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Enbridge Gas Inc.
P.O. Box 2001
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Chatham, Ontario, N7M 5M1
Canada

July 30, 2021

BY RESS AND EMAIL

Christine Long Board
Secretary Ontario
Energy Board
2300 Yonge Street, 27th Floor
Toronto, ON M4P 1E4

Dear Christine Long:

**Re: Enbridge Gas Inc. (Enbridge Gas)
Ontario Energy Board File No.: EB-2021-0079
Corunna and Ladysmith Well Application (REDACTED)**

Enclosed please find the redacted application and evidence for the Corunna and Ladysmith Well Application.

In accordance with the OEB's revised Practice Direction on Confidential Filings effective February 17, 2021, all personal information has been redacted from the following exhibit:

- Exhibit G-1-1, Attachment 1 – Affidavit of Title Search

The confidential unredacted exhibit will be provided to the OEB under separate cover.

The above noted submission has been filed electronically through the OEB's RESS and will be made available on Enbridge Gas's website at:

<https://www.enbridgegas.com/about-enbridge-gas/regulatory>

If you have any questions, please contact the undersigned.

Sincerely,

(Original Digitally Signed)

Adam Stiers
Manager, Regulatory Applications – Leave to Construct

EXHIBIT LIST

A – General

<u>Exhibit</u>	<u>Tab</u>	<u>Schedule</u>	<u>Contents of Schedule</u>
A	1	1	Exhibit List
	2	1	Application & Approvals Requested

B – Project Need

<u>Exhibit</u>	<u>Tab</u>	<u>Schedule</u>	<u>Contents of Schedule</u>
B	1	1	Project Need
			Attachment 1 – Corunna DSA
			Attachment 2 – Corunna Guelph Map
			Attachment 3 – Corunna Cross Section
			Attachment 4 – Ladysmith DSA
			Attachment 5 – Ladysmith Guelph Map
			Attachment 6 – Ladysmith Cross Section
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C – Alternatives & Project Description

<u>Exhibit</u>	<u>Tab</u>	<u>Schedule</u>	<u>Contents of Schedule</u>
C	1	1	Alternatives & Project Description

D – Cost & Economics

<u>Exhibit</u>	<u>Tab</u>	<u>Schedule</u>	<u>Contents of Schedule</u>
D	1	1	Cost & Economics

E – Engineering & Construction

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F – Environmental Matters

<u>Exhibit</u>	<u>Tab</u>	<u>Schedule</u>	<u>Contents of Schedule</u>
F	1	1	Environmental Matters Attachment 1 – Environmental Report Attachment 2 – Stage 1 AA Report Attachment 3 – Stage 2 AA Report Well TC 8 Attachment 4 – Stage 2 AA Report Well TL 8

F – Environmental Matters

<u>Exhibit</u>	<u>Tab</u>	<u>Schedule</u>	<u>Contents of Schedule</u>
F	1	1	Attachment 5 / 6 / 7 – Clearance Letters from MHSTCI Attachment 8 – OPCC Comments

G – Lands Matters

<u>Exhibit</u>	<u>Tab</u>	<u>Schedule</u>	<u>Contents of Schedule</u>
G	1	1	Lands Matters Attachment 1 – Affidavit Search of Title (Redacted)

H – Indigenous Consultation

<u>Exhibit</u>	<u>Tab</u>	<u>Schedule</u>	<u>Contents of Schedule</u>
H	1	1	Indigenous Consultation Attachment 1 – Duty to Consult Letter Attachment 2 – MENDM Duty to Consult Reply

ONTARIO ENERGY BOARD

IN THE MATTER OF the *Ontario Energy Board Act, 1998*, S.O. 1998, c.15, Schedule B; and in particular section 40(1) thereof;

AND IN THE MATTER OF an Application by Enbridge Gas Inc. to the Ministry of Northern Development, Mines, Natural Resources and Forestry for licences to drill an A-1 observation well in each of the Corunna Storage Pool and the Ladysmith Storage Pool.

ENBRIDGE GAS INC.

1. Enbridge Gas Inc. (“Enbridge Gas” or the “Company”) is proposing to drill two new A-1 observation wells (together the “Project”), both of which are located in the geographic Township of Moore, in the Township of St. Clair, in the County of Lambton, Ontario. One observation well will be drilled in the Corunna Storage Pool (“TC 8”) and the second observation well will be drilled in the Ladysmith Storage Pool (“TL 8”). Both storage pools are part of Enbridge Gas’s storage operations and considered designated storage areas pursuant to section 36.1(1) of the *Ontario Energy Board Act, 1998* (the “Act”).
2. Enbridge Gas has applied to the Ministry of Northern Development, Mines, Natural Resources and Forestry (“MNDMNR”) for a licence to drill the two observation wells. Pursuant to section 40 of the Act, Enbridge Gas is seeking favourable report(s) from the Ontario Energy Board (“OEB”) to the MNDMNR to support the Company’s applications to drill.
3. The drilling of the proposed observation wells (TC 8 and TL 8) is needed to monitor natural gas content and pressure in their respective underground storage

formations, to assist in the continued safe and reliable operation of Enbridge Gas's storage facilities. The drilling of the A-1 observation wells will not result in an increase in storage capacity or an increase in deliverability of the Corunna or Ladysmith Storage Pools.

4. Authority to store gas in the Corunna Storage Pool was authorized in the OEB's E.B.O. 5 Decision and Order in reliance upon storage area designations in O.Reg. 330/62 as amended by O.Reg. 7/63. Authority to store gas in the Ladysmith Storage Pool was authorized in the Board's E.B.L.O. 269, E.B.O. 212/213, E.B.R.M. 112 Report and Orders. Enbridge Gas has consulted with affected parties and while negotiations with one landowner is ongoing the Company has no significant concerns regarding the drilling of the proposed observation wells because land rights are established.
5. Enbridge Gas respectfully requests that a favorable report from the OEB for both of the proposed observation wells be provided to the MN DMNR as soon as possible and preferably by September 16, 2021.
6. Enbridge Gas requests that a copy of every document filed with the Board in this proceeding be served on the Applicant and the Applicant's counsel, as follows:

Applicant:

Mr. Adam Stiers
Manager, Regulatory Applications – Leave to Construct

Address: P. O. Box 2001
50 Keil Drive North
Chatham, Ontario N7M 5M1

Telephone: 519-436-4558

Email: adam.stiers@enbridge.com
EGlregulatoryProceedings@enbridge.com

-and-

Ms. Tania Persad
Senior Legal Counsel
Enbridge Gas Inc.

Address for personal service: 500 Consumers Road
Willowdale, Ontario M2J 1P8

Mailing address: P. O. Box 650
Scarborough, Ontario M1K 5E3

Telephone: (416) 495-5891

Email: tania.persad@enbridge.com

Dated at the City of Chatham, Ontario this 30th day of July 2021.

(Original Signed by)

Adam Stiers
Manager, Regulatory Applications – Leave to Construct

PROJECT NEED

1. Enbridge Gas Inc. (“Enbridge Gas” or the “Company”) is proposing to drill two new A-1 observation wells, one in the Corunna Storage Pool (TC 8) and the second in the Ladysmith Storage Pool (TL 8), both of which are located in the geographic Township of Moore, in the Township of St. Clair, in the County of Lambton, Ontario (together, the “Project”). The Corunna Storage Pool and the Ladysmith Storage Pool are both designated storage areas (“DSAs”) as defined in s. 36.1(1)(a) of the *Ontario Energy Board Act, 1998* (the “Act”). Attachments 1-3 and Attachments 4-6 to this Exhibit show the location of the wells (TC 8 and TL 8) within the DSAs and provide additional geological detail for each of the respective storage pools.
2. The drilling of the proposed observation wells is related to Enbridge Gas’s 2020 and 2021/2022 Storage Enhancement Projects. In response to interrogatories in its 2020 Storage Enhancement Project proceeding (EB-2020-0074), Enbridge Gas described the Storage Enhancement Project and its two phases, including the type of work to be completed, pool names and locations and proposed timing of work. At that time the Company identified its intent to drill an A-1 observation well in the Ladysmith Storage Pool (TL 8) in 2021.¹ Further, in its 2021/2022 Storage Enhancement Project application (EB-2020-0256), the Company noted that although it had originally intended to include the proposed A-1 observation wells (TC 8 and TL 8) within the scope of the 2021/2022 Storage Enhancement Project, the scope of the project was modified prior to filing its application with the Ontario Energy Board (“OEB”) to avoid impeding annual storage fill/withdrawal operations.²
3. In this application, Enbridge Gas is requesting that the OEB issue favorable report(s) to the Ministry of Northern Development, Mines, Natural Resources and

¹ EB-2020-0074, Exhibit I.STAFF.3, Table 2, 2020-05-11.

² EB-2020-0256, Exhibit C, Tab 1, Schedule 1, p. 2, 2020-11-13.

Forestry ("MNDMNRF") for the drilling of wells TC 8 and TL 8.

4. The Corunna and Ladysmith Storage Pools contain Guelph Formation observation wells that monitor the pressure in the Guelph reef formation where the gas is stored, but do not contain A-1 Carbonate Formation observation wells. The A-1 Formation is adjacent to the Guelph reef and in many pools, can be a tighter secondary formation that forms part of the gas storage reservoir. Regional geology suggests there is potential for gas to be moving between the Guelph Formation and the A-1 Formation. A-1 observation wells are used to monitor this movement. In addition, A-1 observation wells are used as a tool in storage pool material balance studies to supplement the information obtained from the Guelph observation wells. Storage pools are stabilized biannually, and the Guelph pressure is used to calculate an inventory based on pressure. This is then compared with the pool's metered inventory and any variances are monitored and investigated. Gas movement from the Guelph Formation into the A-1 Carbonate Formation can contribute to these variances. An A-1 observation well can assist with explanations and potential adjustments to pool size and inventory. A-1 observation wells generally improve the ability to effectively manage inventory by providing more accurate measurement of gas pressures in the A-1 Formation. Attachments 1-3 and 4-6 to this Exhibit show the typical location of both Guelph and A-1 observation wells.

The Corunna Storage Pool

5. Authority to store gas in the Corunna Storage Pool was authorized in the E.B.O. 5 Decision and Order and it was designated as a gas storage area pursuant to Ontario Regulation 330/62 (later amended by Ontario Regulation 7/63). The Corunna Storage Pool has been in operation since 1964 and is currently operated and monitored using five injection/withdrawal wells, one observation well and a

gathering system. The gathering system is connected to the Corunna Compressor Station (Tecumseh) via transmission pipelines. The Corunna Storage Pool is used by Enbridge Gas to fulfill part of the storage requirements for both regulated and unregulated storage operations. Leave to vary and/or increase the maximum operating pressure ("MOP") of the Corunna Storage Pool was granted as part of the OEB's Decision and Order on the Company's 2021/2022 Storage Enhancement Project, dated April 22, 2021. Accordingly, the maximum pressure gradient of the Corunna Storage Pool was increased from 15.8 kPa/m (0.70 psi/ft) to 17.2 kPa/m (0.76 psi/ft), resulting in an increase in capacity of 23,800 10^3m^3 . The additional storage capacity forms part of Enbridge Gas's unregulated storage portfolio.

6. As a result of the increased MOP discussed above, the proposed storage observation well is needed to assist in the continued safe and reliable operation of Enbridge Gas's storage facilities. Specifically, the drilling of well TC 8 is needed to assist in monitoring natural gas content and pressure and will not result in an increase in storage capacity or an increase in deliverability in the Corunna Storage Pool.
7. The costs associated with drilling the proposed A-1 observation well in the Corunna Storage Pool will be funded by Enbridge Gas's shareholder as an unregulated storage asset.

The Ladysmith Storage Pool

8. The Ladysmith Storage Pool was designated as a gas storage area in the OEB's E.B.L.O. 269, E.B.O. 212/213, E.B.R.M. 112 Decision with Reasons. The Ladysmith Storage Pool has been in operation since 1999 and is currently operated and monitored using two injection/withdrawal wells, one observation well and a gathering system. The gathering system is connected to the Dawn Operations Centre via the Payne Pool pipeline (see Attachment 7 to this Exhibit for detail).

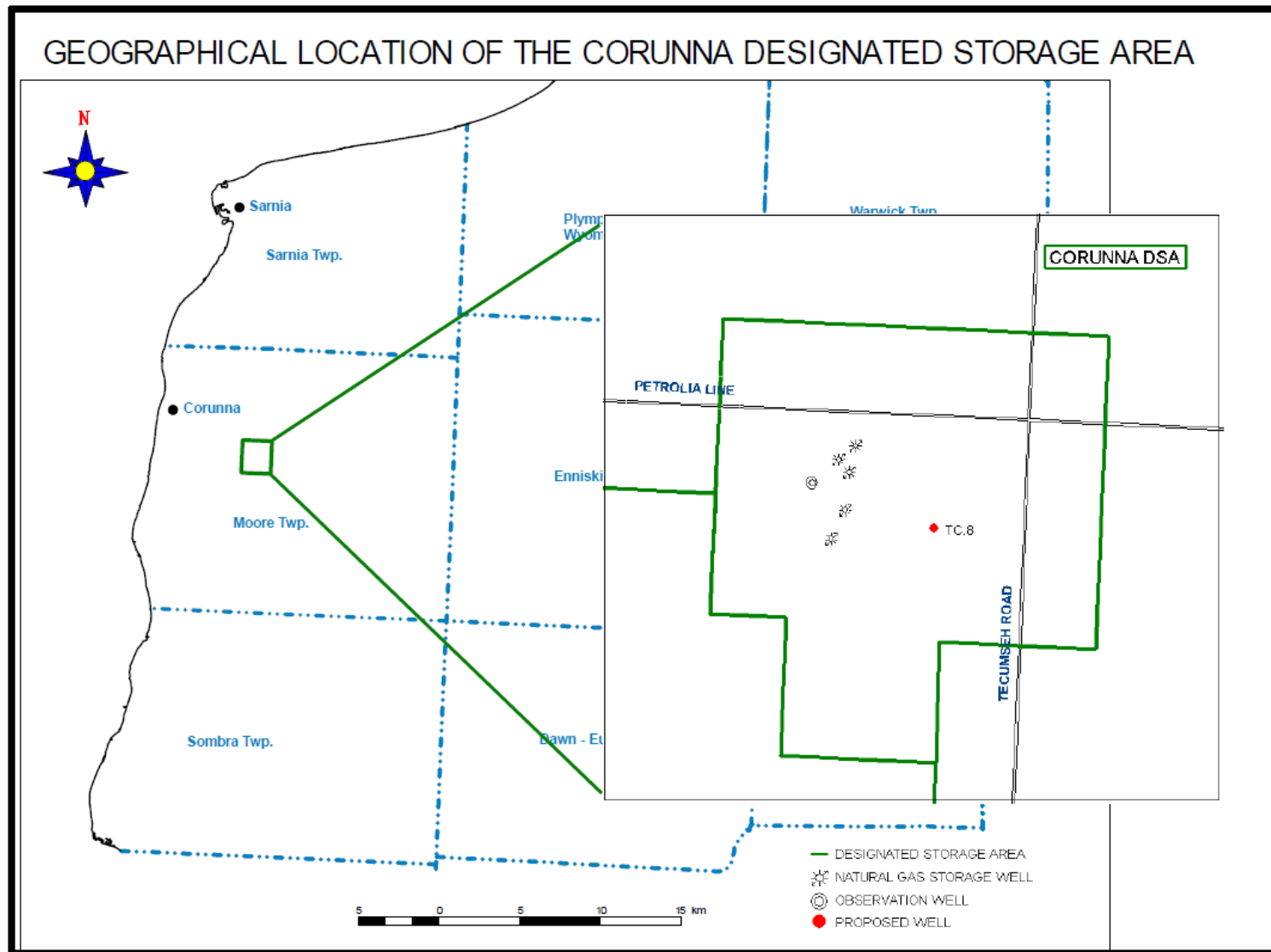
The Ladysmith Storage Pool is currently used by Enbridge Gas to fulfill part of the storage requirements for both regulated and unregulated storage operations.

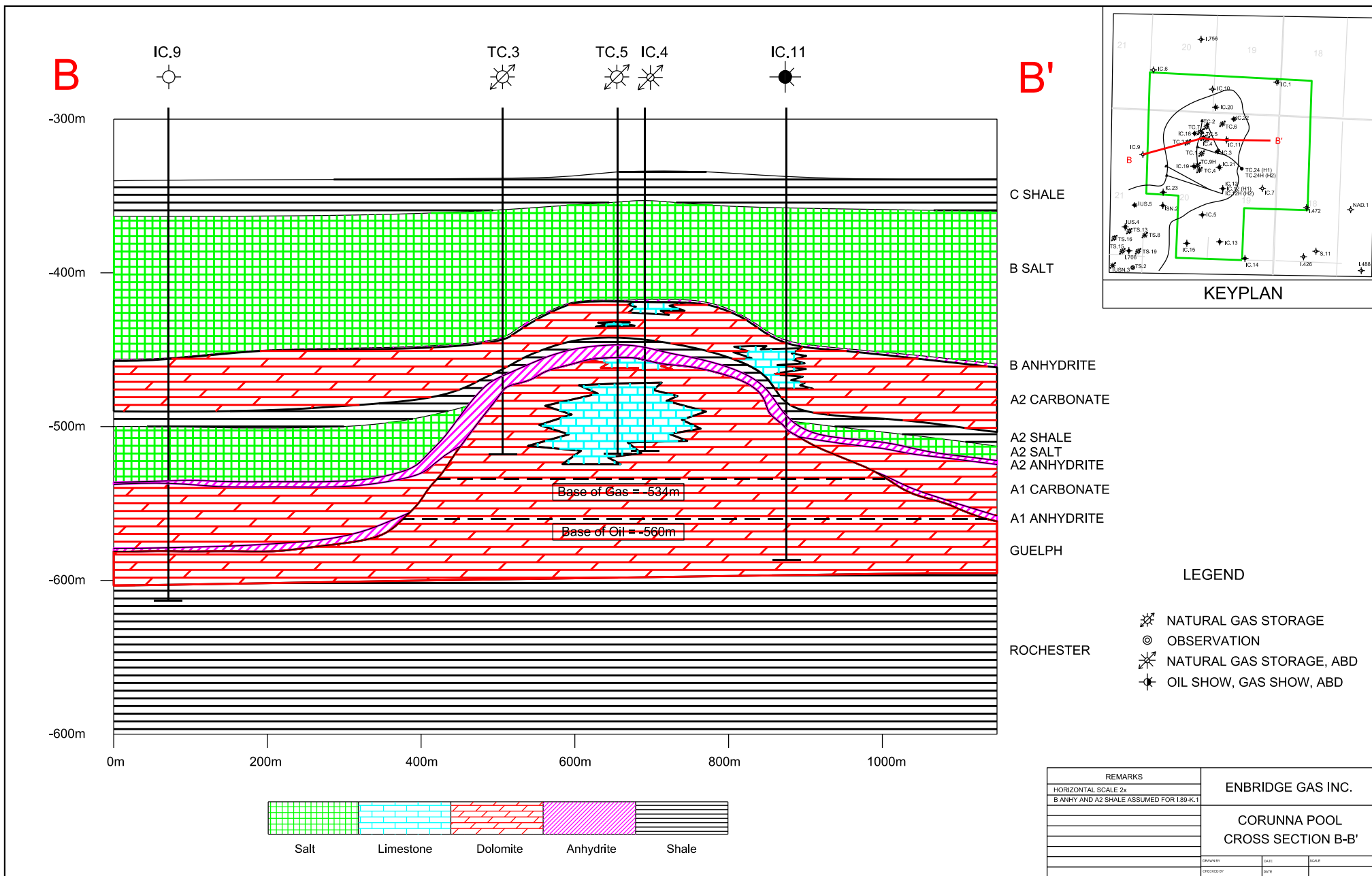
Leave to vary and/or increase the MOP of the Ladysmith Pool was granted as part of the OEB's Decision and Order on the Company's 2021/2022 Storage

