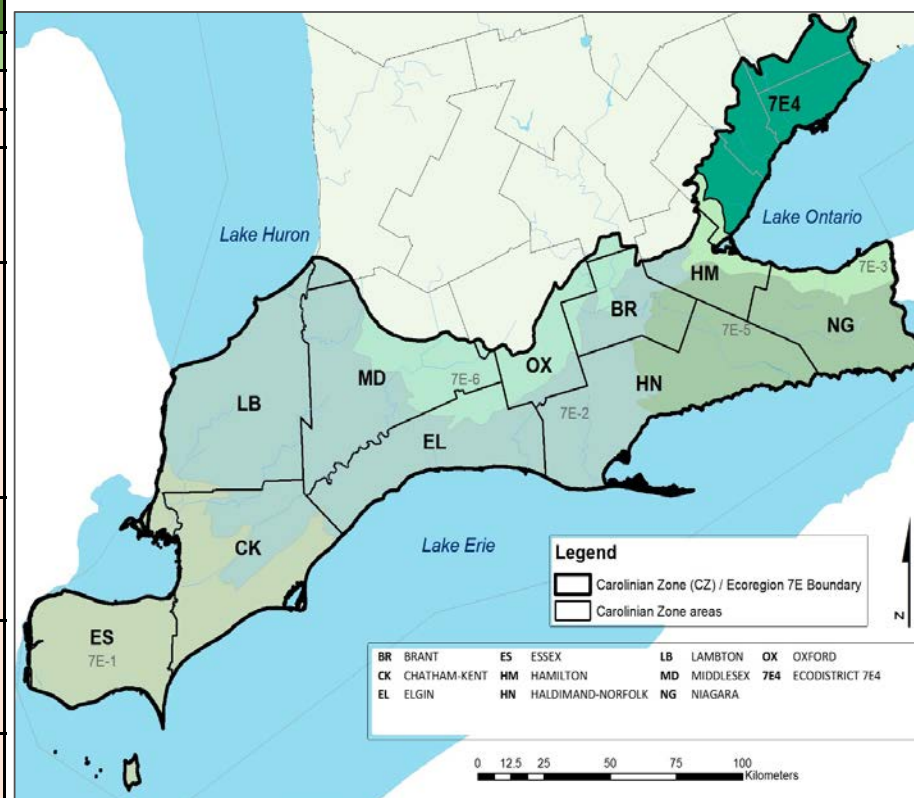
National (N) and Subnational (S) Conservation Status Ranks	
RANK	DEFINITION
NX	Presumed Extirpated - Species or ecosystem is believed to be extirpated from the jurisdiction (i.e., nation, or state/province). Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered. [equivalent to "Regionally Extinct" in IUCN Red List terminology]
SX	
NH	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.
SH	
N1	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.
S1	
N2	Imperiled - At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
S2	
N3	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.
S3	
N4	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.
S4	
N5	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.
S5	

Variant National and Subnational Conservation Status Ranks	
RANK	DEFINITION
N#	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).
S#	

NU	Unrankable - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
SU	
NNR	Unranked - National or subnational conservation status not yet assessed.
SNR	
NNA	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).
SNA	
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#?	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.
S#?	

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 least 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 different 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.
<p>"+" 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.</p>				

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
<p>Waterfowl Stopover and Staging Areas (Terrestrial)</p> <p><u>Rationale:</u> Habitat important to migrating waterfowl.</p>	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). <ul style="list-style-type: none"> 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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} <ul style="list-style-type: none"> 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;	No;	No;
<p>Waterfowl Stopover and Staging Areas (Aquatic)</p> <p><u>Rationale:</u> Important for local and migrant</p>	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	<p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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;	No;	No;

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 Rationale: 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
			<ul style="list-style-type: none"> NHIC Shorebird Migratory Concentration Area 	provides development effects and mitigation measures.				
<p>Raptor Wintering Area</p> <p><u>Rationale:</u> Sites used by multiple species, a high number of individuals and used annually are most significant</p>	<p>Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl</p> <p><u>Special Concern:</u> Short-eared Owl Bald Eagle</p>	<p><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.</p> <p><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).</p>	<p>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}.</p> <p>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.</p> <p><u>Information Sources:</u></p> <ul style="list-style-type: none"> 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. 	<p>Studies confirm the use of these habitats by:</p> <ul style="list-style-type: none"> 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.
<p>Bat Hibernacula</p> <p><u>Rationale:</u> Bat hibernacula are rare habitats in all Ontario landscapes.</p>	<p>Big Brown Bat Tri-colored Bat</p>	<p>Bat Hibernacula may be found in these ecosites: CCR1 CCR2 CCA1 CCA2 (Note: buildings are not considered to be SWH)</p>	<p>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.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> OMNR for possible locations and contact for local experts Natural Heritage Information Center (NHIC) Bat Hibernaculum 	<ul style="list-style-type: none"> 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
			<ul style="list-style-type: none"> 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. 	<p>Projects Potential Impacts to Bats and Bat Habitats”^{ccv}.</p> <ul style="list-style-type: none"> SWH MIST^{cxlix} Index #1 provides development effects and mitigation measures. 				
<p>Bat Maternity Colonies</p> <p><u>Rationale:</u> Known locations of forested bat maternity colonies is extremely rare in all Ontario landscapes.</p>	<p>Big Brown Bat Silver-haired Bat</p>	<p>Maternity colonies considered SWH are found in forested Ecosites.</p> <p>All ELC Ecosites in ELC Community Series: FOD FOM SWD SWM</p>	<p>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}.</p> <ul style="list-style-type: none"> 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} <p><u>Information Sources</u></p> <ul style="list-style-type: none"> OMNR for possible locations and contact for local experts University Biology Departments with bat experts. 	<ul style="list-style-type: none"> Maternity Colonies with confirmed use by; <ul style="list-style-type: none"> >10 Big Brown Bats^l >5 Adult Female Silver-haired Bats^l 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. 	<p>Yes;</p> <p>Suitable deciduous forest community are present within the Study Area (i.e., FOD8-1 along both banks of the Thames River).</p>	<p>Yes;</p> <p>Suitable deciduous forest community are present within the Study Area (i.e., FOD2-2, FOD9-4)</p>	<p>Candidate;</p> <p>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.</p>	<p>Candidate;</p> <p>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.</p>
<p>Turtle Wintering Areas</p> <p><u>Rationale:</u> Generally, sites are the only known sites in the area. Sites with the highest number of individuals are most</p>	<p>Midland Painted Turtle</p> <p><u>Special Concern:</u> Northern Map Turtle Snapping Turtle</p>	<p>Snapping and Midland Painted turtles; ELC Community Classes; SW, MA, OA, and SA. ELC Community Series; FEO and BOO</p> <p>Northern Map Turtle - Open Water areas</p>	<p>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.</p> <ul style="list-style-type: none"> Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen^{ci, cx, cxviii}. Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH. 	<ul style="list-style-type: none"> 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^l. 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. 	<p>Yes;</p> <p>Suitable habitat is present within the Study Area at crossings with natural aquatic features such as Thames River, Baptiste</p>	<p>No;</p> <p>Agricultural drains provide suitable habitat, however, they are man-made and therefore do not qualify as SWH.</p>	<p>Candidate;</p> <p>A turtle overwintering habitat assessment was not completed, however, candidate habitat was observed during field investigations.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>

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> <ul style="list-style-type: none"> EIS studies carried out by Conservation Authorities. Field Naturalist Clubs OMNRF Ecologist or Biologist Natural Heritage Information Center (NHIC) 	<ul style="list-style-type: none"> 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> <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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. or 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.				
<p>Colonially - Nesting Bird Breeding Habitat (Bank and Cliff)</p> <p>Rationale: 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.</p>	Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies).	<p>Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles, cliff faces, bridge abutments, silos, barns (Cliff Swallows).</p> <p>Habitat found in the following ecosites: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1</p>	<ul style="list-style-type: none"> 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Reports and other information available from Conservation Authorities Ontario Breeding Bird Atlas ^{ccv}. Bird Studies Canada; <i>NatureCounts</i> http://www.birdscanada.org/birdmon/ Field Naturalist Clubs. 	<p>Studies confirming:</p> <ul style="list-style-type: none"> 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.
<p>Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)</p> <p>Rationale: Large colonies are important to local bird population, typically sites are only known colony in area and are used annually.</p>	Great Blue Heron Black-crowned Night-Heron Great Egret Green Heron	<p>SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1</p>	<ul style="list-style-type: none"> 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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. 	<p>Studies confirming:</p> <ul style="list-style-type: none"> 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
			<ul style="list-style-type: none"> Reports and other information available from Conservation Authorities MNRF District Offices. Local naturalist clubs. 	provides development effects and mitigation measures.				
<p>Colonially - Nesting Bird Breeding Habitat (Ground)</p> <p><u>Rationale:</u> Colonies are important to local bird population, typically sites are only known colony in area and are used annually.</p>	<p>Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird</p>	<p>Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1:50,000 NTS map).</p> <p>Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird)</p> <p>MAM1-6 MAS1-3 CUM CUT CUS</p>	<ul style="list-style-type: none"> 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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. 	<p>Studies confirming:</p> <ul style="list-style-type: none"> 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.
<p>Migratory Butterfly Stopover Areas</p> <p><u>Rationale:</u> Butterfly stopover areas are extremely rare habitats and are biologically important for butterfly</p>	<p>Painted Lady Red Admiral</p> <p><u>Special Concern:</u> Monarch</p>	<p>Combination of ELC Community Series; need to have present one Community Series from each landclass:</p> <p><u>Field:</u> CUM CUT CUS</p>	<p>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}.</p> <ul style="list-style-type: none"> 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 	<p>Studies confirm:</p> <ul style="list-style-type: none"> 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.		<p><u>Forest:</u> FOC FOD FOM CUP</p> <p>Anecdotally, a candidate sight for butterfly stopover will have a history of butterflies being observed.</p>	<p>an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat ^{cxlviii, cxlix}.</p> <ul style="list-style-type: none"> 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}. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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. 				
<p>Landbird Migratory Stopover Areas</p> <p><u>Rationale:</u> Sites with a high diversity of species as well as high numbers are most significant.</p>	<p>All migratory songbirds.</p> <p>Canadian Wildlife Service Ontario website: http://www.ec.gc.ca/nature/default.asp?lang=En&n=421B7A9D-1</p> <p>All migrant raptors species:</p> <p>Ontario Ministry of Natural Resources: Fish and Wildlife Conservation Act, 1997. Schedule 7: Specially Protected Birds (Raptors)</p>	<p>All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD</p>	<p>Woodlots need to be >5 ha in size ^{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.</p> <ul style="list-style-type: none"> 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}. <p><u>Information Sources</u></p>	<p>Studies confirm:</p> <ul style="list-style-type: none"> Use of the woodlot by >200 birds/day and with >35 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. 	<p>No;</p> <p>The site is more than 5 km from Lake Ontario and Lake Erie.</p>	<p>No;</p> <p>The site is more than 5 km from Lake Ontario and Lake Erie.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>

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
			<ul style="list-style-type: none"> Bird Studies Canada Ontario Nature Local birders and naturalist club Ontario Important Bird Areas (IBA) Program 					
<p>Deer Winter Congregation Areas</p> <p><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}.</p>	White-tailed Deer	<p>All Forested Ecosites with these ELC Community Series; FOC FOM FOD SWC SWM SWD</p> <p>Conifer plantations much smaller than 50 ha may also be used.</p>	<ul style="list-style-type: none"> 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> MNRF District Offices. LIO/NRVIS 	<p>Studies confirm:</p> <ul style="list-style-type: none"> 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
<p>Cliffs and Talus Slopes</p> <p>Rationale: Cliffs and Talus Slopes are extremely rare habitats in Ontario.</p>	<p>Any ELC Ecosite within Community Series:</p> <p>TAO TAS TAT CLO CLS CLT</p>	<p>A Cliff is vertical to near vertical bedrock >3 m in height.</p> <p>A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris</p>	<p>Most cliff and talus slopes occur along the Niagara Escarpment.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Confirm any ELC Vegetation Type for Cliffs or Talus Slopes ^{lxxviii}. SWH MIST ^{cxlix} Index #21 provides development effects and mitigation measures. 	<p>No;</p> <p>No Cliff and Talus slope ecosites were identified within the Study Area.</p>	<p>No;</p> <p>No Cliff and Talus slope ecosites were identified within the Study Area.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>
<p>Sand Barren</p> <p>Rationale: Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry</p>	<p>ELC Ecosites:</p> <p>SBO1 SBS1 SBT1</p> <p>Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always ≤60%.</p>	<p>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%.</p>	<p>A sand barren area >0.5ha in size.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> OMNRF Districts. Natural Heritage Information Center (NHIC) has location information available on their website Field Naturalist Clubs Conservation Authorities 	<ul style="list-style-type: none"> 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. 	<p>No;</p> <p>No Sand Barren ecosites were identified within the Study Area.</p>	<p>No;</p> <p>No Sand Baren ecosites were identified within the Study Area.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>
<p>Alvar</p> <p>Rationale: Alvars are extremely rare habitats in Ecoregion 7E.</p>	<p>ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2</p> <p>Five Alvar Indicator Species:</p> <p>1) <i>Carex crawei</i> 2) <i>Panicum</i></p>	<p>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</p>	<p>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. ^{cxix}</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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. 	<p>Field studies identify four of the five Alvar Indicator Species ^{lxxv} at a Candidate Alvar site is Significant.</p> <ul style="list-style-type: none"> 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. 	<p>No;</p> <p>No Alvar ecosites were identified within the Study Area.</p>	<p>No;</p> <p>No Alvar ecosites were identified within the Study Area.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>

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
	<p><i>philadelphicum</i> 3) <i>Elocharis compressa</i> 4) <i>Scutellaria parvula</i> 5) <i>Trichostema brachiatum</i></p> <p>These indicator species are very specific to Alvars within Ecoregion 7E.</p>	<p>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}.</p>						
<p>Old Growth Forest</p> <p>Rationale: Due to historic logging practices and land clearance for agriculture, old growth forest is rare in Ecoregion 7E.</p>	<p>Forest Community Series: FOD FOC FOM SWD SWC SWM</p>	<p>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.</p>	<ul style="list-style-type: none"> Woodland area is >0.5 ha. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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 	<p>Field Studies will determine:</p> <ul style="list-style-type: none"> 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. 	<p>No;</p> <p>No Old Growth Forest communities were identified within the Study Area.</p>	<p>No;</p> <p>No Old Growth Forest communities were identified within the Study Area.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>
<p>Savannah</p> <p>Rationale: Savannahs are extremely rare habitats in Ontario.</p>	<p>TPS1 TPS2 TPW1 TPW2 CUS2</p>	<p>A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%.</p> <p>In ecoregion 7E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake</p>	<p>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.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Natural Heritage Information Center (NHIC) has location data available on their website. OMNRF Districts. Field Naturalists Clubs. Conservation Authorities. 	<p>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</p> <ul style="list-style-type: none"> 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 	<p>No;</p> <p>No Savannah ecosites were identified within the Study Area.</p>	<p>No;</p> <p>No Savannah ecosites were identified within the Study Area.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>