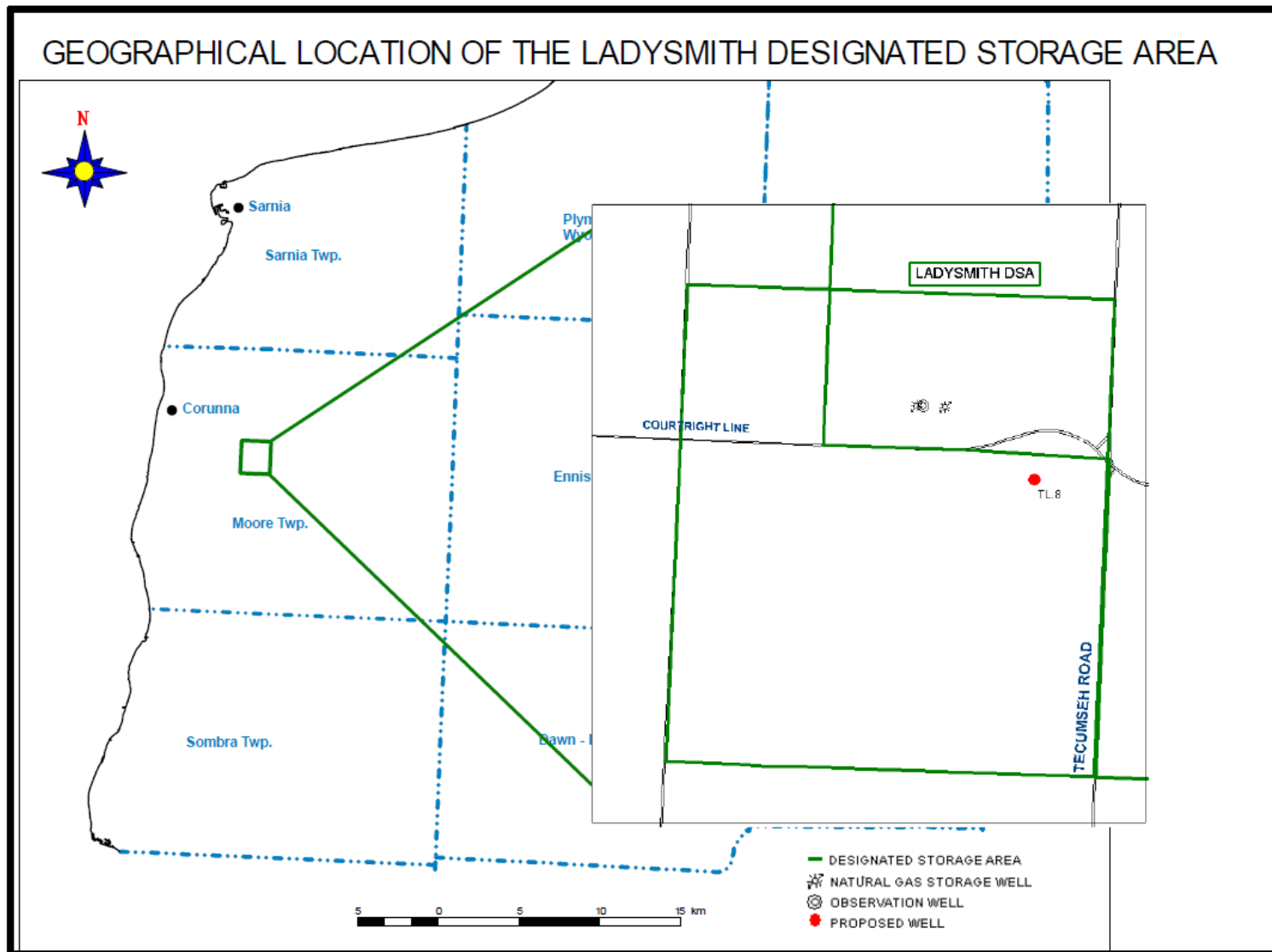
Enhancement Project, dated April 22, 2021. Accordingly, the maximum pressure gradient of the Ladysmith Storage Pool was increased from 15.8 kPa/m (0.70 psi/ft) to 16.5 kPa/m (0.73 psi/ft), resulting in an increase in capacity of 16,500 10^3m^3 .

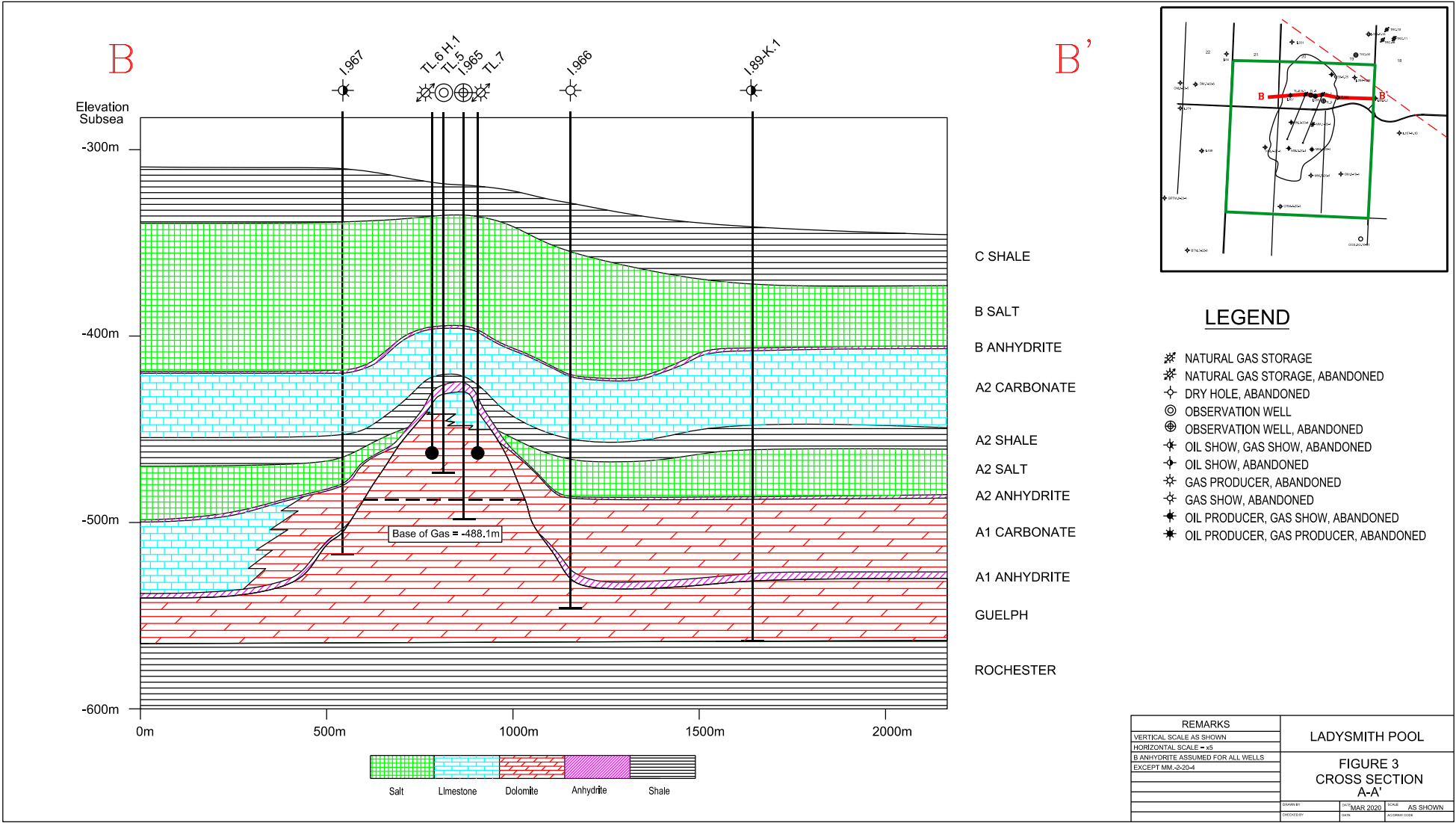
The additional storage capacity forms part of Enbridge Gas's unregulated storage portfolio.

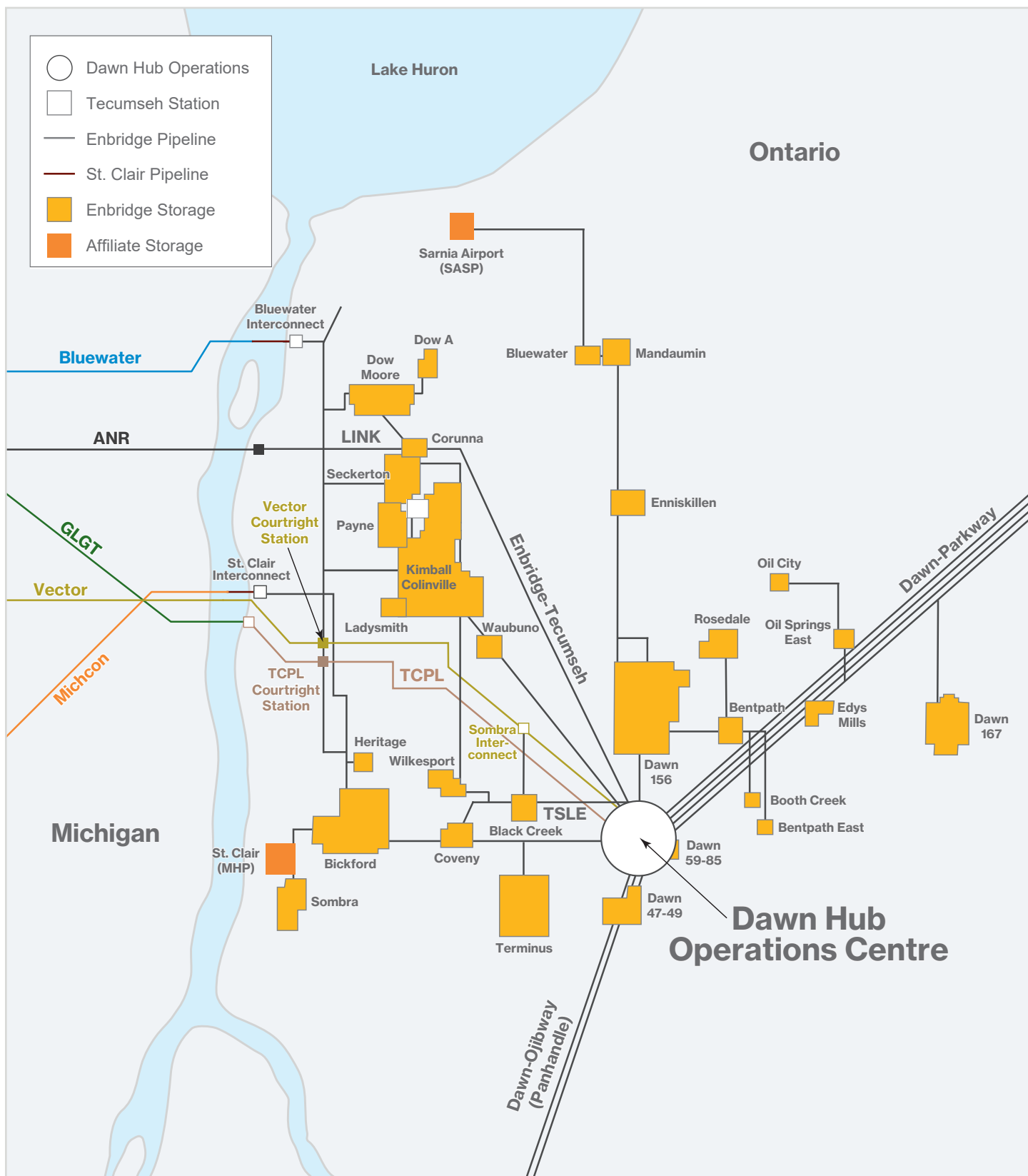
9. As a result of the increased MOP discussed above, the proposed storage observation well is needed to assist in the continued safe and reliable operation of Enbridge Gas's storage facilities. Specifically, the drilling of well TL 8 is needed to assist in monitoring natural gas content and pressure and will not result in an increase in storage capacity or an increase in deliverability in the Ladysmith Storage Pool.
10. The costs associated with drilling the proposed A-1 observation well in the Ladysmith Storage Pool will be funded by Enbridge Gas's shareholder as an unregulated storage asset.











ALTERNATIVES & PROJECT DESCRIPTION

Alternatives

1. As discussed in Exhibit B, both the Corunna and Ladysmith Storage Pools contain Guelph Formation observation wells to monitor pressure in the Guelph reef formation. However, neither of the storage pools contain A-1 Carbonate Formation observation wells. A-1 observation wells will be used to support inventory material balance studies in the future and will help enhance Enbridge Gas's understanding of gas movement (if any) between the A-1 Carbonate and Guelph formations.
2. Enbridge Gas is not aware of any comparable alternative facility or non-facility solution that would enable the Company to monitor the actual movement of natural gas between the Guelph Formation and the A-1 Formation. Nor is the Company aware of any such solution that would provide the ancillary benefit of an A-1 observation well in terms of improving inventory management.

Project Description

3. The Project will commence with the construction of temporary all-weather gravel drilling pads. These drilling pads will occupy approximately 6,400 square metres in total area (approximately 1,600 m² for TC 8 and 4,800 m² for TL 8). The pads will be constructed in compliance with the Environmental Report ("ER") completed by Aecom Canada Ltd. The ER can be found at Exhibit F, Tab 1, Schedule 1, Attachment 1. The pads will provide all-weather access and all activities associated with the drilling of the well will occur on the pad and laneway. Following the completion of drilling operations each observation well site is expected to measure approximately 60 square metres.
4. Upon completion, permanent access laneways to the well sites will remain and the remainder of the land will be restored, and any drainage tile issues will be resolved in accordance with Enbridge Gas's Construction and Maintenance standards.

5. No pipeline facilities are required for these observation wells.

Storage Pressures & Deliverability

6. The MOP and working capacity at the Corunna Storage Pool and the Ladysmith Storage Pool will not change as a result of the proposed drilling operations.
7. As outlined in Exhibit B, Enbridge Gas expects that the drilling of TC 8 and TL 8 will enable it to better monitor the gas content and pressure in the respective underground storage formations, which will assist in the continued safe and reliable operation of Enbridge Gas's storage facilities. No new regulated storage services or market-based storage services are expected to arise as a result of the Project.

Project Timing

8. To ensure it can be done safely, drilling work must occur outside of storage injection/withdrawal operational cycles during a period in which reservoirs are at a low pressure. Enbridge Gas is planning to drill observation wells TC 8 and TL 8 in October 2021, at which time no injection or withdrawal operations are anticipated and the pressures of the impacted storage reservoirs will be below 5,500 kPa. Accordingly, the drilling will not cause any disruption to service from the Corunna Storage Pool and Ladysmith Storage Pool.

Risk Assessment

9. Risks to Project scope and timing have been mitigated through geological interpretations, including reservoir modelling and 3D seismic interpretation to select the most suitable well locations. Both techniques look for the best geological location to drill A-1 observation wells.

10. The pressure in the reef must remain low, so that any gas encountered in the well can be effectively controlled in compliance with the *Oil, Gas & Salt Resources Act*, R.S.O. 1990, c. P.12 and the CSA Z341 Standard. As a result, a 'drilling window' has been provided by Enbridge Gas Storage Operations during which time the reservoir will be below 5,500 kPa. Drilling must be completed by October 15, 2021, to ensure that there will be no disruption to service from the Corunna Storage Pool and Ladysmith Storage Pool and to ensure that the pressure will be suitable to safely complete the drilling of the wells. Due to the time required for site preparations, construction mobilization and drilling, the Company is requesting favorable report(s) from the OEB for both of the proposed observation wells by September 16, 2021 to ensure that drilling can take place during the allotted window. Otherwise, the Project will need to be deferred to 2022 following the close of storage withdrawal operations.

COST AND ECONOMICS

1. As outlined in Exhibit B, the Project is required to assist in monitoring natural gas content and pressure in the Corunna Storage Pool and Ladysmith Storage Pool.
2. Consistent with the Company's 2021/2022 Storage Enhancement Project, the Project will be funded entirely by Enbridge Gas's shareholder as an unregulated storage asset forming part of the Company's unregulated storage operations, and thus benefiting the unregulated business.¹ All costs associated with the Project will be captured in unregulated accounts. Enbridge Gas's ratepayers will not incur any rate impacts as a result of the Project. Accordingly, Enbridge Gas is not providing details of Project financial cost and economics.

¹ EB-2020-0256, Exhibit I.STAFF.1, 2021-02-17.

ENGINEERING AND CONSTRUCTION

Drilling Applications

1. All design, installation and testing of the proposed wells will be in accordance with the requirements of the Ontario *Oil, Gas & Salt Resources Act* ("OGSRA"), Ontario Regulation 245/97, OGSRA Standards v.2.0 and CSA Z341.1-18.
2. The design meets or exceeds the requirements of CSA Z341 Storage of Hydrocarbons in Underground Formations (latest edition) ("CSA Z341").
3. Enbridge Gas understands that the OEB will require it to conform to CSA Z341 to the satisfaction of the MNDMNRF.
4. The drilling applications for observation wells TC 8 and TL 8 were sent to the MNDMNRF via email on June 17, 2021. The cover letter and respective drilling applications provided to the MNDMNRF are set out in Attachments 1-3 to this Exhibit.
5. The MNDMNRF provided confirmation on July 27, 2021 that the drilling applications for TC 8 and TL 8 were referred to the OEB on July 19, 2021. The MNDMNRF's email to Enbridge Gas in this regard is included as Attachment 4 to this Exhibit.
6. Enbridge Gas confirms that it will fulfill, to the satisfaction of the MNDMNRF, all of the relevant requirements of CSA Z341, the OGSRA and related regulations. The following sections outline the requirements and work completed to date related to the aforementioned requirements.

7. In order to comply with CSA Z341, Enbridge Gas completed the following risk assessment activities for each of the storage pools:

- Assessment of neighbouring activities (“Assessment”) to determine the impact of the Project on wells within 1 km, operations within 5 km, and the integrity of all wells penetrating the storage zone; and
- “What if” analysis of hazards and operability (“HAZOP”) issues of well drilling for the Corunna Storage Pool and the Ladysmith Storage Pool.
 - “What if” analysis has been completed and submitted to the MNDMNRF for the Corunna Storage Pool on two past occasions:
 1. In 2015 for the drilling of TC 8 and TC 9H (EB-2015-0303) wells;¹ and
 2. In 2020 as part of the Company’s 2021/2022 Storage Enhancement Project (EB-2020-0256).
 - “What if” analysis has been completed and submitted to the MNDMNRF for the Ladysmith Storage Pool on two past occasions:
 1. In 2018 for the drilling of TL 9 and TL 8 (EB-2019-0012) wells;² and
 2. In 2020 as part of the Company’s 2021/2022 Storage Enhancement Project (EB-2020-0256).