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 Rationale: 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 (E). 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> <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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 Rationale: 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> <ul style="list-style-type: none"> • 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} . <ul style="list-style-type: none"> • 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
<p>Waterfowl Nesting Area</p> <p>Rationale: Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant.</p>	<p>American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard</p>	<p>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</p> <p>Note: includes adjacency to Provincially Significant Wetlands</p>	<p>A waterfowl nesting area extends 120 m ^{cxlix} from a wetland (> 0.5 ha) or a wetland (>0.5 ha) 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}.</p> <ul style="list-style-type: none"> 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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 	<p>Studies confirmed:</p> <ul style="list-style-type: none"> 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. 	<p>Yes;</p> <p>MA communities were identified within the Study Area.</p>	<p>No;</p> <p>No suitable ecosites were identified within the Study Area.</p>	<p>Candidate;</p> <p>Confirmed habitat was not observed during field investigations; however, targeted surveys were not completed.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>
<p>Bald Eagle and Osprey Nesting, Foraging and Perching Habitat</p> <p>Rationale: Nest sites are fairly uncommon in Ecoregion 7E and are used annually by these species. Many suitable nesting locations may</p>	<p>Osprey</p> <p>Special Concern: Bald Eagle</p>	<p>ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds, and wetlands</p>	<p>Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water.</p> <ul style="list-style-type: none"> 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). <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Natural Heritage Information Center (NHIC) compiles all known nesting sites for Bald Eagles in Ontario. 	<p>Studies confirm the use of these nests by:</p> <ul style="list-style-type: none"> 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 	<p>Yes;</p> <p>The FOD8-1 community along the Thames River may provide suitable nesting habitat.</p>	<p>No;</p> <p>No suitable ecosites were identified within the Study Area.</p>	<p>Candidate;</p> <p>A juvenile Bald Eagle was observed flying overhead during field studies; however, targeted surveys were not completed.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>

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.			<ul style="list-style-type: none"> MNR 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 	<p>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}</p> <ul style="list-style-type: none"> 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 				
<p>Woodland Raptor Nesting Habitat</p> <p><u>Rationale:</u> Nests sites for these species are rarely identified; these area sensitive habitats are often used annually by these species.</p>	<p>Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk</p>	<p>May be found in all forested ELC Ecosites.</p> <p>May also be found in SWC, SWM, SWD and CUP3</p>	<p>All natural or conifer plantation woodland/forest stands combined >30ha or with >4 ha of interior habitat ^{lxxxviii, lxxxix, xc, xci, xciii, xciv, xcv, ccvi, cxxxiii}. Interior habitat determined with a 200m buffer ^{cxlviii}</p> <ul style="list-style-type: none"> 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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 	<p>Studies confirm:</p> <ul style="list-style-type: none"> 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 	<p>No;</p> <p>No suitable ecosites were identified within the Study Area of sufficient size.</p>	<p>No;</p> <p>No suitable ecosites were identified within the Study Area of sufficient size.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>

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 Rationale: These habitats are rare and when identified will often be the only breeding site for local populations of turtles.	Midland Painted Turtle Special Concern: 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	<ul style="list-style-type: none"> 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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 Rationale: 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} . <ul style="list-style-type: none"> 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}. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Topographical Map. Thermography. Hydrological surveys conducted by Conservation Authorities and MOE. 	Field Studies confirm: <ul style="list-style-type: none"> 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
			<ul style="list-style-type: none"> Field Naturalists Clubs and landowners. Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped. 	measures				
Amphibian Breeding Habitat (Woodland). Rationale: 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	<ul style="list-style-type: none"> Presence of a wetland, pond, or woodland pool (including vernal pools) >500 m² within or adjacent (within 120 m) to a woodland (no minimum size) ^{clxxxii, lxiii, lxxv, lxvi, lxvii, lxviii, lxi, 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}. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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; <ul style="list-style-type: none"> 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) Rationale: 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 MNR mapping and could be important amphibian breeding habitats ^{clxxxii} . <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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> <ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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
<p>Woodland Area-Sensitive Bird Breeding Habitat</p> <p><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.</p>	<p>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</p> <p><u>Special Concern:</u> Cerulean Warbler Canada Warbler</p>	<p>All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD</p>	<ul style="list-style-type: none"> 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}. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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 	<p>Studies confirm:</p> <ul style="list-style-type: none"> 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. 	<p>No;</p> <p>No suitable ecosites were identified within the Study Area.</p>	<p>No;</p> <p>No suitable ecosites were identified within the Study Area.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>
<p>Marsh Breeding Bird Habitat</p> <p><u>Rationale:</u> Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.</p>	<p>American Bittern Virginia Rail Sora Common Moorhen American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Green Heron Trumpeter Swan</p> <p><u>Special Concern:</u> Black Tern Yellow Rail</p>	<p>MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1</p> <p>For Green Heron: All SW, MA and CUM1 sites.</p>	<p>Nesting occurs in wetlands. All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present ^{cxxiv}.</p> <ul style="list-style-type: none"> 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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. 	<p>Studies confirm:</p> <ul style="list-style-type: none"> 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 	<p>Yes;</p> <p>MA communities were identified within the study area.</p>	<p>No;</p> <p>No suitable ecosites were identified within the Study Area.</p>	<p>Candidate;</p> <p>Confirmed habitat was not observed during field investigations. however, targeted surveys were not completed.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>
<p>Open Country Bird Breeding Habitat</p> <p><u>Rationale:</u> This wildlife habitat is declining throughout</p>	<p>Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow</p> <p><u>Special Concern:</u> Short-eared Owl</p>	<p>CUM1 CUM2</p>	<p>Large grassland areas (includes natural and cultural fields and meadows) >30 ha ^{clx, clxi, clxii, clxiii, clxiv, clxv, clxvi, clxvii, clxviii, clxix}.</p> <ul style="list-style-type: none"> 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). 	<p>Studies confirm:</p> <ul style="list-style-type: none"> 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 	<p>No;</p> <p>No suitable ecosites were identified within the Study Area of sufficient size.</p>	<p>No;</p> <p>No suitable ecosites were identified within the Study Area of sufficient size.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>

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.			<ul style="list-style-type: none"> 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. <p><u>Information Sources:</u></p> <ul style="list-style-type: none"> 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. <ul style="list-style-type: none"> 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. 				
<p>Shrub/Early Successional Bird Breeding Habitat</p> <p><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 ^{cxci}.</p>	<p><u>Indicator Spp:</u> Brown Thrasher Clay-coloured Sparrow</p> <p><u>Common Spp:</u> Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher</p> <p><u>Special Concern:</u> Yellow-breasted Chat Golden-winged Warbler</p>	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. <ul style="list-style-type: none"> 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Agricultural land classification maps, Ministry of Agriculture. Local bird clubs. Ontario Breeding Bird Atlas Reports and other information available from Conservation Authorities. 	Studies confirm: <ul style="list-style-type: none"> 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.
<p>Terrestrial Crayfish;</p> <p><u>Rationale:</u> Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats</p>	Chimney or Digger Crayfish; (<i>Creaserinus fodiens</i>) Devil Crawfish or Meadow Crayfish; (<i>Lacunambarus nebrascensis</i>)	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. <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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> <ul style="list-style-type: none"> 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} . <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 ^{lxviii}. <u>Information Sources</u> <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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
<p>Amphibian Movement Corridors</p> <p><u>Rationale:</u> Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.</p>	<p>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</p>	<p>Corridors may be found in all ecosites associated with water.</p> <ul style="list-style-type: none"> Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1 	<p>Movement corridors between breeding habitat and summer habitat ^{clxxiv, clxxv, clxxvi, clxxvii, clxxviii, clxxix, clxxx, clxxxi}.</p> <p>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.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> MNRF District Office. Natural Heritage Information Centre (NHIC). Reports and other information available from Conservation Authorities. Field Naturalist Clubs. 	<ul style="list-style-type: none"> 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 	<p>No;</p> <p>No suitable ecosites were identified within the Study Area of sufficient size.</p>	<p>No;</p> <p>No suitable ecosites were identified within the Study Area of sufficient size.</p>	<p>No;</p> <p>Candidate habitat was not identified, however, targeted surveys were not completed.</p>	<p>No;</p> <p>Candidate habitat was not identified, however, targeted surveys were not completed.</p>

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
<p>7E-2 Bat Migratory Stopover Area</p> <p><u>Rationale:</u> Stopover areas for long distance migrant bats are important during fall migration.</p>	<p>Hoary Bat Eastern Red Bat Silver-haired Bat</p>	<p>No specific ELC types.</p>	<ul style="list-style-type: none"> 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> OMNRF for possible locations and contact for local experts University of Waterloo, Biology Department 	<ul style="list-style-type: none"> 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. 	<p>No;</p> <p>The study area does not include Long Point.</p>	<p>No;</p> <p>The study area does not include Long Point.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>	<p>No;</p> <p>Candidate habitat was not identified.</p>

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 During Background Review - Panhandle Regional Expansion	Species/Suitable Habitat Identified During Field Investigations - Panhandle	Suitable Habitat Identified During Background Review - Lemmington Interconnect	Species/Suitable Habitat Identified During Field Investigations - Leamington
Birds	Bank Swallow <i>Riparia riparia</i>	THR	THR Schedule +E16:116	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 constructed 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 <i>Tyto alba</i>	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 nesting 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 <i>Hirundo rustica</i>	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 - NHC, OBBA	Yes Antropogenic structures 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 structures 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 <i>Dolichonyx oryzivorus</i>	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 - NHC, 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 <i>Chaetura pelagica</i>	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 <i>Sturnella magna</i>	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 - NHC, 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 During Background Review - Panhandle Regional Expansion	Species/Suitable Habitat Identified During Field Investigations - Panhandle	Suitable Habitat Identified During Background Review - Lemmington Interconnect	Species/Suitable Habitat Identified During Field Investigations - Leamington
Birds	Henslow's Sparrow <i>Centronyx henslowii</i>	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 <i>Rallus elegans</i>	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 Provincially Significant Wetland (PSW) may provide suitable nesting habitat for this species.	No Suitable habitat 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 <i>Ixobrychus exilis</i>	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 associated 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 habitat 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 <i>Protonotaria citrea</i>	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 deciduous 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.

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Fish	Eastern Sand Darter (Ontario populations) <i>Ammocrypta pellucida</i>	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 <i>Erimyzon sucetta</i>	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) <i>Acipenser fulvescens</i>	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 <i>Opsopoeodus emiliae</i>	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 from 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 <i>Notropis anogenus</i>	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 (<i>Chara</i> 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 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.
Mammals	Eastern Small-footed Myotis <i>Myotis leibii</i>	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 <i>Myotis lucifugus</i>	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, <i>Myotis lucifugus</i> 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 <i>Myotis septentrionalis</i>	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, <i>Myotis septentrionalis</i> 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 <i>Perimyotis subflavus</i>	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, <i>Perimyotis subflavus</i> 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 <i>Truncilla donaciformis</i>	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 <i>Obovaria olivaria</i>	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 <i>Toxolasma parvum</i>	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 Baptiste 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 <i>Liatris spicata</i>	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 prairies 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) <i>Emydoidea blandingii</i>	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 associated 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) <i>Plestiodon fasciatus</i>	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 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.
Reptiles	Eastern Foxsnake (Carolinian population) <i>Pantherophis gloydi</i>	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 Riparian habitat associated with the St. Clair Marsh Complex PSW, Baptiste Creek, Jeannettes Creek, the Thames River and agricultural drains as well as the various hedgerows 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 riparian 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 During Background Review - Panhandle Regional Expansion	Species/Suitable Habitat Identified During Field Investigations - Panhandle	Suitable Habitat Identified During Background Review - Lemmington Interconnect	Species/Suitable Habitat Identified During Field Investigations - Leamington
Reptiles	Massasauga (Carolinian population) <i>Sistrurus catenatus</i>	END	END Schedule 1	END	<p>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.</p> <p>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.</p>	TP, BO, MA, FO, AL, RB, and CUM with open areas.	<p>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.</p> <p>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.</p>	Panhandle Study Area - ORAA	No	Neither species nor suitable was identified during field investigations.	Species was not identified through the background review.	Neither species nor suitable was identified during field investigations.
Reptiles	Queensnake <i>Regina septemvittata</i>	END	END Schedule 1	END	<p>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.</p> <p>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.</p>	OAO with clear water and rocky or gravel bottoms with lots of places to hide and abundance of crayfish.	<p>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.</p> <p>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.</p>	Panhandle Study Area - ORAA	Yes	Species was not identified during field investigations, however, suitable habitat was identified and presence should be assumed.	Species was not identified through the background review.	Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Reptiles	Spiny Softshell <i>Apalone spinifera</i>	END	END Schedule 1	END	<p>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.</p> <p>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.</p>	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.	<p>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.</p> <p>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.</p>	Panhandle Study Area - NHIC	Yes	Species was not identified during field investigations, however, suitable habitat was identified and presence should be assumed.	Species was not identified through the background review.	Neither species nor suitable was identified during field investigations, however, targeted surveys were not conducted.
Reptiles	Timber Rattlesnake <i>Crotalus horridus</i>	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.		<p>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.</p> <p>It has not been found anywhere else in Canada since then, and is therefore considered extirpated from Canada.</p>	Panhandle Study Area - NHIC	No	Species is considered extirpated from Ontario.	Species was not identified through the background review.	Species was not identified through the background review.

Glossary

EXP	ESA - Extirpated - a species that no longer exists in the wild in Ontario but still occurs elsewhere. SARA - Extirpated - 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 Status of Endangered 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.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Environmental Report, Section 4.3.2.1, pp. 30-31

Preamble:

The PPS, implemented under the Planning Act (1990), protects Provincially Significant Wetlands (PSWs) from development and site alteration while regulations under the Conservation Authorities Act (1990) prohibit certain activities within wetlands (MNRF, 2010). The PPS further specifies that a wetland is considered provincially significant if evaluated as such through the OWES (MNRF, 2014). Until categorized by NDMNRF, wetlands are classified as "unevaluated".

Question:

- a) Does Enbridge acknowledge that "unevaluated" wetlands are often the result of research gaps, and do not always indicate a lack of ecological importance or value?
- b) Will Enbridge commit to surveying and mitigating effects on both PSWs (classified through the OWES), as well as "unevaluated" wetlands?

Response

- a) Yes.
- b) Yes. Please also see the response to Exhibit I.TFG.6, part d).

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Environmental Report, Section 4.3.2.2.2, pp. 32

Preamble:

The Environmental Report notes that one woodlot on County Road 8 will be crossed by the pipeline, which may result in some tree clearing.