The MNDMNRF did not communicate any concern with any of these past “What if” analyses.

¹ Note that while EB-2015-0303 sought a favourable report of the OEB to the MNDMNRF for TC 9H, the associated HAZOP included both TC 8 and TC 9H.

² Note that while EB-2019-0012 sought a favourable report of the OEB to the MNDMNRF for TL 9, the associated HAZOP included both TL 9 and TL 8.

8. Enbridge Gas sent an email to MNDMNRF on July 7, 2021, indicating that the risk assessments discussed above were reviewed by the original author (UGM Engineering Ltd.) and remained valid for the purposes of this Application. Enbridge Gas requested that the MNDMNRF contact the Company directly if they required additional review of the Risk Assessment and Neighbouring Assessment Reports. To date, the MNDMNRF has not contacted Enbridge Gas to request any additional review. A copy of the Company's correspondence with the MNDMNRF in this regard can be found at Attachment 5 to this Exhibit.
9. Executive Summaries of the risk assessments discussed above can be found at Attachments 6 and 7 to this Exhibit. The Executive Summary for the Corunna Storage Pool contains:
 - A synopsis of the methodology and results of the Assessment for the Corunna Storage Pool. The Assessment identified 77 wells (both abandoned and active) that have been drilled within 1 km of the base of gas of the Corunna Storage Pool, with 42 of the wells (both abandoned and active) penetrating the storage zone. For each of the 42 wells penetrating the storage zone, Enbridge Gas thoroughly reviewed the completions and abandonment methods and the wells were subjected to a qualitative risk ranking evaluation. The review indicated that one well, Imperial Corunna No. 4 ("IC 4") would require remedial work. Although IC 4 had been abandoned in compliance with the requirements of the regulations that were in place at the time (the well was plugged and the well is not leaking), the abandonment does not meet Enbridge Gas standards and will be re-abandoned in the fall of 2021, prior to increasing the pressure in the Corunna Storage Pool. The review indicated that there will be no impact on the integrity of the storage zone from the remainder of the wells (both active and abandoned) located within 1 km and/or existing operations located within 5 km of the base of gas of the Corunna Storage Pool.

- An outline of the considerations employed in the “What if” Analysis of Hazards and Operability Issues sessions and report. A total of 217 (2015) and 240 (2020) “What if” entries were generated from the scope of CSA Z341.1-18 during the two sessions and there were no action items generated from either of the risk ranking sessions. It was concluded that the “What if” sessions records and risk rankings, consideration of the development location and the review of qualitative aspects of the Corunna Pool formed a complete study of the (first) 2015 drilling project and the (second) 2020 delta pressuring project, within the scope of the CSA Z341.1-18 regulation. It was agreed that the sessions had examined safety, operability and technical integrity in a responsible and diligent manner.

The Executive Summary for the Ladysmith Storage Pool contains:

- A synopsis of the methodology and results of the Assessment for the Ladysmith Storage Pool. The Assessment identified 32 wells (both abandoned and active) that have been drilled within 1 km of the base of gas of the Ladysmith Storage Pool, with 11 of the wells (both abandoned and active) penetrating the storage zone. For each of the 11 wells penetrating the storage zone, Enbridge Gas thoroughly reviewed the completions and abandonment methods and the wells were subjected to a qualitative risk ranking evaluation. The review indicated that there will be no impact on the integrity of the storage zone from the wells (both active and abandoned) located within 1 km and/or existing operations located within 5 km of the base of gas of the Ladysmith Storage Pool.
- An outline of the considerations employed in the “What if” Analysis of Hazards and Operability Issues sessions and report. A total of 250 (2018) and 260 (2020) “What if” entries were generated from the scope of CSA Z341.1-18 during both sessions and there were no action items generated from the risk ranking

sessions. It was concluded that the “What if” sessions records and risk rankings, consideration of the development location and the review of qualitative aspects of the Ladysmith Pool formed a complete study of the (first) 2018 drilling project and the (second) 2020 delta pressuring project, within the scope of the CSA Z341.1-18 regulation. It was agreed that the sessions had examined safety, operability and technical integrity in a responsible and diligent manner.

From: [Michael Learn](#)
To: [Petroleum Operations Records \(MNRF\)](#)
Cc: [Kathy McConnell](#)
Subject: New Drilling applications TL8 and TC8
Date: Thursday, June 17, 2021 7:39:50 AM
Attachments: [TC8 Drilling program 16-06-2019 signed.pdf](#)
[TL8 program signed.pdf](#)

Hello Danielle,

Please find attached two new drilling applications for the wells:

TC # 8 - Moore - 3 - 19 – X

TL # 8 - Moore - 1 - 19 - IV

These two wells are part of an Ontario Energy Board application which will be submitted within the next few weeks. The drilling applications are being provided at this time to allow the MNRF additional time for review. Enbridge is requesting the MNRF refer the drilling applications to the Ontario Energy Board at its earliest convenience.

Please contact me for payment for these applications (credit card) and if you have any questions.

Thanks

Michael Learn, P.Eng.
Drilling and Reservoir Engineer,
Underground Storage

ENBRIDGE
TEL: 519-436-4600 | CELL: 519-350-5351
50 Keil Drive N Chatham, Ontario N7M 5M1
enbridge.com
Safety. Integrity. Respect.

Application For Well Licence

***TC # 8 - Moore - 3 - 19 - X
Corunna Pool***

Enbridge Gas Inc.

Geology and Reservoir Engineering

June 16, 2021



Oil, Gas and Salt Resources Act

Application for a Well Licence

Form 1

To the Minister of Natural Resources

v.2015-12-15

The undersigned operator applies for a well licence under the Oil, Gas and Salt Resources Act and the Regulations thereunder and submits the following #

1. WELL NAME

TC # 8 - Moore - 3 - 19 - X

Target Formation

A-1 Anhydrite

Purpose of Proposed Well (Well Type)

Natural Gas Storage

2. OPERATOR

Enbridge Gas Inc.

Tel #

519 436-4600

Fax #

519 436-4560

Street Address

50 Keil Drive North

City

Chatham

Prov.

On

Postal Code

N7M 5M1

Mailing Address

City

Prov.

Postal Code

Contact Name

Mike Learn

Contact Tel #

519-436-4600 x5002815

Email

michael.learn@enbridge.com

3. LOCATION

County

Lambton

Township

Moore

Tract

3

Lot

19

Concession

X

Offshore:

Block

Tract

Licence/Lease No.

Surface location, metres from

433.6

m

North

South

X

Latitude

42⁰ 52' 58.933"

Bottom-hole Lat.

42⁰ 52' 58.933"

Lot Boundaries

258.5

m

East

X

West

Longitude

82⁰ 22' 27.177"

Bottom-hole Long.

82⁰ 22' 27.177"

Within 1.6 km of Designated Storage Area?

Yes

X

No

Off-target?

Yes

X

No

4. WELL PARTICULARS

Vertical

X

Horizontal

Directional

Deepening

Re-entry

Lateral

Rig Type:

Rotary

X

Cable

Well to be cored?

Yes

No

X

Formation at TD

A1 Anhydrite

Ground Elevation

196.8

Proposed Depth

779.5

Proposed Depth TVD

779.5

Proposed Start Date

Oct-21

5. POOLING

Pooling of the Spacing Unit or unitization of the Unit Area shown on the attached well location plan has been completed (see Ont. Reg. 245/97 definitions for “pooled spacing unit” and “unitize”)

YesXNo

6. DRILLING CONTRACTOR

Predator Drilling Inc.

Tel #

403-264-6712

Address

2120, 500 4th Ave S.W.

City

Calgary

Prov.

AB

Postal Code

T2P 2V6

7. PROPOSED CASING AND CEMENTING PROGRAM

Hole Size (mm)	Casing O.D. (mm)	Weight (kg/m)	Grade	New, Used or in-hole	Setting Depth TVD	Setting Formation	CASING SETTING INFORMATION		
							How Set	Cement Type	Cement Top KB / RF
374.0	298.45	69.94	H-40	New	63.3	Kettle Point / Bedrock	Cemented	0:1:0	4
269.9	219.10	35.70	J-55	New	407.3	F Unit Shale	Cemented	0:1:8; 0:1:0	4
200.0	139.10	23.10	J-55	New	779.0	A-1 Anhydrite	Cemented	0:1:0	4

8. BLOW-OUT PREVENTION EQUIPMENT

Diverter,Annular Preventer; Blind Rams, Pipe Rams

9. WELL SECURITY

Name of Trustee

1236596 Ontario Limited

Total # Unplugged Wells

368

Current Balance

\$70,000

Harrison Pensa & Associates

10. REMARKS

11. ENCLOSURES

Fee

X

Location Plan

X

(Land wells only)

Drilling Program

X

12. NOTICE OF COLLECTION

The Ministry of Natural Resources and Forestry is collecting your personal information under the authority of the *Oil, Gas and Salt Resources Act*. Any personal information provided on this application will be used for licensing and law enforcement purposes only and will be protected in accordance with the Freedom of Information and Protection of Privacy Act.

If you have questions about use of your personal information, please contact the Policy and Program Officer, Petroleum Operations Section, Ministry of Natural Resources and Forestry, 659 Exeter Road, London N6E1L3, 519-873-4638.

13. AUTHORITY

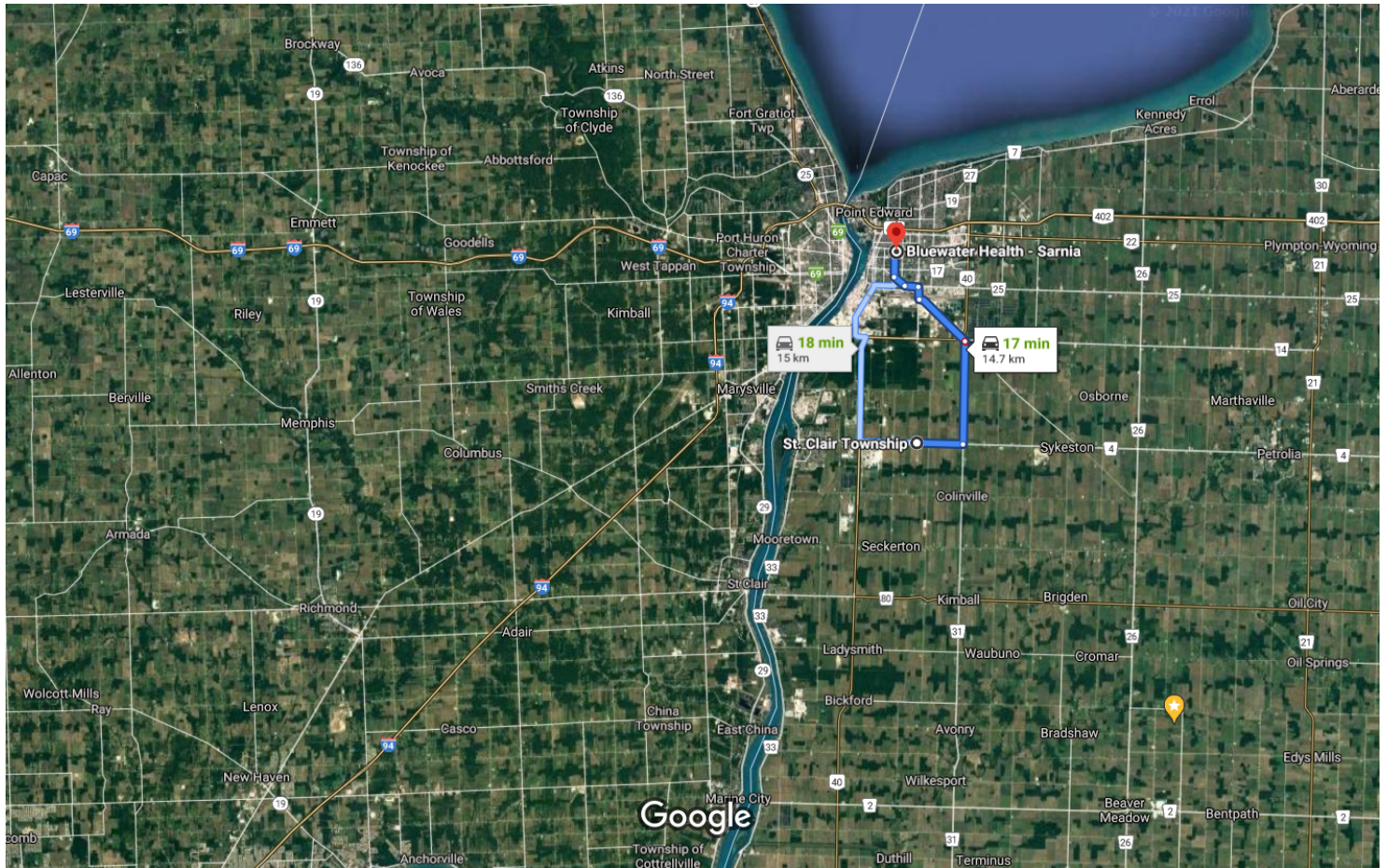
The undersigned certifies that the information provided herein is complete and accurate, the operator has the right to drill or operate a well in the above location, and he/she has authority to bind the operator.

Date (d/m/y)	21-Jun-21	Name	Mike Learn	Signature
		Company	Enbridge Gas Inc.	Title
				Principal Drilling and Reservoir Engineer



St. Clair Township, Ontario to Bluewater Health - Sarnia

Drive 14.7 km, 17 min



Imagery ©2021 TerraMetrics, Map data ©2021 5 km



St. Clair Township

Ontario




1. Head north toward Petrolia Line
0 s (3 m)

Continue on Petrolia Line. Take Kimball Rd/Lambton County Rd 31 and Plank Rd to Maria St in Sarnia

2. Turn right onto Petrolia Line
2.4 km
3. Turn left onto Kimball Rd/Lambton County Rd 31
5.4 km
4. Turn left onto Plank Rd/County Rd 20
[Continue to follow Plank Rd](#)
3.3 km
5. Turn right onto Indian Rd S/County Rd 29
650 m
6. Turn left onto Confederation St/County Rd 25
750 m

-  7. Turn right onto Ontario St
750 m
-  8. Turn right onto Russell St S
1.2 km

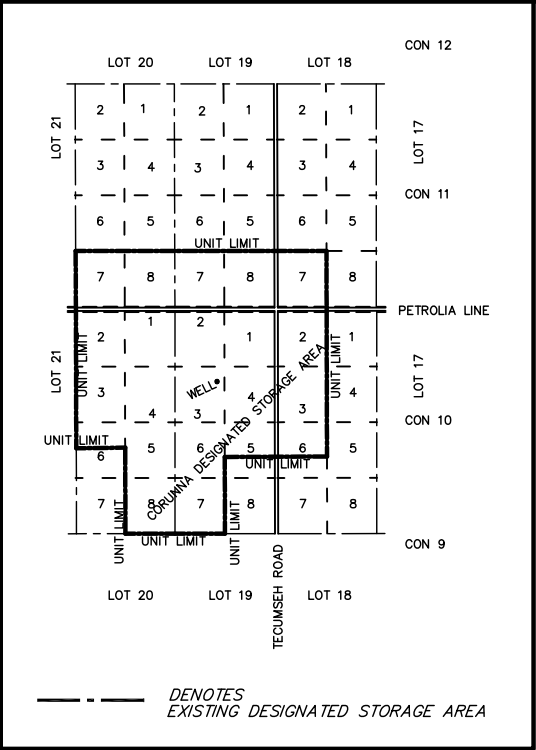
Drive to your destination

-  9. Turn right onto Maria St
2 min (210 m)
-  10. Turn left
100 m
-  Destination will be on the right
110 m

Bluewater Health - Sarnia

89 Norman St, Sarnia, ON N7T 6S3

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

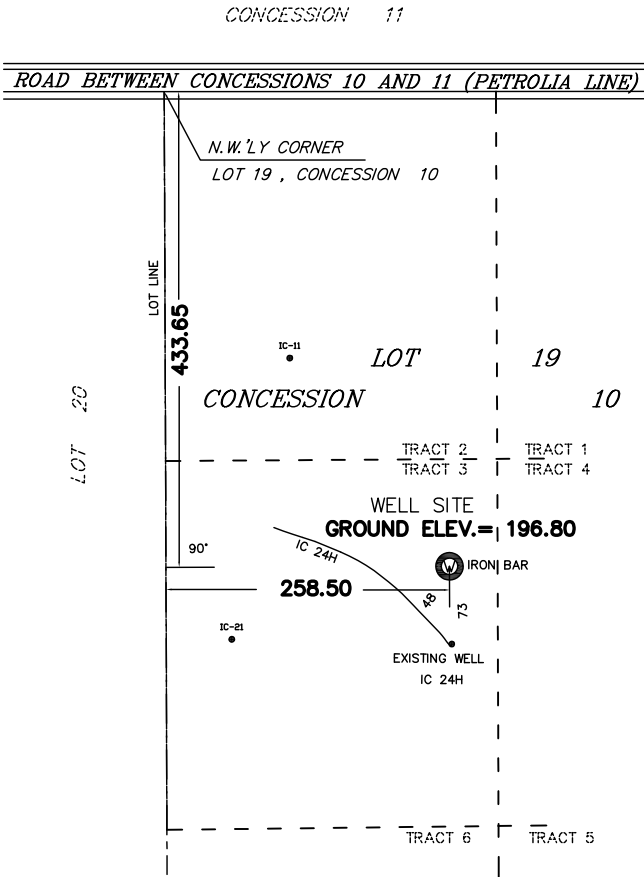


PLAN OF PROPOSED WELL
LOT 19
CONCESSION 10
GEOGRAPHIC TOWNSHIP OF MOORE
TOWNSHIP OF ST. CLAIR
COUNTY OF LAMBTON

SCALE 1:5000

NOTE (WELL SITE) CO-ORDINATES
LATITUDE N. 42°52'58.933" LONGITUDE W. 82°22'27.177"
U.T.M. N 4 748 742.3 E 387 776.9

WELL NAME
TC 8- MOORE - 3 - 19 -10



NOTE GEODETIC HORIZONTAL CONTROL
U.T.M. CO-ORDINATES ARE GEODETIC (DATUM NAD 83 ORIGINAL) AND REFERRED TO MONUMENTS
No.S 693749 AND 693767

NOTE METRIC
DISTANCES SHOWN ON THIS PLAN ARE IN METERS AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

PREPARED BY
BRISCO AND O'ROURKE
SERVING THE PETROLEUM INDUSTRY
THROUGHOUT ONTARIO
WELLS, CONSTRUCTION AND TECHNICAL SURVEYING
DIGITAL MAPPING
LAND AND LEASE SURVEYS

OFFICE (519) 351-5073
CELL (519) 360-2134
FAX (519) 351-3119
PO.BOX 327 - N7M-5K4
CHATHAM, ONTARIO

NOTE BENCH MARK
ELEVATIONS ARE REFERRED TO GEODETIC DATUM AND REFERENCE BENCH MARK BEING
NO. 81U138 SARNIA
ELEVATION = 180.512

PREPARED FOR
ENBRIDGE GAS INC.

FILE NO. 20-5120 PLAN NO. ENB6870.DWG

Timothy J. O'Rourke
FEB. 4, 2021
TIMOTHY J. O'ROURKE C.S.T. A.C.E.T.