Question:

- a) Please provide information on EGI's additive effects for woodlot cover losses due to tree clearing for pipeline construction, operation, and maintenance.
- b) Please explain why the additive effects of woodlot cover losses due to tree clearing for pipeline construction, operation, and maintenance were not included in the Environmental Report, as per OEB Environmental Guidelines?
- c) Please discuss whether there are any plans to identify species of interest and transplant vegetation accordingly? If no, please explain why not.
- d) Will EGI commit to replacing the loss of trees through its Tree Replacement Program? Please explain what age and species of trees will be removed and what age and species of trees will be replanted.

Response

- a) Potential effects to woodlots and associated impacts are outlined in Section 4.3 and 5.3.2 of the ER. Enbridge Gas will avoid clearing trees to the extent feasible. In consultation with directly impacted landowners, Enbridge Gas will restore the lands to a state similar to pre-existing conditions with the exception of woodlands and trees within the permanent easement. In these instances, Enbridge Gas is committed to implementing a tree replacement program that replants 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 based on input from Indigenous

communities (trees to be replaced on a 3:1 area basis at 1000 tree seedlings per acre).

- b) Tree clearing for pipeline construction and operations is anticipated to be minor considering the limited woodlots within the construction footprint. With the implementation of the tree replacement program described in part a) above, additive effects of woodlot removal are not anticipated and thus were not outlined in the cumulative effects assessment.
- c) Although not identified during the 2022 field investigations, a number of plant species of conservation concern (either Special concern provincially or federally, or with a sub-national rank of S3 or lower) were identified to have the potential to occur within the study area (e.g., cup plant, field thistle etc.). See Section 4.3.3.1 of the ER.

If previously unidentified rare plants or ecological communities are discovered during construction, a Plant Species and Ecological Communities of Concern Discovery plan will be followed and will be implemented as part of the Environmental Protection Plan.

- d) Yes, see part a) above. Trees likely to be removed as a result of the Leamington project are largely less than 25 cm diameter at breast height (DBH) with the occasional tree between 25 and 50 cm DBH. Tree species to be removed include mostly shagbark hickory, with some elm, swamp oak and Freeman's maple. The project will attempt to limit tree removal to the greatest extent possible.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Environmental Report, Section 4.4.7, pp. 45-46

Preamble:

The Panhandle Loop and Leamington Interconnect are proposed to be constructed looping existing pipeline infrastructure (Panhandle Loop) or adjacent to or within existing road allowances on public or private property (Leamington Interconnect).

Question:

- a) Has EGI evaluated the impacts of controlled vehicle access routes on surrounding communities, many of which contain Three Fires First Nation band members who live off reserve? If no, please explain why not.

Response

- a) Yes, Enbridge Gas has evaluated traffic impacts as part of the ER in Section 4.4.4. Enbridge Gas has also been consulting with the relevant municipalities to develop road access requirements and crossing methods to limit impacts to traffic.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Environmental Report, Table 5-4, p. 57

Preamble:

The Environmental Report notes that if the pipeline route or an adjacent farm field is identified as having SCN all equipment and boots should be properly cleaned before moving to an area that has not shown to be impacted by SCN. This may involve thorough washing before moving equipment from an impacted field to non-impacted field.

Question:

- a) Please explain how Enbridge is testing for SCN along the pipeline route and adjacent farm field(s)?
- b) Does Enbridge have a SCN-specific best practice protocol? Are Enbridge contractors/consultants trained specifically in mitigating SCN spread?
- c) Where does "thorough washing" occur, to prevent field contamination?
- d) Please explain how potential downstream impacts are mitigated from washing contaminated equipment (including boots) with SCN?

Response

- a) As noted in Table 5.1 Potential Impacts and Recommended Mitigation and Protective Measures of the Environmental Report, Enbridge Gas has conducted pre-construction soil-sampling program to determine the presence of soybean cyst nematode ("SCN") on agricultural lands along the pipeline right of way. Samples were taken from each field through a series of grab samples based on sample area. The samples are then submitted to a lab for confirmation of soybean cyst nematodes and eggs. If SCN is found, best management practices will be developed in consultation with landowners and with consideration of local management practices. Local management practices may include pressure washing of equipment upon

leaving an infested field and/or topsoil stripping of infested fields. Any imported topsoil will also be analyzed for SCN prior to placement.

- b) Yes, Enbridge Gas has developed a number of best management practices for mitigating the spread of SCN. In general, these practices are developed with the affected landowners but typically include establishment of on-site pressure washing equipment upon leaving an infested field and/or topsoil stripping of infested fields and avoiding importing topsoil infected with SCN.

Yes, Enbridge Gas trains all field personnel (including contractors) regarding environmental mitigation measures required during construction, including measures to limit the spread of SCN.

- c) Thorough washing involves setting up wash stations at the edge of an infested field so that clean equipment can exit the wash station on a non-infested field/property. Wash stations are designed in accordance with Table 5.5 of the ER to avoid the potential for field and surface water contamination.
- d) Wash stations are designed in accordance with Table 5.5 of the ER to avoid the potential for field and surface water contamination.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Environmental Report, Table 5-5, pp. 59-60

Preamble:

The Environmental Report notes EGI should restrict construction equipment to designated controlled vehicle access routes to minimize the potential contamination and that it should control quantity and quality of stormwater discharge using best management practices.

Question:

- a) Please explain why dewatering mitigation measures were excluded from this Table?
- b) What mitigation measures will be taken (throughout the project's lifecycle), to maintain the biophysical features of the surface water whilst dewatering occurs?
- c) If surface water quality and/or quantity is altered post-dewatering, please explain how fish and invertebrate habitat will be restored.
- d) Please provide all vehicle routes for construction sites along bodies of water (rivers, streams, wetlands, etc.).
- e) Please provide a clear, visual map for all construction sites.
- f) Please provide information on EGI's stormwater discharge best management practices, in part, as it relates to changes in surface water quality and quantity.

Response

- a) Mitigation measures for dewatering are outlined in Section 5.3.1.2 & Table 5-3 of the ER with additional mitigation measures pertaining to stormwater best management practices presented in Table 5-5.
- b) and f)

Dewatering will only occur during construction. Mitigation measures for dewatering are outlined in Section 5.3.1.2 & Table 5-3 of the ER with additional mitigations pertaining to stormwater best management practices presented in Table 5-5. Some examples of mitigation measures identified in the ER include the use of erosion and sediment control measures, filtration tubs, sediment bags, discharge being setback a minimum of 30 metres from a waterbody, and oversight from a full-time environmental inspector.

- c) A full-time Environmental Inspector (“EI”) will be designated for the project. The EI will be responsible for monitoring water taking/discharge for any potential erosion and sediment control issues that may affect the quality and quantity of surface water. In the unlikely event that water quality or quantity are affected to a point that impacts to fish and invertebrate habitat occur, Enbridge Gas would work with DFO and other applicable agencies / Indigenous communities to create a plan in accordance with the EPP and DFO requirements.
- d) and e)
Please see Attachment 1 to this response.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

Due to size, the attachment to this response can be found electronically by accessing the link below and will be filed with the OEB under separate cover.

<https://www.enbridgegas.com/about-enbridge-gas/projects/panhandle-regional-expansion>

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Environmental Report, Section 5.3.2.2, p. 61

Preamble:

The Environmental Report notes that a field investigation of each watercourse crossing will be conducted to determine if fish and/or fish habitat is present.

Question:

- a) Please provide information on EGI's field investigation protocol for determining fish and fish habitat, including accounting for various watercourses.

Response

- a) Qualified aquatic biologists have completed ecological field investigations to determine if fish and/or fish habitats are present. The proposed pipeline right-of-way, plus 25 m upstream and downstream of the right-of-way limits, were assessed for the presence of fish and/or fish habitat. Visual aquatic habitat assessments within these limits were completed at each of the watercourse crossings. 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. 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.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Environmental Report, Table 5-13, p. 76

Preamble:

The Environmental Report provides obtaining any municipal approvals required for land restrictions and haul routes as a proposed mitigation measure.

Question:

- a) Please share land restriction locations. If EGI has not determined the location of restricted lands, please explain when these lands will be identified.

Response

- a) Enbridge Gas engaged in early consultation with municipalities regarding haul routes, to assess whether they have construction projects of their own on proposed roads. This early engagement was also conducted to ensure roads are adequate for construction loads.

Enbridge Gas has consulted with all municipalities and confirmed their agreement with Enbridge Gas' proposed haul routes.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Exhibit A, Tab 2, Schedule 1, Attachment 1, p. 1

Preamble:

Section 94 of the Act requires applicants for an order granting leave under the relevant part to file a map showing the general location of the proposed work and the municipalities, highways, railways, utility lines and navigable waters through, under, over, upon or across which the proposed work is to pass.

Question:

- a) Please indicate whether there are any navigable waters impacted by the Project. If yes, please provide details and all analysis undertaken by EGI with respect to the impacts on navigable waters by the Project.

Response

- a) Yes, the project crosses the Thames River, which is considered a navigable waterway under the Canadian Navigable Waters Act schedule for navigable waters. All major watercourse crossings for the project, including the Thames River, are proposed to be undertaken using trenchless installation methods, which will mitigate any potential impacts on the navigational use of the watercourses.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group (“TFG”)

INTERROGATORY

References:

- Enbridge Inc. Indigenous Peoples Policy (the IPP), provided at Exhibit H, Tab 1, Schedule 2, Attachment 5
- National Inquiring into Missing and Murdered Indigenous Women and Girls (“MMWIG”) “Calls for Justice”⁵
- Truth and Reconciliation Commission of Canada (“TRCC”) “Calls to Action”, see Appendix C⁶
- United Nations Declaration on the Rights of Indigenous Peoples (“UNDRIP”), see Appendix D⁷

Preamble:

The IPP provides that Enbridge Inc. recognizes “the importance of [UNDRIP] within the context of existing Canadian and U.S. law and the commitments that governments in both countries have made to protecting the rights of Indigenous Peoples.”

The IPP notes that “[p]ositive relationships with Indigenous Peoples, based on mutual respect and focused on achieving common goals, will create constructive outcomes for Indigenous communities and for Enbridge”

Enbridge Inc. has committed to pursuing sustainable relationships with Indigenous Nations and groups and that it engages in forthright and sincere consultation with Indigenous Peoples about projects and operations through processes that seek to achieve early and meaningful engagement so the input of Indigenous Nations can help define projects that may occur on lands traditionally used by Indigenous Peoples.

⁵ MMIWG “Calls for Justice” (June 2019), available online at: https://www.mmiwg-ffada.ca/wp-content/uploads/2019/06/Calls_for_Justice.pdf.

⁶ TRCC “Calls to Action” (29 March 2016), available online at: <https://crc-canada.org/wp-content/uploads/2016/03/trc-calls-to-action-english.pdf>.

⁷ UN General Assembly, United Nations Declaration on the Rights of Indigenous Peoples: resolution / adopted by the General Assembly (2 October 2007), A/RES/61/295, available online at: https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf.

Section 4(a) of the United Nations Declaration on the Rights of Indigenous Peoples Act, 6 affirms UNDRIP as a universal international human rights instrument with application in Canadian law.

UNDRIP requires that Indigenous Peoples are consulted in good faith in order to obtain their free, prior and informed consent (“FPIC”) (i) before measures are adopted that affect them (article 19) or (ii) when undertaking a project that affect their rights to land, territory and resources (article 32).

The TRCC’s Call to Action #92 calls upon the corporate sector in Canada to adopt UNDRIP as a reconciliation framework and to apply its principles, norms, and standards to corporate policy and core operational activities involving Indigenous peoples and their lands and resources.

Question:

- a) Please explain EGI’s position on whether current industrial development – including this Project – continues to have destructive impacts on the social and economic wellbeing of Indigenous peoples.
- b) How does EGI identify common goals? Please explain how EGI navigates times when EGI’s goals are not the same as a First Nation’s goals.
- c) How does EGI determine constructive outcomes? Please explain whether EGI works with Indigenous nations to identify constructive outcomes and explain how EGI navigates times when EGI’s preferred outcome is not the preferred outcome of the Indigenous nation.
- d) How does EGI’s gas expansion across southwestern Ontario respect previous Indigenous generations and benefit future Indigenous generations?
- e) What has EGI learned specifically as it relates to relationship building with Indigenous communities and the proposed Panhandle Expansion?
- f) What is EGI’s definition of sustainability?
- g) Please explain how EGI plans to adopt and implement the TRCC Calls to Action and MMIWG Calls to Justice.
- h) Will EGI commit to the MMIWG Calls to Justice for Extraction and Development Industries in relation to the safety and security of Indigenous women, girls, and 2SLGBTQQA people during all stages of the Project?
- i) Will EGI commit to the MMIWG Calls to Justice for Extraction and Development Industries in relation to providing increased social infrastructure to meet the needs of CKSPFN and CFN?
- j) Will EGI commit to full implementation of TRCC #92 “Business and Reconciliation”, including adopting the United Nations Declaration on the Rights of Indigenous Peoples as a reconciliation framework and to apply its principles, norms, and standards to corporate policy and core operational activities involving Indigenous peoples and their lands and resources. If yes, please explain how

EGL has met each of i. through iii. under TRCC #92, specifically as it relates to the Project. If no, please explain why EGL is not willing to fully implement TRCC #92 in relation to the Project.

- k) How has EGL included provisions in this project to address its impacts on vulnerable groups, including Indigenous women and girls?
- l) Please explain the contents of EGL's Indigenous awareness programs and who facilitated these programs.
- m) What agreements, authorizations, and or approvals with and/or from First Nation governments, including the Three Fires First Nations, does EGL envision needing or entering into to support the Project?
- n) Please discuss and provide any updates, as it pertains to each of the Three Fires First Nations, to the "Indigenous Consultation Report; Log and Project Correspondence" in tabular format.
- o) Did EGL provide a description to potentially impacted First Nations of other provincial or federal approvals that may be required for the Project to proceed?
- p) Please provide details of any analysis undertaken by EGL to assess and determine the impacts on Treaty lands, generally, and on the Treaty lands of each of the Three Fires First Nations as part of the (i) Application, generally, and (ii) the Environmental Report. Did EGL perform any analysis prior to contacting potentially impacted First Nations and Indigenous customers? If no analysis was performed, please explain why not.
- q) Please discuss whether section 3 of the Standard Conditions of Approval, includes the requirement to obtain the FPIC of affected Indigenous communities. If no, please explain whether EGL's determination that FPIC is not a "necessary approvals, permits, licences, certificates, agreements and rights required to construct, operate and maintain the project" is consistent with the IPP and the TRCC's Call to Action #92.

Response

- a) Potential Project impacts on socio-economic features are outlined in Section 5.3.3 of the ER and align with the OEB's Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario (2016).

Enbridge Gas is committed to working with every potentially affected Indigenous group to avoid or mitigate any potential impacts the Project may have on their rights and interests.

- b) As outlined in the Exhibit H, Tab 1, Schedule 1, Attachment 1, Enbridge Gas, as per MOE directive, consults with potentially affected Indigenous groups, in part, to understand the goals of the Nations with which we are engaging. Through dialogue,

information sharing and relationship building, Enbridge Gas attempts to align common goals among all parties.