AUTHORIZED BY THE MINISTER OF NATURAL RESOURCES UNDER THE PETROLEUM RESOURCES ACT OF ONTARIO

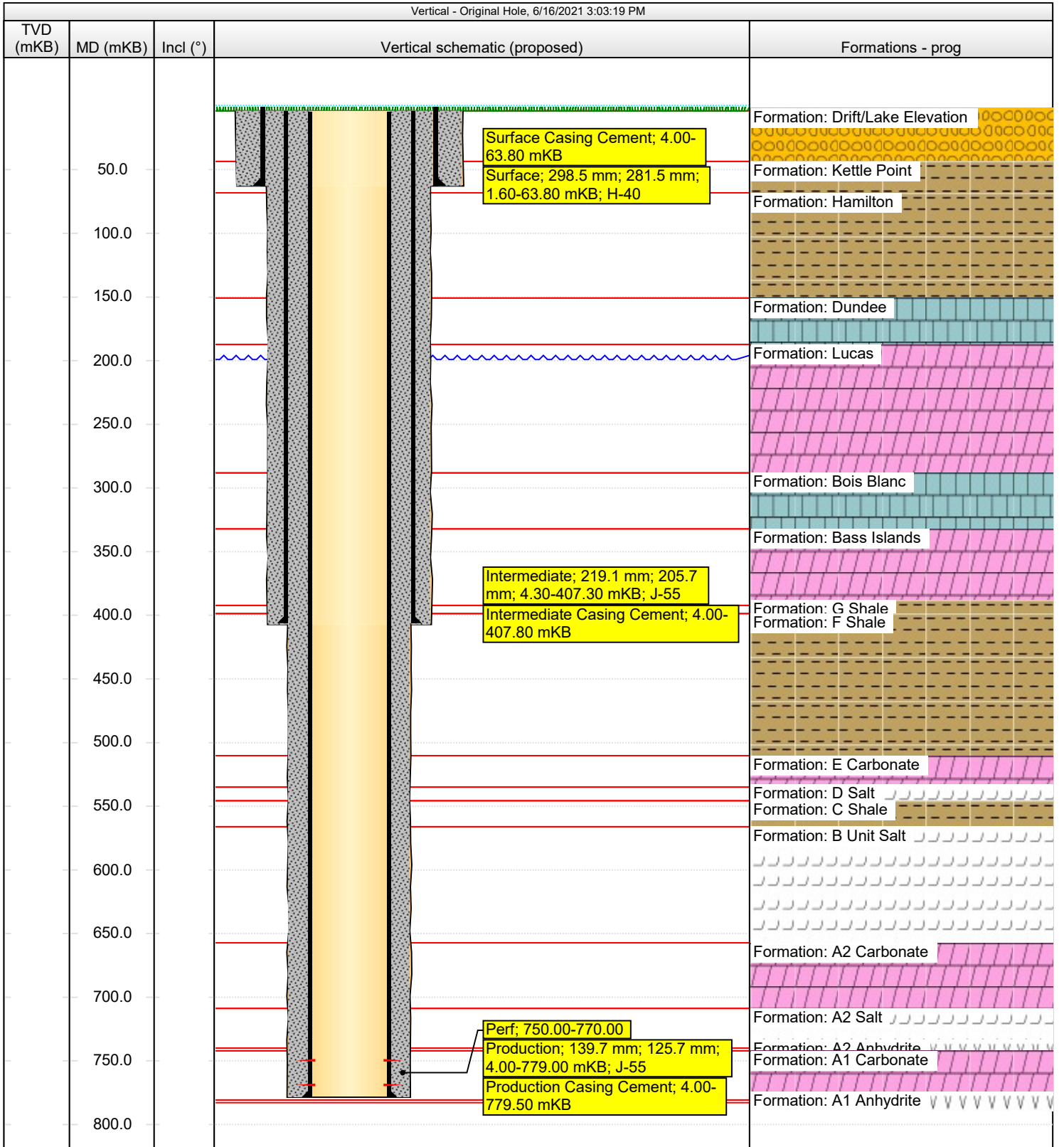
Well Name: TC#8, Moore 3-19-X

License Number:

Most Recent Job

Job Category	Primary Job Type	Secondary Job Type	Start Date	End Date
Drilling	Drilling - original			

TD: 779.50



Contacts	
TC # 8 - Moore - 3 - 19 - X	
Police Fire & Ambulance	911
911 Address	6399 Tecumseh Road, St. Clair Township
Tecumseh Control Room	519-862-6012
M.O.E. Spills Hotline	1-800-268-6060
MNR Contact	519-873-4645
MOL	1-877-202-0008

ENBRIDGE GAS CONTACTS

Rob Newport -	Storage Superintendent	519-683-4468 x5102178 519-365-0897	Rob.Newport@enbridge.com
Shelie Cascadden	Geologist	519-818-7008	Shelie.Cascadden@enbridge.com
Mike Learn	Drilling and reservoir engineer	519-436-4600 x5002815 519-350-5351 519-251-9701	michael.learn@enbridge.com
Kathy McConnell	Technical Manger storage and reservoir	519-862-6032 519-312-2168	kathy.mcconnell@enbridge.com
Chris Pincombe	Land Agent	519-862-6092 519-381-1408	Chris.pincombe@enbridge.com

Contractors

Contractor	Contact	Phone	Email
<u>Drilling and Cementing</u>			
Predator Drilling	Jon Picray, Tool Push	403-801-1824	jpicyay@predatordrilling.com
	Paulo Facca	403-264-6712 403-669-1372	PFacca@predatordrilling.com
Terry Marsh Well Drilling	Terry Marsh	519-695-6060 519-695-9804	
Black Creek	Ian Veen	519-834-2941 519-383-4645	

Wellheads

Wellmaster	Brian DeJaegher	519-688-0500	bdejaegher@wellmaster.ca
Stream-Flo	Karen Derrick	832-647-0710	kderrick@streamflo.com
ECAN	Robert Wainwright	519-627-3824 519-468-3922	

Drill Bits:

Brad Takenaka	Varel Rock Bits Canada Sales Manager	Office: 403-968-9369 Cell: 403-303-2533	btakenaka@varelintl.com
Mike Kellar	Trendon Bit Service Ltd. Director, Sales Office:	403-990-1299	mkellar@trendoninc.com

Wireline Services:

Baker Hughes	Dapo Laniya	Office: 519-332-8030 Cell: 519-339-6783	Dapo.Laniya@bakerhughes.com
Weatherford	Dave Tipping	Office: 519-683-2010 Cell: 519-436-3541	dave.tipping@canada.weatherford.com

Water Hauling:

McKeegan	Melvin McKeegan	519-864-1782 519-332-7676	
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Contacts

TC # 8 - Moore - 3 - 19 - X

Harold Marcus Limited	Denis Marcus	Office: 519-695-3735 Cell: 519-380-5238	dmarcus@haroldmarcus.com
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Rental Equipment:

Dale Holland	Wheatley Wireline Services Ltd.	Office: 519-825-3680 Fax: 519-825-9348 Cell: 519-322-8015	
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Keith Davis	Ecan Energy Services Inc.	Office: 519-627-3824 Fax: 519-627-5306 Cell: 519-437-7038	kmecanen@kent.net
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Vern Anger	Canfish Services Inc. Fishing Supervisor	Office: 780-955-2600 Cell: 403-845-0012	
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Orval Beam	Orval L. Beam Limited Operations Manager Tank Rentals	Office: 519-436-0164 Fax: 519-436-0164 Cell: 519-436-4801	
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Welders:

St. Clair Mechanical President	John Dawson	Office: 519-864-0927 Cell: 519-330-9672	
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Government & Other Agencies

MNRF	Petroleum Resources Centre	Office: 519-873-4634 Fax: 519-873-4645	ogsr.mnrf.gov.on.ca
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MOECC	Spill Reporting	1-800-268-6060	
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MOL	Health & Safety	1-800-265-1676	
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Oil, Gas & Salt Resources Library		Office: 519-686-2772 Fax: 519-686-7225	
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Geological Prognosis of:

TC # 8 - Moore - 3 - 19 - X

Lot: 19
Conc: X
Tract: 3
Pool: Corunna

Township: Moore
County: Lambton
Objective: Natural gas Storage
Coordinates: 433.6 m. **South**
258.5 m. **East**
UTM Coords: 387777, 4748742

Geology Contacts: Shelie Cascadden 436-4600 x5002153 (work) 519-818-7008 (cell)

Remarks: Base of Gas -534
Tops derived from I. 756 and IC 10

Contacts	Top (m.)	Elev.(m.)	Thickness	Gas	Oil	H2O	Remarks/Expected Pressure
Rig Floor	0.0	200.8	4.0				
Ground Elevation	4.0	196.8	44.3				Actual
Kettle Point / Bedrock	48.3	152.5	28.5			x	Fresh Water @ 46.1
Hamilton	76.8	124.0	80.5				
Dundee	157.3	43.5	34.5				
Detroit River	191.8	9.0	143.5				Sulphur water @ 194
Bois Blanc			0.0				
Bass Island	335.3	-134.5	60.0				
G Unit	395.3	-194.5	7.0				
F Unit Shale	402.3	-201.5	31.0				
F Salt	433.3	-232.5	81.5				
E Unit Carbonate	514.8	-314.0	26.0				
D Unit Salt	540.8	-340.0	9.5				
C Unit Shale	550.3	-349.5	15.5				
B Unit Marker	565.8	-365.0	7.5				
B Unit			0.0				
B Salt	573.3	-372.5	90.0				
B Anhydrite			0.0				
A-2 Unit Carbonate	663.3	-462.5	35.0	x			Gas may be possible
A-2 Shale	698.3	-497.5	5.0				
A-2 Salt	703.3	-502.5	35.0				
A-2 Anhydrite	738.3	-537.5	2.0	x			
A-1 Unit Carbonate	740.3	-539.5	38.0	x			Gas may be possible
A-1 Anhydrite	778.3	-577.5	11.5				
Guelph	789.8	-589.0	-10.0				
Total Depth	779.8	-579.0					

Sample Requirements:

One sample shall be collected every 3 meters of formation drilled once the Kettle Point/bedrock is reached

DRILLING PROCEDURE

TC # 8 - Moore - 3 - 19 - X

Pre Spud

Fresh Water Well samples

Obtain samples from all fresh water wells located within a minimum radius of 750m of the proposed well. Perform water analysis and keep copies of the results.

Site Preparation

Prepare drilling location.

Locate all drainage tiles crossing lease area.

Strip and stockpile all top soil from lease.

Construct adequate berms around lease and access road as required.

Cut, block and divert drainage tile as required.

Government Notification

Underground Storage to notify M.N.R.F. 48 hours prior to spud and prior to resumption of drilling activities.

Signs

Install rig sign on access road to lease.

Safety Meeting

Conduct a pre-spud safety meeting for all crews. Rig Manager and all crew members must be present.

Additional safety meetings shall be conducted at the Well Site Supervisor's discretion.

DRILLING PROCEDURE

TC # 8 - Moore - 3 - 19 - X

CONDUCTOR AND SURFACE HOLE - CABLE TOOL

1. Move in and rig up cable tool drilling rig.

Note: All depths referenced to 4.0 mKB

2. Drill and drive 406 mm conductor pipe 1 m into Kettle Point / Bedrock (49.3 mKB) with a 374 mm bit. Ensure that fresh water is shut off before proceeding.

Note: Record fresh water interval

3. Record conductor casing OD, weight, grade and set depth.
4. Drill minimum 15.5 m into Kettle Point / Bedrock (63.8 mKB) with a 374 mm bit.

Note: One sample shall be collected every 3 m once Kettle Point / Bedrock is reached.

5. Hold Safety Meeting
6. Run 298.45 mm surface casing to bottom (63.8 mKB) with centralizers 2m above shoe and at joints 2, 4 and 8. Tack weld guide shoe on bottom. The optimum makeup torque is 4170 N-m (3070 ft-lb) and the maximum makeup torque is 5210 N-m (3840 ft-lb).
7. Record surface casing OD, weight, grade, placement of cementing hardware and set depth.
8. Raise surface casing 0.5 m off bottom and set in slips. Cement 298.45 mm surface casing to surface as per cementing program.
9. Wait on cement (W.O.C.) for 24 hours.
10. Record cement top in casing.
11. Rig out cable tool rig.
12. Rig in rotary rig.

Measure height of rig floor to ground and adjust drilling program

SURFACE HOLE - ROTARY

1. Move in and rig up rotary drilling rig.

Measure height of rig floor to ground and adjust drilling program

2. Drill minimum 15.5 m into Kettle Point / Bedrock (63.8 mKB) with a 374 mm bit.

One sample shall be collected every 3 m once A-2 Shale is reached.

3. Hold Safety Meeting
4. Run 298.45 mm surface casing to bottom (63.8 mKB) with centralizers 2m above shoe and at joints 2, 4 and 8. Tack weld guide shoe on bottom. The optimum makeup torque is 4170 N-m (3070 ft-lb) and the maximum makeup torque is 5210 N-m (3840 ft-lb).
5. Record surface casing OD, weight, grade, placement of cementing hardware and set depth.
6. Raise surface casing 0.5 m off bottom and set in slips. Cement 298.45 mm surface casing to surface as per cementing program.
7. Wait on cement (W.O.C.) for 24 hours.
8. Record cement top in casing.

DRILLING PROCEDURE

TC # 8 - Moore - 3 - 19 - X

INTERMEDIATE HOLE - ROTARY

1. Pressure Test entire BOP system and surface casing to 1225 kPag for 10 minutes and record results in log according to OGSRA Operating Standards v 2.0 sec. 4.5.2.1
2. Drill out cement with 269.9 mm bit.
3. Drill 0.5 m of new formation.
4. Hold safety meeting. Pressure Test surface casing and BOP in accordance with Pressure Test Program - Surface Casing-Pressure Test
5. Drill until at the top of F Shale formation (402.3 mKB) with 269.9 mm bit, surveying every 30 m.

Note: Geologist must be on site to verify top of F Shale.

6. Drill 5.5m into the F Shale formation to 407.8m with 269.9 mm bit or as directed by company personnel
7. Hold safety meeting. Run the 219.1 mm intermediate casing to (407.3 mKB) with a float collar at top of bottom joint. Centralizers should be placed 2 m above shoe, at joints 2, 4 and 5 and every 5th joint to surface. Cement basket should be placed above Detroit River formation. Threadlock guide shoe on bottom.
8. The optimum makeup torque is 6480 N-m (4770 ft-lb) and the maximum makeup torque is 8090 N-m (5960 ft-lb). Land casing at proper elevation for thread-on type casing bowl.
9. Record intermediate casing OD, weight, grade, placement of cementing hardware and set depth.
10. Prepare to cement 219.1 mm intermediate casing to surface.
11. Hold safety meeting with all on-site personnel.
12. Pressure test surface equipment to 15 MPag for 1 minute. Ensure no leaks.
13. Pump citric acid followed by fresh water pre-flush. Cement to surface as per cementing program. Ensure cement returns to surface. Take a minimum of four cement samples. Record all circulating pressures and volumes.
14. W.O.C. for 48 hours.
15. Hold Safety Meeting. Cased Hole Logging. *See LOGGING PROGRAM, Log Run 1.*
16. Pressure Test Pipe Rams to 1400 kPag for ten minutes. Pressure Test the entire BOP system to 7000 kPag for 10 minutes and record results in log according to OGSRA Operating Standards
(This pressure test also tests the casing and casing bowl requirement of 5,500 kPag.)

DRILLING PROCEDURE

TC # 8 - Moore - 3 - 19 - X

Production Hole

1. Drill a maximum of 0.5 m of new formation with 200 mm bit.
2. Prepare for Pressure Integrity Test (P.I.T.). Using a low volume, high pressure pump, pressure test the formation at a pressure equivalent to a gradient of 18 kPa/m for 10 min using an incompressible fluid.
3. Drill 1.2 m into the A-1 Anhydrite (779.5m) with 200 mm bit. Survey every 30m

Note: Geologist will be onsite to verify top of A-1 Anhydrite formation.

4. Run 139.1 mm production casing to 779mKB with insert float at top of bottom joint. Centralizers to be placed 2 m above shoe, at joints 2, 3, 4 and 5 and every 4th joint to surface. Tack weld guide shoe on bottom. The optimum makeup torque is 2740 N-m (2020 ft-lb) and the maximum makeup torque is 3440 N-m (2530 ft-lb). Ensure that a collar is not positioned where the wellhead seals need to be installed.
5. Record production casing OD, weight, grade, placement of cementing hardware and set depth.
6. Hold safety meeting.
7. Prepare to cement 139.1 mm production casing to surface.
8. Pressure test surface equipment to 15 MPa for 1 minute. Ensure no leaks.
9. Pump citric acid followed by fresh water pre-flush. Cement to surface as per Cementing Program - 139.7mm PRODUCTION CASING. Displace cement with fresh water. Ensure cement returns to surface or arrange for remedial cementing from surface. Take a minimum of four cement samples to verify setup time and density. Record all circulating pressures and volumes.
10. Lift BOP and set casing slips.
11. Set primary seals. Cut off casing to proper height. Install casing spool.
12. Install master valve and suspend the well in accordance with Section 5 of the OGSRA Operating Standards v.2.0.
13. Rig out rotary drilling rig.
14. Rig in Service rig
15. Rig in wireline company.
16. Perforate well from 750 mKb to 770 mKb with 10 shots per meter.
17. Rig out wireline company.
18. Bail hole dry
19. rig out service rig
20. Install blind flange on top of master valve.
21. Drilling department to notify M.N.R.F. within 48 hours of reaching TD.

CASING PROGRAM

TC # 8 - Moore - 3 - 19 - X

CONDUCTOR CASING SUMMARY (Cable Tool: 1.9 m KB-GL) (CABLE TOOL ONLY)

Description	Metric		Imperial	
	Value	Unit	Value	Unit
Top	0.0	mKB	0.0	ftKB
Bottom	49.3	mKB	161.7	ftKB
Outside Diameter	406.00	mm	15.984	inches
Weight	96.70	kg/m	65.0	lb/ft
Drift Diameter	382.60	mm	15.063	inches
Inside Diameter	488.95	mm	19.250	inches
Grade	H40		H40	
Thread	N/A		N/A	
Coupling	Welded		Welded	
Burst	N/A		N/A	psi
Collapse	N/A	kPa	N/A	psi
Pipe Body Yield Strength	N/A	daN	N/A	lb-f
Joint Strength	N/A	daN	N/A	lb-f
Torque - Optimum	N/A	N-m	N/A	ft-lb
Torque - Maximum	N/A	N-m	N/A	ft-lb
Condition	New			
Float Equipment	None			
Shoe	Drive			
Threadlock	Tack weld drive shoe on bottom joint of casing			

SURFACE CASING SUMMARY (Cable Tool: 1.9 m KB-GL)

Description	Metric		Imperial	
	Value	Unit	Value	Unit
Top	0.0	mKB	0.0	ftKB
Bottom	63.3	mKB	207.7	ftKB
Outside Diameter	298.45	mm	11.750	inches
Weight	69.94	kg/m	47.0	lb/ft
Drift Diameter	277.60	mm	10.929	inches
Inside Diameter	281.50	mm	11.083	inches
Grade	H-40		H-40	
Thread	8 Rd.		8 Rd.	
Coupling	N/A		N/A	
Burst	11,310	kPa	1,640	psi
Collapse	10,410	kPa	1,510	psi
Pipe Body Yield Strength	478,000	daN	736,000	lb-f
Joint Strength	136,600	daN	307,000	lb-f
Torque - Optimum	4,170	N-m	3,070	ft-lb
Torque - Maximum	5,210	N-m	3,840	ft-lb
Condition	New			
Float Equipment	None			
Centralizers	Joints 2, 4 and 8			
Shoe	Guide			
Threadlock	Threadlock guide shoe on bottom joint of casing			

CASING PROGRAMTC # 8 - Moore - 3 - 19 - X**INTERMEDIATE CASING SUMMARY**

Description	Metric		Imperial	
	Value	Unit	Value	Unit
Top	0.0	mKB	0.0	ftKB
Bottom	407.3	mKB	1336.3	ftKB
Outside Diameter	219.10	mm	8.626	inches
Weight	35.70	kg/m	24.0	lb/ft
Drift Diameter	202.50	mm	7.972	inches
Inside Diameter	205.60	mm	8.094	inches
Grade	J-55		J-55	
Thread	8 Rd.		8 Rd.	
Coupling	ST & C		ST & C	
Burst	21,170	kPa	3,070	psi
Collapse	9,450	kPa	1,370	psi
Pipe Body Yield Strength	169,500	daN	381,000	lb-f
Joint Strength	108,500	daN	244,000	lb-f
Torque - Optimum	6,480	N-m	4,770	ft-lb
Torque - Maximum	8,090	N-m	5,960	ft-lb
Condition	New			
Float Equipment	Float Collar (Top of 1 st joint)			
Centralizers	Joints 2,4 & 5; every 4 th joint & 10 m from surface			
Cement Basket	Run above Detroit River formation			
Shoe	Guide			
Threadlock	Threadlock guide shoe on bottom joint of casing			

PRODUCTION CASING SUMMARY

Description	Metric		Imperial	
	Value	Unit	Value	Unit
Top	0.0	mKB	0.0	ftKB
Bottom	779.0	mKB	2555.8	ftKB
Outside Diameter	139.10	mm	5.476	inches
Weight	23.10	kg/m	15.5	lb/ft
Drift Diameter	122.60	mm	4.827	inches
Inside Diameter	125.70	mm	4.949	inches
Grade	J-55		J-55	
Thread	8 RD		8 RD	
Coupling	ST & C		ST & C	
Burst	27,100	kPa	3,930	psi
Collapse	27,850	kPa	4,040	psi
Pipe Body Yield Strength	110,300	daN	248,000	lb-f
Joint Strength	96,500	daN	217,000	lb-f
Torque - Optimum	2,740	N-m	2,020	ft-lb
Torque - Maximum	3,440	N-m	2,530	ft-lb
Condition	New			
Float Equipment	Float Collar (Top of 1 st joint)			
Centralizers	Joints 2,4 & 5; every 4 th joint & 10 m from surface			
Shoe	Guide			
Threadlock	Threadlock guide shoe on bottom joint of casing			

CEMENTING PROGRAMTC # 8 - Moore - 3 - 19 - X**406.4 mm SURFACE CASING****Equipment**

- Pumping unit
- Cementing head (plug loading type)
- One 406.0 mm wiper plug

CEMENT SPECIFICATIONS**Description****Cable Tool****Value Unit****Rotary****Value Unit**

Top	0.0 mKB	0 mKB
Bottom	63.3 mKB	63.3 mKB
Pre-sweep (Fresh Water)	2.00 m ³	2.00 m ³
Cement Excess (Openhole)	100%	100%
Cement Excess (Cased Hole)	30%	30%
Cement Type	0:1:0	0:1:0
Mix Water	Fresh	Fresh
Additives	3% CaCl ₂	3% CaCl ₂
Density	1901 kg/m ³	1901 kg/m ³
Water Requirement	0.440 m ³ /t	0.440 m ³ /t
Yield	0.757 m ³ /t	0.757 m ³ /t
Cement Volume	8.67 m ³	5.05 m ³
Cement Yield	11.45 tonnes	6.67 tonnes
Displacement #1 (Fresh Water)	0.50 m ³	0.50 m ³
Displacement #2 (Brine)	3.44 m ³	3.44 m ³
Displacement Rate	0.6 - 0.8 m ³ /min	0.6 - 0.8 m ³ /min
W.O.C.	24 hrs	24 hrs
24 Hr. Compressive Strength	20,684 kPa	20,684 kPa

CEMENTING PROCEDURE

1. Run casing.
2. Pump pre-sweep, pump cement, drop top plug. DO NOT PUMP OUT LINES.
3. Displace plug with water. DO NOT OVERDISPLACE MORE THAN 1/2 SHOE JOINT VOLUME.
Bump plug 3,500 kPa over pumping pressure.
4. Maintain a constant pump rate throughout the cement job.
5. Catch cement slurry samples while mixing and set aside.
6. Observe setting time and cement quality.
7. If no cement returns to surface, consult with Storage Operations Supervisor regarding re-cementing from top with macaroni string using Class 'G' cement + 3% CaCl₂.
8. Obtain a 1 litre sample of the dry cement used in the cement job. This will be used for testing if subsequent cement problems occur (i.e. flash setting).

CEMENTING PROGRAM

TC # 8 - Moore - 3 - 19 - X

298.5 mm INTERMEDIATE CASING

Equipment

- Pumping unit
- Cementing head (plug loading type)
- One 298.5 mm wiper plug

NOTE:

Lead Cement: Surface to top of Bois Blanc

Tail Cement: Top of Bois Blanc to casing shoe

CEMENT SPECIFICATIONS

Description

	Lead	Tail
	Value Unit	Value Unit
Top	0.0 mKB	335.3 mKB
Bottom	335.3 mKB	407.3 mKB
Pre-sweep #1 (Citric Acid)	3.00 m ³	N/A
Pre-sweep #2 (Fresh Water)	1.00 m ³	N/A
Cement Excess (Openhole)	100%	100%
Cement Excess (Cased Hole)	30%	30%
Cement Type	0:1:8 Class 'G'	0:1:0 Class 'G'
Mix Water	Fresh	Fresh
Celloflakes	2 bags	N/A
Prehydrated Gel	2%	N/A
Additives	0.75% T-10	2% CaCl ₂ ; 0.75% T-10
Density	1604 kg/m ³	1901 kg/m ³
Water	0.864 m ³ /t	0.440 m ³ /t
Yield	1.212 m ³ /t	0.757 m ³ /t
Cement Volume	13.18 m ³	3.24 m ³
Cement Yield	10.87 tonnes	4.28 tonnes
Pump Rate	0.6 - 0.8 m ³ /min	0.6 - 0.8 m ³ /min
Displacement #1 (Fresh Water)	N/A m ³	0.50 m ³
Displacement #2 (Brine)	N/A m ³	12.71 m ³
W.O.C.	48 hrs	48 hrs
24 Hr. Compressive Strength	1379 kPa	15,858 kPa

CEMENTING PROCEDURE

1. Run casing.
2. Pump pre-sweep, pump Lead cement, pump Tail Cement and drop wiper plug. DO NOT PUMP OUT LINES.
3. Displace plug with fresh water and then brine. DO NOT OVERDISPLACE MORE THAN 1/2 SHOE JOINT VOLUME. Bump plug 3,500 kPa over pumping pressure.
4. Maintain a constant pump rate throughout the cement job.
5. Catch cement slurry samples while mixing and set aside.
6. Observe setting time and cement quality.
7. If no cement returns to surface, consult with Storage Operations Supervisor regarding re-cementing from top with macaroni string using Class 'G' cement + 3% CaCl₂.
8. Obtain a 1 litre sample of the dry cement used in the cement job. This will be used for testing if subsequent cement problems occur (i.e. flash setting).
9. Run a Cement Bond Log (CBL) to evaluate the integrity of the cement bond and to locate the position of the cement top.

CEMENTING PROGRAM**TC # 8 - Moore - 3 - 19 - X****219.1 mm PRODUCTION CASING****Equipment**

- Pumping unit
- Cementing head (plug loading type)
- One 219.1 mm wiper plug

CEMENT SPECIFICATIONS

Description	Value	Unit
Top	0.0	mKB
Bottom	779.0	mKB
Pre-sweep (Citric Acid)	3.00	m ³
Pre-sweep (Fresh Water)	1.00	m ³
Cement Excess (Openhole)	100%	
Cement Excess (Cased Hole)	30%	
Cement Type	0:1:0	Class 'G'
Mix Water	10%	Salt Water
Fluid loss/Dispersant	0.75%	T-10
Gas Block (if required)	0.4%	D-24
Density	1901	kg/m ³
Water Requirement	0.440	m ³ /t
Yield	0.772	m ³ /t
Cement Volume	22.68	m ³
Cement Yield	29.38	tonnes
Pump Rate	0.6 - 0.8	m ³ /min
Displacement (Brine)	0.75	m ³
W.O.C.	48	hrs
24 Hr. Compressive Strength	6,895	kPa

NOTE: Cement program may be changed if well integrity conditions dictate**CEMENTING PROCEDURE**

1. Run casing and set casing slips.
2. Pump pre-sweep, pump cement, drop top plug. PUMP OUT LINES.
3. Displace plug with brine. DO NOT OVERDISPLACE MORE THAN 1/2 SHOE JOINT VOLUME.
Bump plug 3,500 kPa over pumping pressure.
4. Maintain a constant pump rate throughout the cement job.
5. Catch cement slurry samples while mixing and set aside.
6. Observe setting time and cement quality.
7. If no cement returns to surface, consult with Storage Operations Supervisor regarding re-cementing from top with macaroni string using Class 'G' cement + 3% CaCl₂.
8. Obtain a 1 litre sample of the dry cement used in the cement job. This will be used for testing if subsequent cement problems occur (i.e. flash setting).
9. Run a Cement Bond Tool to evaluate the integrity of the cement bond and to locate the position of the cement top.

PRESSURE TEST PROGRAM

TC # 8 - Moore - 3 - 19 - X

SURFACE CASING - PRESSURE TEST

1. Pressure Test surface casing to 1380 kPag for 10 minutes and pressure test BOP system to a pressure equivalent to one- half its working pressure. Record results in log according to OGSRA Operating Standards v 2.0 sec. 4.5.21.

INTERMEDIATE CASING - PRESSURE TEST

1. Pressure Test Intermediate casing to 1380 kPag for 10 minutes and pressure test annular preventer to a pressure equivalent to one- half its working pressure. Record results in log according to OGSRA Operating Standards v 2.0 sec. 4.5.21.

PRODUCTION HOLE - PRESSURE INTEGRITY TEST (PIT)

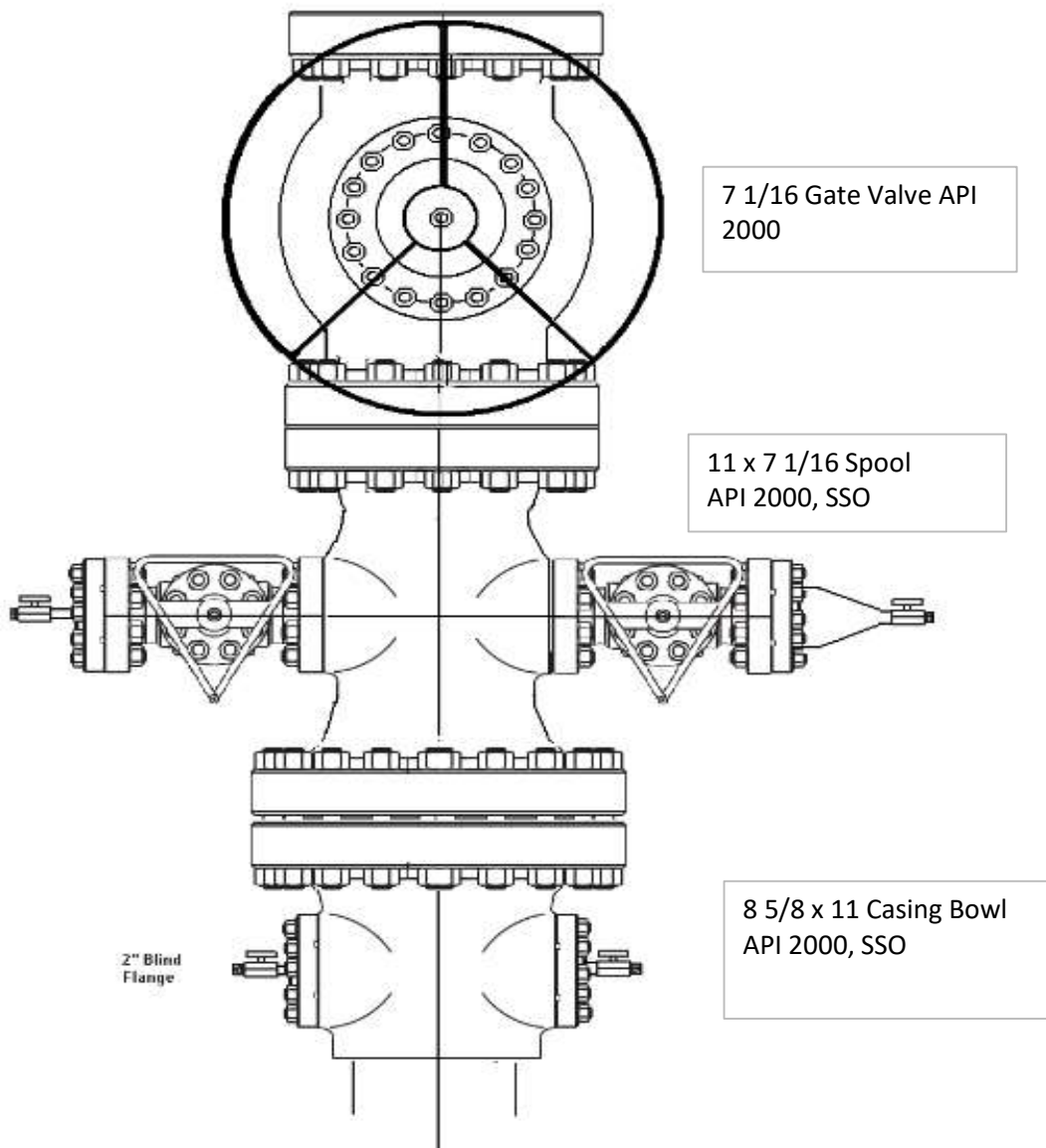
1. Drill 0.5 m of new formation.
2. Using a low volume, high pressure pump, pressure test the formation at a pressure equivalent to a gradient of 18 kPa/m for a duration of ten (10) minutes using an incompressible fluid.

PRODUCTION CASING - PRESSURE TEST

1. Pressure test wellhead and production casing to 13,790 kPa for four (4) hours.
2. Install Wellhead and Master Valve and 177.8 mm BOP. The lubricator and components shall have a minimum pressure rating of 120% of the formation pressure. Pressure test annular preventer to 1380kPa for 10 minutes. Pressure test annular preventer to 7000 kPa for 10 minutes

WELLHEAD

TC # 8 - Moore - 3 - 19 - X



LOGGING PROGRAM

TC # 8 - Moore - 3 - 19 - X

Run #	Logging Interval	Hole Condition		Comments
		Fluid Filled	Gas Filled	
1	Intermediate-Surface	Gamma Ray Cement Bond Log		Logs run after 48 hr WOC
2	Production - Surface	Cement Bond Log High Res Vertilog Gamma Ray		Logs run after 48 hr WOC
3	TD-Surface	Gamma Ray Compensated Neutron Z-Density*	Gamma Ray Linear Porosity Neutron* Z-Density*	

NOTE: * open hole section only

ABANDONMENT PROGRAM

TC # 8 - Moore - 3 - 19 - X

If drilling results prove unsuccessful, the well will be plugged and abandoned as follows:

- 1 Notify MNRF by fax 48 hrs prior to commencing plugging operations
- 2 Run tubing to TD and cement to surface with 23.5 m³ of 0:1:0 Class 'G' neat cement.
- 3 Pull all tubing from well.
- 4 Wait on cement overnight.
- 5 Ensure cement top is at surface.
- 6 Cut all casing strings off a minimum of 1.0 m below grade and weld on steel plate.
- 7 Restore surface location to original condition.

Application For Well Licence

***TL # 8 - Moore - 1 - 19 - IV
Ladysmith Pool***

Enbridge Gas Inc.

Geology and Reservoir Engineering

June 16, 2021



Oil, Gas and Salt Resources Act

Application for a Well Licence

Form 1

To the Minister of Natural Resources

v.2015-12-15

The undersigned operator applies for a well licence under the Oil, Gas and Salt Resources Act and the Regulations thereunder and submits the following #

1. WELL NAME

TL # 8 - Moore - 1 - 19 - IV

Target Formation

Guelph

Purpose of Proposed Well (Well Type)

Natural Gas Storage

2. OPERATOR

Enbridge Gas Inc.

Tel #

519 436-4600

Fax #

519 436-4560

Street Address

50 Keil Drive North

City

Chatham

Prov.

On

Postal Code

N7M 5M1

Mailing Address

City

Prov.

Postal Code

Contact Name

Mike Learn

Contact Tel #

519-436-4600 x5002815

Email

michael.learn@enbridge.com

3. LOCATION

County

Lambton

Township

Moore

Tract

1

Lot

19

Concession

IV

Offshore:

Block

Tract

Licence/Lease No.

Surface location, metres from

81

m

North

South

X

Latitude

42° 48' 46.317"

Bottom-hole Lat.

42° 48' 46.317"

Lot Boundaries

352.4

m

East

West

X

Longitude

82° 22' 34.331"

Bottom-hole Long.

82° 22' 34.331"

Within 1.6 km of Designated Storage Area?

Yes

X

No

Off-target?

Yes

X

No

4. WELL PARTICULARS

Vertical

X

Horizontal

Directional

Deepening

Re-entry

Lateral

Rig Type:

Rotary

X

Cable

Well to be cored?

Yes

No

X

Formation at TD

A1 Anhydrite

Ground Elevation

190.1

Proposed Depth

726.3

Proposed Depth TVD

726.3

Proposed Start Date

Oct-21

5. POOLING

Pooling of the Spacing Unit or unitization of the Unit Area shown on the attached well location plan has been completed (see Ont. Reg. 245/97 definitions for “pooled spacing unit” and “unitize”)

Yes X

No

6. DRILLING CONTRACTOR

Predator Drilling Inc.

Tel #

403-264-6712

Address

2120, 500 4th Ave S.W.

City

Calgary

Prov.

AB

Postal Code

T2P 2V6

7. PROPOSED CASING AND CEMENTING PROGRAM

Hole Size (mm)	Casing O.D. (mm)	Weight (kg/m)	Grade	New, Used or in-hole	Setting Depth TVD	Setting Formation	CASING SETTING INFORMATION		
							How Set	Cement Type	Cement Top KB / RF
374.0	298.45	69.94	H-40	New	62.6	Kettle Point / Bedrock	Cemented	0:1:0	4.6
269.9	219.10	35.70	J-55	New	449.1	F Unit Shale	Cemented	0:1:8; 0:1:0	4.6
200.0	139.10	23.10	J-55	New	725.8	A-1 Anhydrite	Cemented	0:1:0	4.6

8. BLOW-OUT PREVENTION EQUIPMENT

Diverter,Annular Preventer; Blind Rams, Pipe Rams

9. WELL SECURITY

Name of Trustee

1236596 Ontario Limited

Total # Unplugged Wells

366

Current Balance

\$70,000

Harrison Pensa & Associates

10. REMARKS

11. ENCLOSURES

Fee

X

Location Plan

X

(Land wells only)

Drilling Program

X

12. NOTICE OF COLLECTION

The Ministry of Natural Resources and Forestry is collecting your personal information under the authority of the *Oil, Gas and Salt Resources Act*. Any personal information provided on this application will be used for licensing and law enforcement purposes only and will be protected in accordance with the Freedom of Information and Protection of Privacy Act.