- c) Enbridge Gas recognizes that long-term relationships are built on trust and respect and are critical to creating sustainable and mutually beneficial outcomes. Enbridge Gas has applied a lifecycle approach to its engagement, which recognizes the need for continual engagement with Indigenous groups located in proximity to our proposed and existing assets—not just during the project design and approval stage, but throughout the project lifecycle.

Enbridge Gas determines constructive outcomes based on the feedback of the Nations with which we engage. When Enbridge Gas and Indigenous Nations do not experience alignment on common goals or are not in agreement, Enbridge Gas maintains communication and dialogue and is committed to achieving mutually beneficial and agreed upon outcomes to the best of our ability. Enbridge Gas understands that relationships require long-term commitment and ongoing engagement.

- d) Enbridge Gas expansion programs take into consideration potential impacts of proposed projects on Aboriginal and Treaty Rights, with a view to effectively mitigating any impacts. Enbridge Gas consults with Nations, with a view to understanding traditional and historical practices in the area of proposed expansion and welcomes Indigenous traditional knowledge.

Enbridge Gas' gas expansion across southwestern Ontario ensures that customers, including on and off reserve customers, have access to reliable, clean and affordable natural gas.

- e) Enbridge Gas has been engaging and consulting with Indigenous communities for decades. Over this time and based on advancements and refinements, we have updated our Indigenous Peoples Policy to reflect the changing requirements and expectations of engagement and consultation. Enbridge engages with over 300 Nations enterprise wide and continues to learn best practices through our experiences and through our relationships with Indigenous Peoples.

As an example of a best practice, Enbridge has implemented a “Lifecycle Approach” to relationships and engagement. Enbridge is committed to building respectful, constructive and enduring relationships that foster trust with and generate benefits for Indigenous groups over the lifecycle of our assets—from project proposals and design through construction, operations, maintenance and, to ultimately and safely removing a pipeline from service at the end of its useful life. We recognize consistency and continuity are important to developing and maintaining positive relationships. Long-term relationships are built on trust and respect and are critical to creating sustainable and mutually beneficial outcomes. We have come to recognize

the need for continual engagement—not just when we’re actively working in an area or during a project, but constantly and consistently with all those in proximity to our operating assets.

More information on how Enbridge builds relationship can be found in our [Our 2022 report: Continuing our Path to Reconciliation: Indigenous engagement and inclusion — An update.](#)⁸

In terms of discussion and consultation with potentially affected Indigenous groups as it relates to the Project, we have learned that capacity to engage on multiple Enbridge Gas projects is challenging. Enbridge Gas has offered and provided capacity funding to help address this issue. As demonstrated in the response to Exhibit I.STAFF.22, part a) above, through ongoing consultation with Nations about the Project, we have learned of Nations’ questions and concerns regarding the Project and have tried to address those questions and concerns, providing further information or committing to further action as appropriate. Enbridge Gas has proposed or adapted mitigation measures to address these concerns.

- f) Sustainability means that our business strategies are aligned with societal and environmental goals. How well we perform as a steward of our environment, a safe operator of essential energy infrastructure, a good neighbor and a diverse employer is inextricably linked to our business success and our ability to create long-term value for all stakeholders.
- g) Enbridge Gas is working toward meeting TRCC #92 through the following:
- Enbridge Gas endeavors to engage as early as possible in the Project planning stage, taking into account the scale and scope of the Project, by sharing Project related information with potentially affected Indigenous groups, and meeting with Indigenous groups as per their interest to obtain their input and guidance as to how any potential impacts the Project may have on Aboriginal rights and interests can be avoided or mitigated, as appropriate. This includes, for example, seeking and responding to comments on Project-related environmental or archaeological reports, inclusion in monitoring, consideration of Project changes and potential business or employment opportunities. Through its engagement, Enbridge Gas aims to secure the free, prior and informed consent of potentially impacted Indigenous groups, to the greatest degree possible (recognizing, that legally consent is not required except in certain circumstances).
 - Enbridge Inc. has implemented an Indigenous supply chain management program which requires contractors to abide by instructions presented in the Socio-Economic Requirement of Contractors (“SERC”) and to develop an

⁸https://www.enbridge.com/~/_media/Enb/Documents/Reports/ENB_Path_to_Reconciliation_Progress_Report.pdf#page=8

Indigenous participation & inclusion plan which is evaluated in the bid review process and contract managed when implemented.

- As part of a suite of Enbridge Inc.'s ESG goals, by 2025, Enbridge Inc. is striving to achieve 3.5% representation within our workforce of Indigenous people and is undertaking specific recruitment and retention efforts in this regard.
- As part of Enbridge Inc.'s ESG goals, by the end of 2022, Enbridge Inc. has targeted completion of Indigenous awareness training by 100% of its workforce (i.e., employees and contractors) to enhance our understanding and knowledge of Indigenous culture and rights. Enbridge Inc. contributes to supporting Indigenous education and training efforts through community investment initiatives corporately and locally. In Ontario alone, in 2022, Enbridge Inc. will contribute approximately \$200,000 towards Indigenous community investment.

Through its lifecycle engagement program, Enbridge Gas enters into long term relationship agreements designed to support operational engagement, provide capacity funding as needed, and offers Project-related agreements when appropriate.

- h) Enbridge Gas is a public utility and does not generally involve a long term, large, transient workforce. Enbridge Inc. has implemented a number of measures corporately to address MMIWG.
- Enbridge Inc.'s Statement on Business Conduct specifically states that Enbridge Inc. will not tolerate human rights abuses, including human trafficking.
 - Enbridge Inc. has a working group that is in the process of developing an enterprise-wide approach to human trafficking prevention (HTP).
 - Enbridge Inc. is developing the governance structure for an approach specific to human trafficking prevention which will be part of the overall human rights program.
 - Enbridge Inc.'s internal audit group has recommended that all projects have some element of human trafficking awareness messaging or training. The HTP working group is beginning development of the awareness program.

For this Project, there would be an average of approximately 100 contractor employees working directly on the pipeline segments over the span of the 20km pipeline portion of the Project. The Project will not have any work camps. The Project workers will primarily be drawn from union halls in the areas governing the physical geography of the work. Any contractor that is a part of this Project must comply with, at minimum, Enbridge Gas's policies, which include Enbridge Inc.'s Statement on Business Conduct, which addresses conduct expectations.

- i) While no significant adverse residual effects on community services and infrastructure are anticipated, in the event that such effects materialized, Enbridge Gas would work in consultation with the Indigenous community to mitigate those impacts.

Indigenous communities are able to apply for funding through Enbridge Inc.'s corporate citizenship program. Enbridge Gas would be happy to discuss this program with all Indigenous communities and has provided the link to the application for funding:

<https://www.enbridge.com/About-Us/Our-Values/Corporate-citizenship/Apply-For-Funding.aspx>

In addition, through its lifecycle engagement program, Enbridge Gas enters into long term relationship agreements designed to support operational engagement, provide capacity funding as needed, and offers Project-related agreements when appropriate.

Should TFG have further suggestions based on local and regional experiences and best practices, Enbridge Gas encourages information sharing in this regard.