If you have questions about use of your personal information, please contact the Policy and Program Officer, Petroleum Operations Section, Ministry of Natural Resources and Forestry, 659 Exeter Road, London N6E1L3, 519-873-4638.

13. AUTHORITY

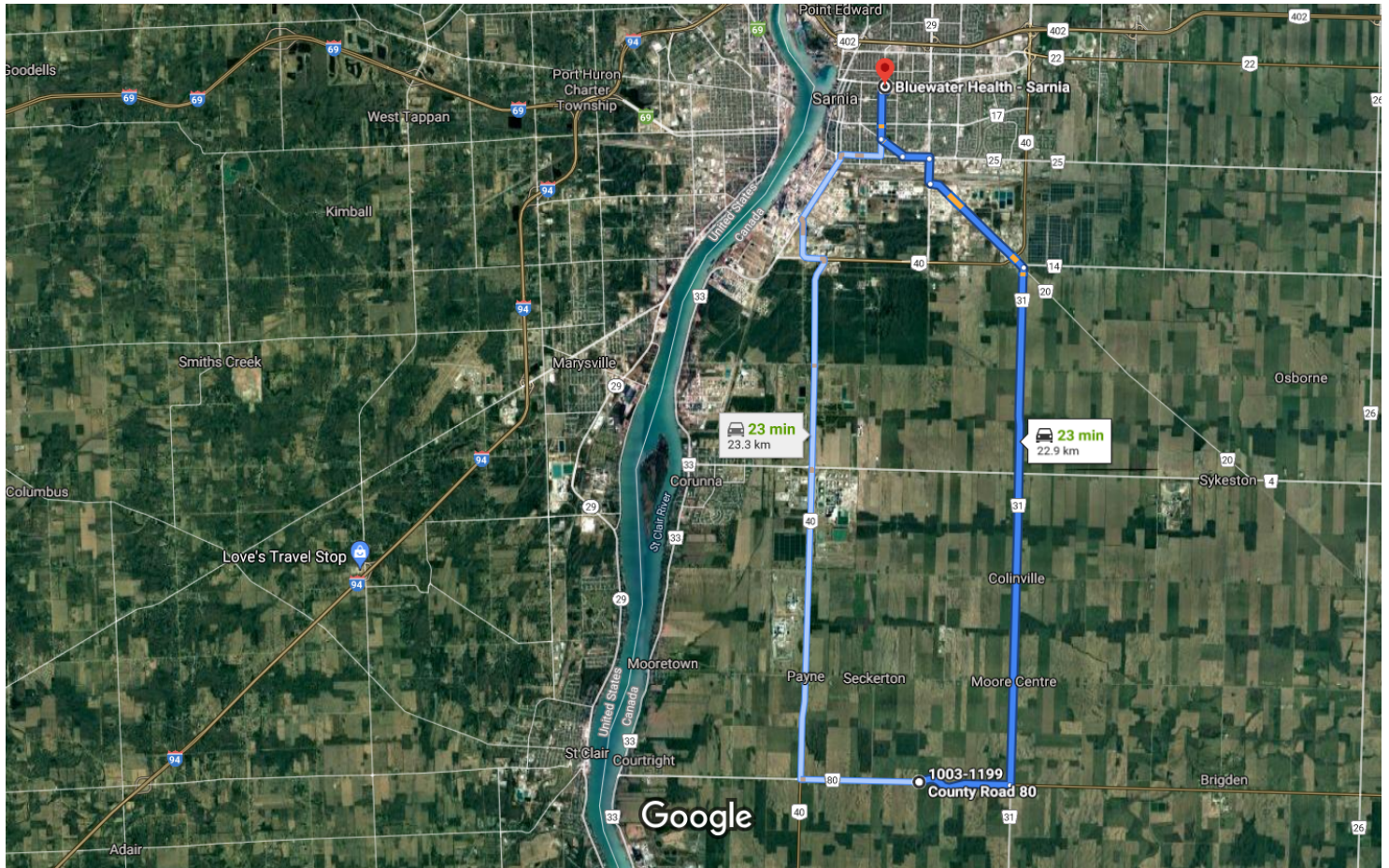
The undersigned certifies that the information provided herein is complete and accurate, the operator has the right to drill or operate a well in the above location, and he/she has authority to bind the operator.

Date (d/m/y)	21-Jun-21	Name	Mike Learn	Signature
		Company	Enbridge Gas Inc.	Title
				Principal Drilling and Reservoir Engineer



1003-1199 County Rd 80, Courtright, ON N0N 1H0 to
Bluewater Health - Sarnia

Drive 22.9 km, 23 min




Imagery ©2021 TerraMetrics, Map data ©2021 2 km

1003-1199 County Rd 80

Courtright, ON N0N 1H0

Take Kimball Rd/Lambton County Rd 31 and Plank Rd to
Maria St in Sarnia

1. Head east on Courtright Line/County Rd 80 toward Tecumseh Rd
21 min (22.7 km)
2. Turn left onto Kimball Rd/Lambton County Rd 31
2.5 km
3. Turn left onto Plank Rd/County Rd 20
13.5 km
[Continue to follow Plank Rd](#)
4. Turn right onto Indian Rd S/County Rd 29
3.3 km
5. Turn left onto Confederation St/County Rd 25
650 m
6. Turn right onto Ontario St
750 m

-  7. Turn right onto Russell St S


1.2 km

Drive to your destination

2 min (210 m)

-  8. Turn right onto Maria St

100 m

-  9. Turn left

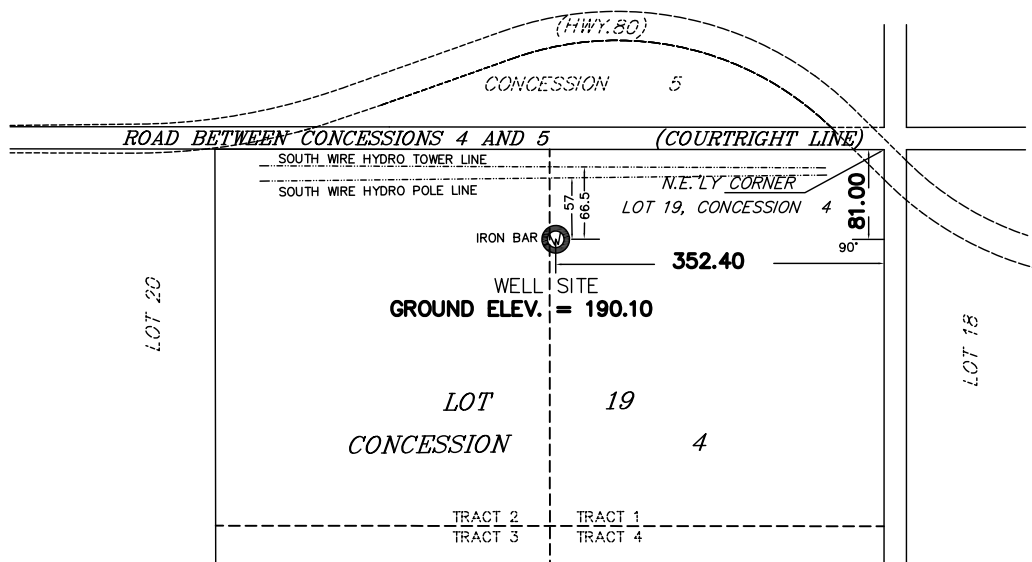
 Destination will be on the right

110 m

Bluewater Health - Sarnia

89 Norman St, Sarnia, ON N7T 6S3

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.



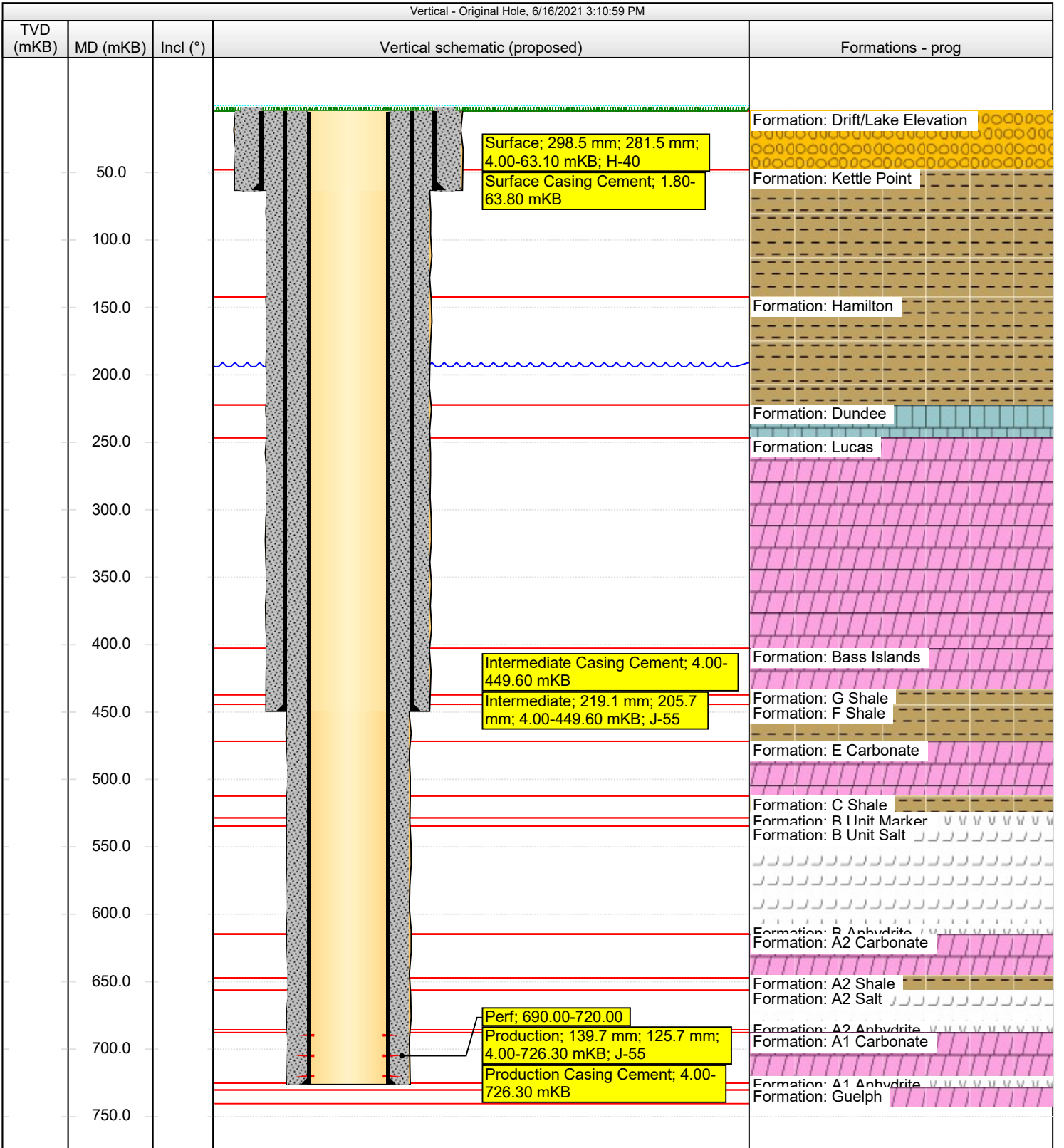
AUTHORIZED BY THE MINISTER OF NATURAL RESOURCES
UNDER THE PETROLEUM RESOURCES ACT OF ONTARIO

Well Name: TL #8, Moore 1-19-IV
License Number:

Most Recent Job

Job Category	Primary Job Type	Secondary Job Type	Start Date	End Date
Drilling	Drilling - original			

TD: 726.30



Contacts	
TL # 8 - Moore - 1 - 19 - IV	
Police Fire & Ambulance	911
911 Address	6399 Tecumseh Road, St. Clair Township
Tecumseh Control Room	519-862-6012
M.O.E. Spills Hotline	1-800-268-6060
MNR Contact	519-873-4645
MOL	1-877-202-0008

ENBRIDGE GAS CONTACTS

Rob Newport -	Storage Superintendent	519-683-4468 x5102178 519-365-0897	Rob.Newport@enbridge.com
Shelie Cascadden	Geologist	519-818-7008	Shelie.Cascadden@enbridge.com
Mike Learn	Drilling and reservoir engineer	519-436-4600 x5002815 519-350-5351 519-251-9701	michael.learn@enbridge.com
Kathy McConnell	Technical Manger storage and reservoir	519-862-6032 519-312-2168	kathy.mcconnell@enbridge.com
Chris Pincombe	Land Agent	519-862-6092 519-381-1408	Chris.pincombe@enbridge.com

Contractors

Contractor	Contact	Phone	Email
<u>Drilling and Cementing</u>			
Predator Drilling	Jon Picray, Tool Push	403-801-1824	jpicyay@predatordrilling.com
	Paulo Facca	403-264-6712 403-669-1372	PFacca@predatordrilling.com
Terry Marsh Well Drilling	Terry Marsh	519-695-6060 519-695-9804	
Black Creek	Ian Veen	519-834-2941 519-383-4645	

Wellheads

Wellmaster	Brian DeJaegher	519-688-0500	bdejaegher@wellmaster.ca
Stream-Flo	Karen Derrick	832-647-0710	kderrick@streamflo.com
ECAN	Robert Wainwright	519-627-3824 519-468-3922	

Drill Bits:

Brad Takenaka	Varel Rock Bits Canada Sales Manager	Office: 403-968-9369 Cell: 403-303-2533	btakenaka@varelintl.com
Mike Kellar	Trendon Bit Service Ltd. Director, Sales Office:	403-990-1299	mkellar@trendoninc.com

Wireline Services:

Baker Hughes	Dapo Laniya	Office: 519-332-8030 Cell: 519-339-6783	Dapo.Laniya@bakerhughes.com
Weatherford	Dave Tipping	Office: 519-683-2010 Cell: 519-436-3541	dave.tipping@canada.weatherford.com

Water Hauling:

McKeegan	Melvin McKeegan	519-864-1782 519-332-7676	
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Contacts

TL # 8 - Moore - 1 - 19 - IV

Harold Marcus Limited	Denis Marcus	Office: 519-695-3735 Cell: 519-380-5238	dmarcus@haroldmarcus.com
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Rental Equipment:

Dale Holland	Wheatley Wireline Services Ltd.	Office: 519-825-3680 Fax: 519-825-9348 Cell: 519-322-8015	
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Keith Davis	Ecan Energy Services Inc.	Office: 519-627-3824 Fax: 519-627-5306 Cell: 519-437-7038	kmecanen@kent.net
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Vern Anger	Canfish Services Inc. Fishing Supervisor	Office: 780-955-2600 Cell: 403-845-0012	
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Orval Beam	Orval L. Beam Limited Operations Manager Tank Rentals	Office: 519-436-0164 Fax: 519-436-0164 Cell: 519-436-4801	
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Welders:

St. Clair Mechanical President	John Dawson	Office: 519-864-0927 Cell: 519-330-9672	
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Government & Other Agencies

MNRF	Petroleum Resources Centre	Office: 519-873-4634 Fax: 519-873-4645	ogsr.mnrf.gov.on.ca
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MOECC	Spill Reporting	1-800-268-6060	
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MOL	Health & Safety	1-800-265-1676	
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Oil, Gas & Salt Resources Library		Office: 519-686-2772 Fax: 519-686-7225	
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Geological Prognosis of:

TL # 8 - Moore - 1 - 19 - IV

Lot: 19
Conc: IV
Tract: 1
Pool: Ladysmith

Township: Moore
County: Lambton
Objective: Natural gas Storage
Coordinates: 81 m. **South**
352.4 m. **West**
UTM Coords: 387487, 4740952

Geology Contacts: Shelie Cascadden 436-4600 x5002153 (work) 519-818-7008 (cell)

Remarks: Base of Gas -518
Tops derived from IK10 and DM 6-19-4

Contacts	Top (m.)	Elev.(m.)	Thickness	Gas	Oil	H2O	Remarks/Expected Pressure
Rig Floor	0.0	194.1	4.0				
Ground Elevation	4.0	190.1	43.6				Actual
Kettle Point / Bedrock	47.6	146.5	94.5			x	Fresh Water @ 43
Hamilton	142.1	52.0	80.0				
Dundee	222.1	-28.0	25.0				
Detroit River	247.1	-53.0	156.0				
Bois Blanc			0.0				
Bass Island	403.1	-209.0	34.0				
G Unit	437.1	-243.0	7.0				
F Unit Shale	444.1	-250.0	28.0				
F Salt			0.0				
E Unit Carbonate	472.1	-278.0	40.0				
D Unit Salt			0.0				
C Unit Shale	512.1	-318.0	17.0				
B Unit Marker	529.1	-335.0	6.0				
B Unit			0.0				
B Salt	535.1	-341.0	79.3				
B Anhydrite	614.4	-420.3	0.7				
A-2 Unit Carbonate	615.1	-421.0	32.0	x			Gas may be possible
A-2 Shale	647.1	-453.0	9.5				
A-2 Salt	656.6	-462.5	29.5				
A-2 Anhydrite	686.1	-492.0	2.0	x			Gas may be possible
A-1 Unit Carbonate	688.1	-494.0	37.0	+			
A-1 Anhydrite	725.1	-531.0	5.0				
Guelph	730.1	-536.0	-3.8				Gas may be possible
Total Depth	726.3	-532.2					

Geology & Reservoir Engineering, Enbridge Gas Inc.

June 16, 2021

Sample Requirements:

One sample shall be collected every 3 meters of formation drilled once the Kettle Point/bedrock is reached

WELLBORE, CASING AND CEMENTING SUMMARY

TL # 8 - Moore - 1 - 19 - IV

Description	Hole Size (mm)	MD / TVD (mKB)	Drilling Fluids	Casing Size, Grade, Weight kg/m	Formation @ Depth	Depth Into Formation (m)	How Set
Conductor Hole	374	48.6	n/a	406	Kettle Point / Bedrock	1	Driven - Cement squeeze if necessary. If a rotary rig is used for the drilling of the well conductor casing will not be run
		48.6		LP			
				n/a			
Surface Hole	374	63.1	n/a or water	298.45	Kettle Point / Bedrock	15.5	Cement to surface with 11.31 Class G 0-1-0 cement with 2-3% CaCl ₂ . See Cement Program for volumes
		63.1		H-40			
				69.94			
Intermediate Hole	269.9	449.6	Fresh Water	219.10	F Unit Shale	5.5	Cement to Surface with 13.06 Tonne Class G 0-1-8 plus 1-3% CaCl ₂ followed by 2.94 Class G with 1-3% CaCl ₂ . Depending on hole conditions, consideration may be given to running tixotropic cement or additional loss circulation materials
		449.6		J-55			
				35.70			
Production Hole	200	726.3	Brine	139.10	A-1 Anhydrite	1.2	Cement to surface with 28.74 Tonnes Class G, 0-1-0 with 2% CaCl ₂ +10% NaCl. See Cement Program for details
		726.3		J-55			
				23.10			
All depths referenced to 4.0 mKB							

DRILLING PROCEDURE

TL # 8 - Moore - 1 - 19 - IV

Pre Spud

Fresh Water Well samples

Obtain samples from all fresh water wells located within a minimum radius of 750m of the proposed well. Perform water analysis and keep copies of the results.

Site Preparation

Prepare drilling location.

Locate all drainage tiles crossing lease area.

Strip and stockpile all top soil from lease.

Construct adequate berms around lease and access road as required.

Cut, block and divert drainage tile as required.

Government Notification

Underground Storage to notify M.N.R.F. 48 hours prior to spud and prior to resumption of drilling activities.

Signs

Install rig sign on access road to lease.

Safety Meeting

Conduct a pre-spud safety meeting for all crews. Rig Manager and all crew members must be present.

Additional safety meetings shall be conducted at the Well Site Supervisor's discretion.

DRILLING PROCEDURE

TL # 8 - Moore - 1 - 19 - IV

CONDUCTOR AND SURFACE HOLE - CABLE TOOL

1. Move in and rig up cable tool drilling rig.

Note: All depths referenced to 4.0 mKB

2. Drill and drive 406 mm conductor pipe 1 m into Kettle Point / Bedrock (48.6 mKB) with a 374 mm bit. Ensure that fresh water is shut off before proceeding.

Note: Record fresh water interval

3. Record conductor casing OD, weight, grade and set depth.
4. Drill minimum 15.5 m into Kettle Point / Bedrock (63.1 mKB) with a 374 mm bit.

Note: One sample shall be collected every 3 m once Kettle Point / Bedrock is reached.

5. Hold Safety Meeting
6. Run 298.45 mm surface casing to bottom (63.1 mKB) with centralizers 2m above shoe and at joints 2, 4 and 8. Tack weld guide shoe on bottom. The optimum makeup torque is 4170 N-m (3070 ft-lb) and the maximum makeup torque is 5210 N-m (3840 ft-lb).
7. Record surface casing OD, weight, grade, placement of cementing hardware and set depth.
8. Raise surface casing 0.5 m off bottom and set in slips. Cement 298.45 mm surface casing to surface as per cementing program.
9. Wait on cement (W.O.C.) for 24 hours.
10. Record cement top in casing.
11. Rig out cable tool rig.
12. Rig in rotary rig.

Measure height of rig floor to ground and adjust drilling program

SURFACE HOLE - ROTARY

1. Move in and rig up rotary drilling rig.

Measure height of rig floor to ground and adjust drilling program

2. Drill minimum 15.5 m into Kettle Point / Bedrock (63.1 mKB) with a 374 mm bit.

One sample shall be collected every 3 m once A-2 Shale is reached.

3. Hold Safety Meeting
4. Run 298.45 mm surface casing to bottom (63.1 mKB) with centralizers 2m above shoe and at joints 2, 4 and 8. Tack weld guide shoe on bottom. The optimum makeup torque is 4170 N-m (3070 ft-lb) and the maximum makeup torque is 5210 N-m (3840 ft-lb).
5. Record surface casing OD, weight, grade, placement of cementing hardware and set depth.
6. Raise surface casing 0.5 m off bottom and set in slips. Cement 298.45 mm surface casing to surface as per cementing program.
7. Wait on cement (W.O.C.) for 24 hours.
8. Record cement top in casing.

DRILLING PROCEDURE

TL # 8 - Moore - 1 - 19 - IV

INTERMEDIATE HOLE - ROTARY

1. Pressure Test entire BOP system and surface casing to 1225 kPag for 10 minutes and record results in log according to OGSRA Operating Standards v 2.0 sec. 4.5.2.1
2. Drill out cement with 269.9 mm bit.
3. Drill 0.5 m of new formation.
4. Hold safety meeting. Pressure Test surface casing and BOP in accordance with Pressure Test Program - Surface Casing-Pressure Test
5. Drill until at the top of F Shale formation (444.1 mKB) with 269.9 mm bit, surveying every 30 m.

Note: Geologist must be on site to verify top of F Shale.

6. Drill 5.5m into the F Shale formation to 449.6m with 269.9 mm bit or as directed by company personnel
7. Hold safety meeting. Run the 219.1 mm intermediate casing to (449.1 mKB) with a float collar at top of bottom joint. Centralizers should be placed 2 m above shoe, at joints 2, 4 and 5 and every 5th joint to surface. Cement basket should be placed above Detroit River formation. Threadlock guide shoe on bottom.
8. The optimum makeup torque is 6480 N-m (4770 ft-lb) and the maximum makeup torque is 8090 N-m (5960 ft-lb). Land casing at proper elevation for thread-on type casing bowl.
9. Record intermediate casing OD, weight, grade, placement of cementing hardware and set depth.
10. Prepare to cement 219.1 mm intermediate casing to surface.
11. Hold safety meeting with all on-site personnel.
12. Pressure test surface equipment to 15 MPag for 1 minute. Ensure no leaks.
13. Pump citric acid followed by fresh water pre-flush. Cement to surface as per cementing program. Ensure cement returns to surface. Take a minimum of four cement samples. Record all circulating pressures and volumes.
14. W.O.C. for 48 hours.
15. Hold Safety Meeting. Cased Hole Logging. *See LOGGING PROGRAM, Log Run 1.*
16. Pressure Test Pipe Rams to 1400 kPag for ten minutes. Pressure Test the entire BOP system to 7000 kPag for 10 minutes and record results in log according to OGSRA Operating Standards
(This pressure test also tests the casing and casing bowl requirement of 5,500 kPag.)

DRILLING PROCEDURE

TL # 8 - Moore - 1 - 19 - IV

Production Hole

1. Drill a maximum of 0.5 m of new formation with 200 mm bit.
2. Prepare for Pressure Integrity Test (P.I.T.). Using a low volume, high pressure pump, pressure test the formation at a pressure equivalent to a gradient of 18 kPa/m for 10 min using an incompressible fluid.
3. Drill 0.5 m into the A-2 Anhydrite (726.3m) with 200 mm bit. Survey every 30m

Note: Geologist will be onsite to verify top of A-1 Anhydrite formation.

4. Run 139.1 mm production casing to 725.8mKB with insert float at top of bottom joint. Centralizers to be placed 2 m above shoe, at joints 2, 3, 4 and 5 and every 4th joint to surface. Tack weld guide shoe on bottom. The optimum makeup torque is 2740 N-m (2020 ft-lb) and the maximum makeup torque is 3440 N-m (2530 ft-lb). Ensure that a collar is not positioned where the wellhead seals need to be installed.
5. Record production casing OD, weight, grade, placement of cementing hardware and set depth.
6. Hold safety meeting.
7. Prepare to cement 139.1 mm production casing to surface.
8. Pressure test surface equipment to 15 MPa for 1 minute. Ensure no leaks.
9. Pump citric acid followed by fresh water pre-flush. Cement to surface as per Cementing Program - 139.7mm PRODUCTION CASING. Displace cement with fresh water. Ensure cement returns to surface or arrange for remedial cementing from surface. Take a minimum of four cement samples to verify setup time and density. Record all circulating pressures and volumes.
10. Lift BOP and set casing slips.
11. Set primary seals. Cut off casing to proper height. Install casing spool.
12. Install master valve and suspend the well in accordance with Section 5 of the OGSRA Operating Standards v.2.0.
13. Rig out rotary drilling rig.
14. Rig in Service rig
15. Rig in wireline company.
16. Perforate well from 690 mKb to 720 mKb with 10 shots per meter.
17. Rig out wireline company.
18. Bail hole dry
19. rig out service rig
20. Install blind flange on top of master valve.
21. Drilling department to notify M.N.R.F. within 48 hours of reaching TD.

CASING PROGRAM

TL # 8 - Moore - 1 - 19 - IV

CONDUCTOR CASING SUMMARY (Cable Tool: 1.9 m KB-GL) (CABLE TOOL ONLY)

Description	Metric		Imperial	
	Value	Unit	Value	Unit
Top	0.0	mKB	0.0	ftKB
Bottom	48.6	mKB	159.4	ftKB
Outside Diameter	406.00	mm	15.984	inches
Weight	96.70	kg/m	65.0	lb/ft
Drift Diameter	382.60	mm	15.063	inches
Inside Diameter	488.95	mm	19.250	inches
Grade	H40		H40	
Thread	N/A		N/A	
Coupling	Welded		Welded	
Burst	N/A		N/A	psi
Collapse	N/A	kPa	N/A	psi
Pipe Body Yield Strength	N/A	daN	N/A	lb-f
Joint Strength	N/A	daN	N/A	lb-f
Torque - Optimum	N/A	N-m	N/A	ft-lb
Torque - Maximum	N/A	N-m	N/A	ft-lb
Condition	New			
Float Equipment	None			
Shoe	Drive			
Threadlock	Tack weld drive shoe on bottom joint of casing			

SURFACE CASING SUMMARY (Cable Tool: 1.9 m KB-GL)

Description	Metric		Imperial	
	Value	Unit	Value	Unit
Top	0.0	mKB	0.0	ftKB
Bottom	62.6	mKB	205.4	ftKB
Outside Diameter	298.45	mm	11.750	inches
Weight	69.94	kg/m	47.0	lb/ft
Drift Diameter	277.60	mm	10.929	inches
Inside Diameter	281.50	mm	11.083	inches
Grade	H-40		H-40	
Thread	8 Rd.		8 Rd.	
Coupling	N/A		N/A	
Burst	11,310	kPa	1,640	psi
Collapse	10,410	kPa	1,510	psi
Pipe Body Yield Strength	478,000	daN	736,000	lb-f
Joint Strength	136,600	daN	307,000	lb-f
Torque - Optimum	4,170	N-m	3,070	ft-lb
Torque - Maximum	5,210	N-m	3,840	ft-lb
Condition	New			
Float Equipment	None			
Centralizers	Joints 2, 4 and 8			
Shoe	Guide			
Threadlock	Threadlock guide shoe on bottom joint of casing			

CASING PROGRAM

TL # 8 - Moore - 1 - 19 - IV

INTERMEDIATE CASING SUMMARY

Description	Metric		Imperial	
	Value	Unit	Value	Unit
Top	0.0	mKB	0.0	ftKB
Bottom	449.1	mKB	1473.4	ftKB
Outside Diameter	219.10	mm	8.626	inches
Weight	35.70	kg/m	24.0	lb/ft
Drift Diameter	202.50	mm	7.972	inches
Inside Diameter	205.60	mm	8.094	inches
Grade	J-55		J-55	
Thread	8 Rd.		8 Rd.	
Coupling	ST & C		ST & C	
Burst	21,170	kPa	3,070	psi
Collapse	9,450	kPa	1,370	psi
Pipe Body Yield Strength	169,500	daN	381,000	lb-f
Joint Strength	108,500	daN	244,000	lb-f
Torque - Optimum	6,480	N-m	4,770	ft-lb
Torque - Maximum	8,090	N-m	5,960	ft-lb
Condition	New			
Float Equipment	Float Collar (Top of 1 st joint)			
Centralizers	Joints 2,4 & 5; every 4 th joint & 10 m from surface			
Cement Basket	Run above Detroit River formation			
Shoe	Guide			
Threadlock	Threadlock guide shoe on bottom joint of casing			

PRODUCTION CASING SUMMARY

Description	Metric		Imperial	
	Value	Unit	Value	Unit
Top	0.0	mKB	0.0	ftKB
Bottom	725.8	mKB	2381.2	ftKB
Outside Diameter	139.10	mm	5.476	inches
Weight	23.10	kg/m	15.5	lb/ft
Drift Diameter	122.60	mm	4.827	inches
Inside Diameter	125.70	mm	4.949	inches
Grade	J-55		J-55	
Thread	8 RD		8 RD	
Coupling	ST & C		ST & C	
Burst	27,100	kPa	3,930	psi
Collapse	27,850	kPa	4,040	psi
Pipe Body Yield Strength	110,300	daN	248,000	lb-f
Joint Strength	96,500	daN	217,000	lb-f
Torque - Optimum	2,740	N-m	2,020	ft-lb
Torque - Maximum	3,440	N-m	2,530	ft-lb
Condition	New			
Float Equipment	Float Collar (Top of 1 st joint)			
Centralizers	Joints 2,4 & 5; every 4 th joint & 10 m from surface			
Shoe	Guide			
Threadlock	Threadlock guide shoe on bottom joint of casing			

CEMENTING PROGRAM

TL # 8 - Moore - 1 - 19 - IV

406.4 mm SURFACE CASING

Equipment

- Pumping unit
- Cementing head (plug loading type)
- One 406.0 mm wiper plug

CEMENT SPECIFICATIONS

Description

Cable Tool

Rotary

	Value Unit	Value Unit
Top	0.0 mKB	0 mKB
Bottom	62.6 mKB	62.6 mKB
Pre-sweep (Fresh Water)	2.00 m ³	2.00 m ³
Cement Excess (Openhole)	100%	100%
Cement Excess (Cased Hole)	30%	30%
Cement Type	0:1:0	0:1:0
Mix Water	Fresh	Fresh
Additives	3% CaCl ₂	3% CaCl ₂
Density	1901 kg/m ³	1901 kg/m ³
Water Requirement	0.440 m ³ /t	0.440 m ³ /t
Yield	0.757 m ³ /t	0.757 m ³ /t
Cement Volume	8.56 m ³	5.00 m ³
Cement Yield	11.31 tonnes	6.60 tonnes
Displacement #1 (Fresh Water)	0.50 m ³	0.50 m ³
Displacement #2 (Brine)	3.40 m ³	3.40 m ³
Displacement Rate	0.6 - 0.8 m ³ /min	0.6 - 0.8 m ³ /min
W.O.C.	24 hrs	24 hrs
24 Hr. Compressive Strength	20,684 kPa	20,684 kPa

CEMENTING PROCEDURE

1. Run casing.
2. Pump pre-sweep, pump cement, drop top plug. DO NOT PUMP OUT LINES.
3. Displace plug with water. DO NOT OVERDISPLACE MORE THAN 1/2 SHOE JOINT VOLUME.
Bump plug 3,500 kPa over pumping pressure.
4. Maintain a constant pump rate throughout the cement job.
5. Catch cement slurry samples while mixing and set aside.
6. Observe setting time and cement quality.
7. If no cement returns to surface, consult with Storage Operations Supervisor regarding re-cementing from top with macaroni string using Class 'G' cement + 3% CaCl₂.
8. Obtain a 1 litre sample of the dry cement used in the cement job. This will be used for testing if subsequent cement problems occur (i.e. flash setting).

CEMENTING PROGRAM

TL # 8 - Moore - 1 - 19 - IV

298.5 mm INTERMEDIATE CASING

Equipment

- Pumping unit
- Cementing head (plug loading type)
- One 298.5 mm wiper plug

NOTE:

Lead Cement: Surface to top of Bois Blanc

Tail Cement: Top of Bois Blanc to casing shoe

CEMENT SPECIFICATIONS

Description

	Lead	Tail
	Value Unit	Value Unit
Top	0.0 mKB	403.1 mKB
Bottom	403.1 mKB	449.1 mKB
Pre-sweep #1 (Citric Acid)	3.00 m ³	N/A
Pre-sweep #2 (Fresh Water)	1.00 m ³	N/A
Cement Excess (Openhole)	100%	100%
Cement Excess (Cased Hole)	30%	30%
Cement Type	0:1:8 Class 'G'	0:1:0 Class 'G'
Mix Water	Fresh	Fresh
Celloflakes	2 bags	N/A
Prehydrated Gel	2%	N/A
Additives	0.75% T-10	2% CaCl ₂ ; 0.75% T-10
Density	1604 kg/m ³	1901 kg/m ³
Water	0.864 m ³ /t	0.440 m ³ /t
Yield	1.212 m ³ /t	0.757 m ³ /t
Cement Volume	15.83 m ³	2.23 m ³
Cement Yield	13.06 tonnes	2.94 tonnes
Pump Rate	0.6 - 0.8 m ³ /min	0.6 - 0.8 m ³ /min
Displacement #1 (Fresh Water)	N/A m ³	0.50 m ³
Displacement #2 (Brine)	N/A m ³	14.09 m ³
W.O.C.	48 hrs	48 hrs
24 Hr. Compressive Strength	1379 kPa	15,858 kPa

CEMENTING PROCEDURE

1. Run casing.
2. Pump pre-sweep, pump Lead cement, pump Tail Cement and drop wiper plug. DO NOT PUMP OUT LINES.
3. Displace plug with fresh water and then brine. DO NOT OVERDISPLACE MORE THAN 1/2 SHOE JOINT VOLUME. Bump plug 3,500 kPa over pumping pressure.
4. Maintain a constant pump rate throughout the cement job.
5. Catch cement slurry samples while mixing and set aside.
6. Observe setting time and cement quality.
7. If no cement returns to surface, consult with Storage Operations Supervisor regarding re-cementing from top with macaroni string using Class 'G' cement + 3% CaCl₂.
8. Obtain a 1 litre sample of the dry cement used in the cement job. This will be used for testing if subsequent cement problems occur (i.e. flash setting).
9. Run a Cement Bond Log (CBL) to evaluate the integrity of the cement bond and to locate the position of the cement top.

CEMENTING PROGRAM

TL # 8 - Moore - 1 - 19 - IV

219.1 mm PRODUCTION CASING

Equipment

- Pumping unit
- Cementing head (plug loading type)
- One 219.1 mm wiper plug

CEMENT SPECIFICATIONS

Description	Value	Unit
Top	0.0	mKB
Bottom	725.8	mKB
Pre-sweep (Citric Acid)	3.00	m ³
Pre-sweep (Fresh Water)	1.00	m ³
Cement Excess (Openhole)	100%	
Cement Excess (Cased Hole)	30%	
Cement Type	0:1:0	Class 'G'
Mix Water	10%	Salt Water
Fluid loss/Dispersant	0.75%	T-10
Gas Block (if required)	0.4%	D-24
Density	1901	kg/m ³
Water Requirement	0.440	m ³ /t
Yield	0.772	m ³ /t
Cement Volume	22.18	m ³
Cement Yield	28.74	tonnes
Pump Rate	0.6 - 0.8	m ³ /min
Displacement (Brine)	0.75	m ³
W.O.C.	48	hrs
24 Hr. Compressive Strength	6,895	kPa

NOTE: Cement program may be changed if well integrity conditions dictate

CEMENTING PROCEDURE

1. Run casing and set casing slips.
2. Pump pre-sweep, pump cement, drop top plug. PUMP OUT LINES.
3. Displace plug with brine. DO NOT OVERDISPLACE MORE THAN 1/2 SHOE JOINT VOLUME.
Bump plug 3,500 kPa over pumping pressure.
4. Maintain a constant pump rate throughout the cement job.
5. Catch cement slurry samples while mixing and set aside.
6. Observe setting time and cement quality.
7. If no cement returns to surface, consult with Storage Operations Supervisor regarding re-cementing from top with macaroni string using Class 'G' cement + 3% CaCl₂.
8. Obtain a 1 litre sample of the dry cement used in the cement job. This will be used for testing if subsequent cement problems occur (i.e. flash setting).
9. Run a Cement Bond Tool to evaluate the integrity of the cement bond and to locate the position of the cement top.

PRESSURE TEST PROGRAM

TL # 8 - Moore - 1 - 19 - IV

SURFACE CASING - PRESSURE TEST

1. Pressure Test surface casing to 1380 kPag for 10 minutes and pressure test BOP system to a pressure equivalent to one- half its working pressure. Record results in log according to OGSRA Operating Standards v 2.0 sec. 4.5.21.

INTERMEDIATE CASING - PRESSURE TEST

1. Pressure Test Intermediate casing to 1380 kPag for 10 minutes and pressure test annular preventer to a pressure equivalent to one- half its working pressure. Record results in log according to OGSRA Operating Standards v 2.0 sec. 4.5.21.