- j) Please see response to part f) above.
- k) Enbridge Gas's suppliers, which includes contractors and subcontractors, are required to follow Enbridge Inc.'s policies including the Supplier Code of Conduct, which outlines Enbridge Inc. requirements regarding the ethical standards and business conduct of its suppliers. The Supplier Code of Conduct states "Enbridge believes that each individual with whom we come in contact deserves to be treated fairly, honestly, and with dignity. We do not condone any form of harassment, discrimination, or inappropriate actions or language of any kind." Drug & Alcohol Programs, Respectful Workplace Training and Indigenous Peoples Awareness Training are required and specific to the Construction Contractor(s) that will construct the Project.
- l) While Indigenous awareness training has generally been a part of Enbridge Inc.'s approach since 2018, Enbridge Inc. has advanced this training over time to provide increased exposure, experiences and relevant information to build a deeper understanding of and appreciation for Indigenous Peoples, including:
- i. an overview of key concepts, including government laws and policies and their effects on Indigenous Peoples;
 - ii. the protection and restoration of treaty rights; and
 - iii. raising of awareness of the historical injustices and lasting impacts of the treatment of Indigenous Peoples.

Specific topics addressed in the training include:

- i. pre-contact and post-contact experiences of Indigenous peoples;
- ii. the Canadian constitution as it relates to Indigenous Peoples;
- iii. the history and impact of the Indian Act;
- iv. the history and impact of Residential Schools;
- v. the United Nations Declaration on the Rights of Indigenous Peoples;
- vi. the Truth and Reconciliation Commission Report; and
- vii. Missing and Murdered Indigenous Women.

The Enbridge Inc. Indigenous Awareness Training Program, which applies to Enbridge Gas, was developed through a partnership with a respected 100% Indigenous owned Training Company, a First Nations Enbridge Inc. employee who was a former College Professor in Indigenous Programming and a working group of Indigenous and non-indigenous employees.

Beginning in 2021, all new employees are required to complete the training as part of their onboarding and all employees and contractors are expected to complete the training by the end of 2022. As of September 13, 2022, at least 87% of Enbridge Inc. employees have completed the mandatory Indigenous Awareness online training program. We would be happy to discuss possible opportunities for TFG (CKSPFN/CFN) to provide Indigenous awareness training in the region.

Additionally, in person training opportunities are regularly offered by Indigenous employees and local Indigenous cultural representatives in the various regions Enbridge Gas operates.

- m) As the proposed Project does not traverse reserve land, it is not anticipated that formal First Nation approval or authorizations will be necessary. Enbridge Gas has offered capacity funding to all Indigenous groups identified as being potentially impacted by the Project and has entered into a number of capacity funding agreements to support engagement on the Project. Specific information cannot be shared due to confidentiality of these agreements.
- n) Please see the response to Exhibit I.STAFF.22 part a).
- o) Enbridge Gas outlined the provincial and federal approvals that may be required for the Project to proceed in the proposed Project notification letter sent to CKSPFN on October 15, 2021 and February 8, 2022 (set out at Exhibit H, Tab 1, Schedule 1, Attachment 7). The Environmental Report, which was provided to Indigenous communities, contains further details of such approvals within Table 1.1 (Exhibit F, Tab 1, Schedule 1, Attachment 1).

- p) Enbridge Gas completed an analysis of the potential Project impacts on physical, bio-physical and socio-economic environmental features, which would include features within lands that are the subject of Treaties. This analysis includes recommended mitigation and protective measures. This information can be found in Section 5 of the Environmental Report (Exhibit F, Tab 1, Schedule 1, Attachment 1).

Enbridge Gas remains committed to engagement with the TFG to further understand any specific concerns regarding potential impacts the Project may have on Treaty lands and how these impacts can be avoided or mitigated as appropriate.

- q) It is Enbridge Gas's understanding that the referenced phrasing in section 3 of the Standard Conditions of Approval is not referring to FPIC. In Enbridge Gas' view, the manner in which Enbridge Gas approaches consultation and engagement with Indigenous groups is consistent with both its IPP and the TRCC's Call to Action. Please also see response to part g) above.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Environmental Guidelines - Section 3.3 Indigenous Consultation

Preamble:

The Environmental Guidelines provide that the procedural aspects of the duty to consult generally include, among others, "responding to questions and concerns raised by Indigenous communities and keeping the Crown apprised of rights assertions by communities"

Question:

- a) Has EGI responded to the questions and concerns submitted directly to EGI by CKSPFN on July 5, 2022?
- b) Has EGI kept the Crown apprised of CKSPFN's Declaration to the Waterways and Lakebeds within its Traditional Territory (Appendix A)? If not, why not.
- c) Please explain EGI's understanding of the CKSPFN's Declaration to the Waterways and Lakebeds within its Traditional Territory, specifically as it relates to any approvals EGI may need to obtain from CKSPFN in order to cross water within the treaty territory.

Response

- a) Yes, on August 18, 2022, Enbridge Gas provided its responses to the comments on the ER received from CKSPFN on July 5, 2022.
- b) Enbridge Gas provided CKSFPN's Declaration to the Waterways and Lakebeds within its Traditional Territory to the Crown on July 25, 2022.
- c) Enbridge Gas has reviewed CKSPFN's Declaration to the Waterways and Lakebeds within its Traditional Territory and understands CKSPFN has asserted rights to the Waterways and Lakebeds within its Traditional Territory. As stated in response b) above, Enbridge Gas has notified the MOE of CKSPFN's Declaration and

understands that CKSPFN may be in discussions with various levels of government regarding this matter. Enbridge Gas is of the view that CKSPFN's consent is not legally required at this time; however, a goal of Enbridge Gas's engagement is to aim to secure consent and avoid or mitigate any potential impacts the Project may have on CKSPFN's rights, including its asserted rights to the Waterways and Lakebeds within its Traditional Territory.

Enbridge Gas has proposed mitigation measures on the waterways and lakebeds as set out in the environmental report to avoid or mitigate any potential impacts on rights. Should CKSPFN have any additional specific information on how its asserted rights could be potentially impacted by the Project, Enbridge Gas will work with the CKSPFN to mitigate those impacts as appropriate.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group ("TFG")

INTERROGATORY

References:

Exhibit A, Tab 2, Schedule 1, p. 3

Preamble:

EGL notes that parties affected by the Application include the (i) owners of lands, government agencies and municipalities over which the pipeline will be constructed and (ii) customers resident or located in the municipalities, police villages, Indigenous communities and Métis organizations served by EGL, together with those to whom EGL sells gas, or on whose behalf EGL distributes, transmits, or stores gas. [emphasis added]

Question:

- a) Please file any and all analysis EGL has performed, that is not already provided in the Application, in connection with how the Application will, or is anticipated to, affect residents and members, including off-reserve members, of each of the Three Fires First Nations:
 - i. that EGL serves;
 - ii. to which EGL sells gas; and
 - iii. on whose behalf EGL distributes, transmits, or stores gas.
- b) Please indicate whether EGL recognizes that the following groups are also affected by this application:
 - i. Indigenous nations whose Aboriginal and Treaty Rights are impacted by the continued expansion of gas infrastructure across Treaty territory and directly impacted by the increased ground level ozone caused by fugitive emissions; and
 - ii. current and future generations who will face the challenges of accelerated anthropogenic climate change.

Response

- a) There is no additional analysis available regarding impacts to residents and members of each of the Three Fires First Nations.
- b) Enbridge Gas has been engaging with the Indigenous groups identified by the MOE in relation to the Project, which includes those who may have constitutionally protected Aboriginal or Treaty rights that may be adversely affected by the Project.

Enbridge Gas recognizes the importance of addressing fugitive emissions and climate change. In 2020, Enbridge committed to eliminate GHG emissions from our business on a net basis (net zero) by 2050 with an interim goal to reduce the emissions intensity of GHG emissions from our operations 35% by 2030. Please see the response to Exhibit I.TFG.9 part c), for further information regarding the measurement and management of fugitive emissions.