PRODUCTION HOLE - PRESSURE INTEGRITY TEST (PIT)

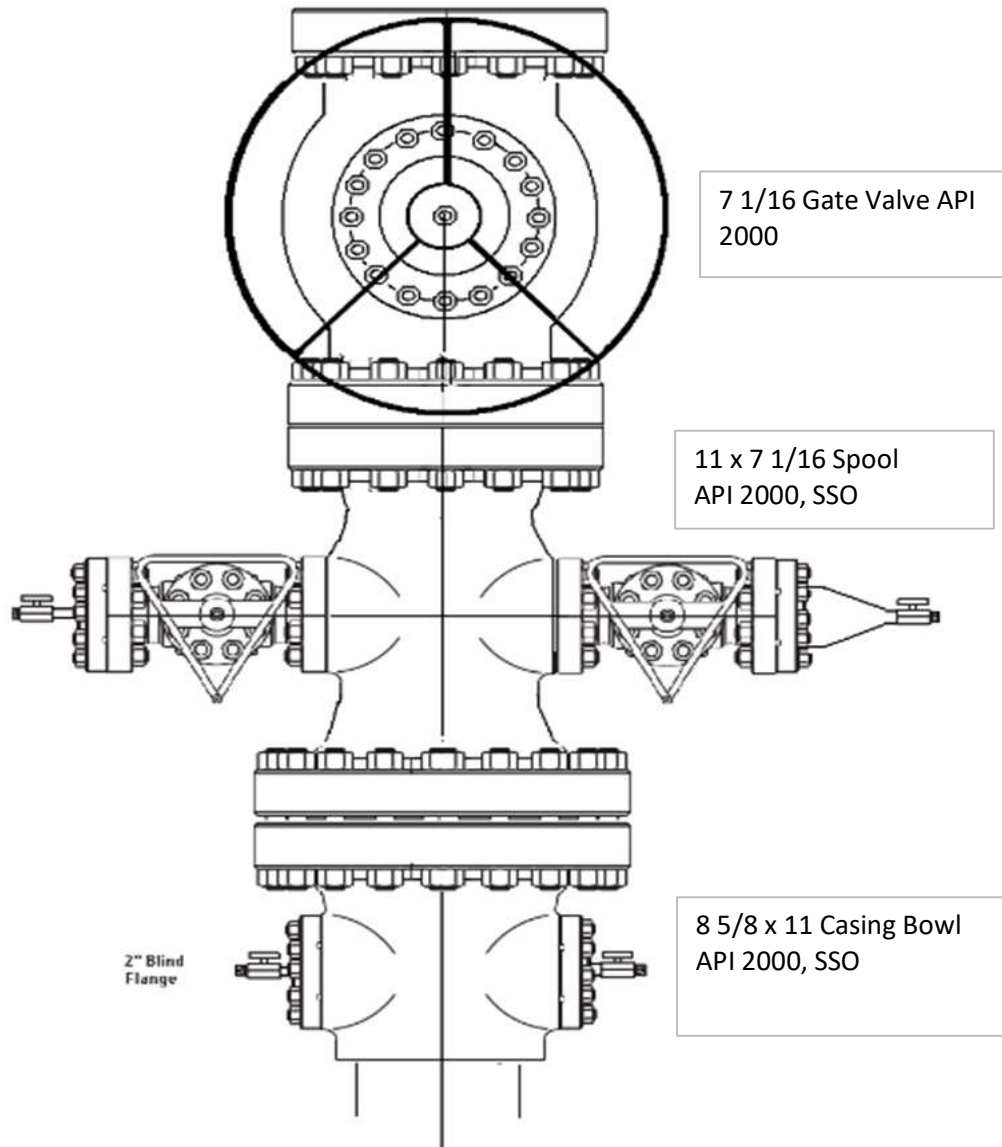
1. Drill 0.5 m of new formation.
2. Using a low volume, high pressure pump, pressure test the formation at a pressure equivalent to a gradient of 18 kPa/m for a duration of ten (10) minutes using an incompressible fluid.

PRODUCTION CASING - PRESSURE TEST

1. Pressure test wellhead and production casing to 13,790 kPa for four (4) hours.
2. Install Wellhead and Master Valve and 177.8 mm BOP. The lubricator and components shall have a minimum pressure rating of 120% of the formation pressure. Pressure test annular preventer to 1380kPa for 10 minutes. Pressure test annular preventer to 7000 kPa for 10 minutes

WELLHEAD

TL # 8 - Moore - 1 - 19 - IV



LOGGING PROGRAM

TL # 8 - Moore - 1 - 19 - IV

Run #	Logging Interval	Hole Condition		Comments
		Fluid Filled	Gas Filled	
1	Intermediate-Surface	Gamma Ray Cement Bond Log		Logs run after 48 hr WOC
2	Production - Surface	Cement Bond Log High Res Vertilog Gamma Ray		Logs run after 48 hr WOC
3	TD-Surface	Gamma Ray Compensated Neutron Z-Density*	Gamma Ray Linear Porosity Neutron* Z-Density*	

NOTE: * open hole section only

ABANDONMENT PROGRAM

TL # 8 - Moore - 1 - 19 - IV

If drilling results prove unsuccessful, the well will be plugged and abandoned as follows:

- 1 Notify MNRF by fax 48 hrs prior to commencing plugging operations
- 2 Run tubing to TD and cement to surface with 23.5 m³ of 0:1:0 Class 'G' neat cement.
- 3 Pull all tubing from well.
- 4 Wait on cement overnight.
- 5 Ensure cement top is at surface.
- 6 Cut all casing strings off a minimum of 1.0 m below grade and weld on steel plate.
- 7 Restore surface location to original condition.

From: [Douglas, Danielle \(MNRF\)](#)
To: [Kathy McConnell](#)
Subject: [External] RE: Drilling Applications for TL 8 Moore 1-19-IV and TC 8 Moore 3-19-X
Date: Tuesday, July 27, 2021 1:01:10 PM
Attachments: [image001.png](#)

EXTERNAL: PLEASE PROCEED WITH CAUTION.

This e-mail has originated from outside of the organization. Do not respond, click on links or open attachments unless you recognize the sender or know the content is safe.

Hi Kathy,

I hope you are well.

The applications were referred to the OEB on July 19, 2021.

Sincerely,

Danielle Douglas

Records Officer | Integration Branch

Ministry of Northern Development, Mines, Natural Resources and Forestry
(NDMNRF)

| Government of Ontario

659 Exeter Road | London | Ontario | N6E 1L3

M 226-559-0749 | F 519-873-4645 | danielle.douglas@ontario.ca



As part of providing [accessible customer service](#), please let me know if you have any accommodation needs or require communication supports or alternate formats.

From: Kathy McConnell <Kathy.McConnell@enbridge.com>
Sent: July 27, 2021 12:58 PM
To: Douglas, Danielle (MNRF) <Danielle.Douglas@ontario.ca>
Subject: Drilling Applications for TL 8 Moore 1-19-IV and TC 8 Moore 3-19-X

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

Hello Danielle,

I was hoping that you could help me find out the status of 2 drilling applications: TL 8 Moore 1-19-IV and TC 8 Moore 3-19-X. Have these applications been referred to the Ontario Energy Board?

Regards,

Kathy

Kathy McConnell P. Geo.; PMP
Technical Manager Storage & Reservoir

ENBRIDGE GAS INC.

TEL: 519-862-6032 | CELL: 519-312-2168 | FAX: 519-862-1168
3501 Tecumseh Road, Mooretown, Ontario, N0N 1M0

enbridgegas.com

Safety. Integrity. Respect. Inclusion

From: [Kathy McConnell](#)
To: POSrecords@ontario.ca
Subject: Reports to support the Drilling Applications for TC 8 Moore 3-19-X and TL 8 Moore 1-19-IV
Date: Wednesday, July 7, 2021 2:38:00 PM
Attachments: [Corunna NA Executive Summary.pdf](#)
[Ladysmith NA Executive Summary.pdf](#)
[UGM ExecSum Ladysmith TL 08.pdf](#)
[UGM ExeSum Corunna TC 08.pdf](#)

Good Afternoon,

Enbridge Gas Inc. (Enbridge) recently submitted 2 drilling applications for the above-mentioned wells. In compliance with Section 5 of CSA Z341.1-18, Enbridge is required to completed a Risk Assessment and an Assessment of Neighbouring Activities. These reports were previously submitted to the Ministry, for TC 8 as part of EB-2016-0303 and EB-2020-0256 and for TL 8 as part of EB-2019-0012 and EB-2020-0256. Enbridge did not receive any comments or concerns from the Ministry.

The Risk Assessments have been reviewed by the original author, UGM Engineering Ltd., and remain valid for these applications. The Executive Summaries for the Risk Assessments are attached. The Executive Summaries for the Neighbouring Assessments are also attached.

If the Ministry wishes to review the Risk Assessment and Neighbouring Assessment Reports again, please let me know.

Regards,

Kathy

Kathy McConnell P. Geo.; PMP
Technical Manager Storage & Reservoir

ENBRIDGE GAS INC.

TEL: 519-862-6032 | CELL: 519-312-2168 | FAX: 519-862-1168
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enbridgegas.com

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From: [Petroleum Operations Records \(MNRF\)](#)
To: [Kathy McConnell](#)
Subject: [External] Automatic reply: Reports to support the Drilling Applications for TC 8 Moore 3-19-X and TL 8 Moore 1-19-IV
Date: Wednesday, July 7, 2021 2:39:19 PM

EXTERNAL: PLEASE PROCEED WITH CAUTION.

This e-mail has originated from outside of the organization. Do not respond, click on links or open attachments unless you recognize the sender or know the content is safe.

Thank you for contacting the Ministry of Natural Resources and Forestry's Petroleum Operations Section. This communication acknowledges receipt of your e-mail and advises that one of our staff will reach out to you within 15 business days to update you on the status of your request.

If you have submitted an Operation Activity Notice, we will review your submission and, if there are no concerns, we will update the status in our system. If we have any questions, we will contact you.

Please note that our regular working hours are 08:15 to 16:30 (EST) Monday to Friday. This email account is not monitored outside of these hours, on weekends, or on statutory holidays.

If this is an emergency involving a spill, please report it to the Spills Action Centre by calling 416-325-3000, 1-800-268-6060 (toll free), or 1-855-889-5775 (TTY).

For general information about exploring for and extracting oil, natural gas and salt resources in Ontario, visit [Ontario.ca](https://www.ontario.ca).

Regards,
Petroleum Operations Section.

Executive Summary

Title: Assessment of Neighbouring Activities
The Corunna Storage Pool
Authors: Enbridge Gas Inc.

The “Assessment of Neighbouring Activities” report has been completed to comply with the requirements of Clause 5.2 of Standard CSA Z341.1-18 – Storage of Hydrocarbons in Underground Formations – Reservoir Storage (“CSA Z341.1-18”).

The Corunna Pool is a natural gas storage pool and an oil producing pool. It is protected by a Designated Storage Area (DSA) which was approved by Ontario Energy Board in 1964. The DSA is comprised of approximately 212 hectares. Enbridge is confident that the DSA adequately protects the Corunna Pool. In addition, Ontario Regulation 245/97 under the Oil, Gas and Salt Resources Act provides protection of the reservoir against the performance of any well work, within a 1.6 km of the DSA boundary, that will or is likely to fracture the storage reservoir or to result in communication between the well and the storage reservoir.

The report reviews the geology, the existing and abandoned wells within 1 kilometre of the storage zone, subsurface operations within 5 kilometres of the storage zone, and wells penetrating the storage zone.

Well drilling records from the Oil, Gas and Salt Resources Library (OGSRL) indicate that 77 wells have been drilled within 1 km of the base of gas of the Corunna Pool. Enbridge has conducted a review of these wells and is satisfied that they have not had any “impact on the integrity of the storage facility” as required by CSA Z341.1-18 Clause 5.2(a).

A review of records from the OGSRL for subsurface activities within 5 kilometres of the Corunna Pool indicates that there are 10 subsurface operations, including oil and natural gas production and natural gas and hydrocarbon storage operations. Enbridge is satisfied that there is no “impact on the integrity of the storage zone” as required by the CSA Z341.1-18 Clause 5.2(b).

Forty-two wells penetrate the Corunna storage zone. Twenty-seven of the wells are associated with oil production and storage operations and 15 of the wells are abandoned. The integrity of each well that penetrates the storage zone, including casing, cement, and abandonment records was reviewed. As part of the review, it was determined that although the abandonment of Imperial Corunna 4 did meet the Standards at the time it was plugged and the well is not currently leaking, the abandonment does not meet Enbridge Standards and as a result, the well will be re-abandoned, prior to increasing the pressure in the pool. Enbridge is satisfied that the remaining wells penetrating the Corunna Pool meet the requirements of CSA Z341.1-18 Clause 5.2(c).

In conclusion, the Corunna Pool has been safely operated as a natural gas storage pool since 1964 and is protected by an approved DSA. The technical information reviewed, indicates that there is minimal risk regarding the potential migration of natural gas between any known existing or abandoned wells within 1 km, and existing operations within 5 km, of the Corunna Pool. All active wells that penetrate the storage zone within the Corunna Pool are utilized as part of storage operations.

All the active wells are operated and maintained in accordance with CSA Z341.1-18 Storage of Hydrocarbons in Underground Formations and in accordance with the Oil, Gas and Salt Resources Act, its regulations and Provincial Operating Standards. Enbridge is satisfied that the drilling of an A-1 Observation well will not compromise the integrity of the Corunna Pool or any associated facilities.

Executive Summary

Date: June 2021

**Title: "What if" Analysis of Hazards and Operability Issues
Delta Pressuring Project 2020 - Corunna Pool + TC 08 Drilling Project 2015**

Author: Gordon Cowan, P.Eng., U G M Engineering Ltd. (UGM)

Introduction

U G M Engineering was contracted to prepare a "What if" Analysis for the Corunna Pool concerning the Delta Pressuring Project 2020; and also the Drilling Project 2015.

This Executive Summary June 2021 edition incorporates specific information concerning the currency of the original TC 08 work in light of a location change for the actual 2021 drilling, compared to the location analyzed in the 2015 work. Comments concerning the location change can be found in the later portions of this work.

Summary of Two Qualitative Risk Assessments

UGM qualitative HAZOP assessments consider the Corunna Pool facilities as a whole, in its examination of natural gas storage reservoir risk. Qualitative HAZOP assessments are modelled from, and derivatives of, qualitative risk assessment methodologies used in the chemical process industry that have been adapted for natural gas storage application. Such assessments are focused on large scale releases of natural gas through upset events.

The activities examined by "What if" Analysis for the Corunna Pool were covered through two separate Z31.1-18 type exercises. The first were the December 1, 2, 2015 sessions. These sessions covered the drilling of I/W TC 9H and observation well TC 08. The second set of sessions were the virtual DP20 sessions held August 10, 11, and 12, 2020. Both the Corunna Pool session sets used similar methodology to previous CSA Z341.1-18 Delta Pressuring and Drilling Project qualitative risk assessments.

These sessions were attended by the "What if" Leader and up to nine technical experts, the number being variable according to project set. The preparation for the sessions, selection of the project scope systems, subsystems, session conduction, and reporting function for the "What if" analysis was performed by UGM team leader Gordon W. Cowan, P.Eng., using PHA Pro 8.8 software for recording, organizing and reporting functions.

The first 2015 drilling sessions generated a total of 217 "What ifs." The second set of delta pressuring oriented sessions generated a total of 240 "What ifs." These "What ifs" were generated from the scope of the CSA Z341.1-18 and examined in the respective sessions. Relative risk expression, in the form of risk ranking, was performed for each "What if," using the 5x5 Natural Gas Storage Reservoir Risk Matrix for the 2015 sessions, and the 7+7 Enbridge Standardized Operational Risk Matrix for the DP20 sessions.

The risk matrices provided a qualitative expression made up of the session group's assignment of values for likelihood and severity, which are then multiplied or added to provide an expression of risk.

The operability, and storage aspects of the project were of primary concern for the "What if" examinations. Financial, safety, environmental, public impact, and personnel protection issues were also addressed. For all the systems examined, the group as a whole determined whether the system/question/topic had been covered in adequate depth.

It was concluded that the "What if" sessions records and risk rankings, consideration of the development location, and the review of qualitative aspects of the Corunna Pool formed a complete study of (first) the 2015 drilling project, and (second) the 2020 Pool Delta Pressuring Project, within the scope of the CSA Z341.1-18 regulation. It was agreed that the sessions had examined safety, operability and technical integrity in a responsible and diligent manner.

TC 08 Location Change

Although the physical location of the wellhead has changed from that of the 2015 examination, there are numerous items which are common:

- TC 08 is an A1 observation well, which means there is no mechanism for high upset flow in a similar manner to an I/W well - casing does not reach Guelph formation
- neither the 2015 nor the 2021 TC 08 location exposes public entities or Enbridge sites to significant thermal radiation in the event of an ignited uncontrolled full reservoir incident
- although the 2021 location is about 975 metres distant from the 2015 analyzed location, the reservoir characteristics of both locations are similar - specifically, both locations are outside of the DSA
- no significant changes in drilling or maintenance activity have been identified as a result of the change of location.

The conclusion of UGM Z341.1 qualitative review of the 2015 drilling work and the 2020 delta pressuring work, coupled with large scale natural gas storage reservoir release potential, indicates that there is no service to either public or Enbridge personnel protection through repeat of the Z341.1 2015 qualitative hazard assessment work.

With respect to HAZOP oriented qualitative review as outlined by Z341.1-18 regulation, the previous 2015 and 2020 HAZOP sessions remain valid for the purpose of present day evaluation.

Executive Summary

Title: Assessment of Neighbouring Activities
The Ladysmith Storage Pool
Authors: Enbridge Gas Inc.

The “Assessment of Neighbouring Activities” report has been completed to comply with the requirements of Clause 5.2 of Standard CSA Z341.1-18 – Storage of Hydrocarbons in Underground Formations – Reservoir Storage (“CSA Z341.1-18”).

The Ladysmith Pool is protected by a Designated Storage Area (DSA) which was approved by Ontario Energy Board in 1999. The DSA is comprised of approximately 366 hectares. Enbridge is confident that the DSA adequately protects the Ladysmith Pool. In addition, Ontario Regulation 245/97 under the Oil, Gas and Salt Resources Act provides protection of the reservoir against the performance of any well work, within a 1.6 km of the DSA boundary, that will or is likely to fracture the storage reservoir or to result in communication between the well and the storage reservoir.

The report reviews the geology, the existing and abandoned wells within 1 kilometre of the storage zone, subsurface operations within 5 kilometres of the storage zone, and wells penetrating the storage zone.

Well drilling records from the Oil, Gas and Salt Resources Library (OGSRL) indicate that 32 wells have been drilled within 1 km of the base of gas of the Ladysmith Pool. Enbridge has conducted a review of these wells and is satisfied that they have not had any “impact on the integrity of the storage facility” as required by CSA Z341.1-18 Clause 5.2(a).

A review of records from the OGSRL for subsurface activities within 5 kilometres of the Ladysmith Pool indicates that there are 9 subsurface operations, including oil and natural gas production and natural gas storage operations. Enbridge is satisfied that there is no “impact on the integrity of the storage zone” as required by the CSA Z341.1-18 Clause 5.2(b).

Eleven wells penetrate the Ladysmith storage zone. Four of the wells are associated with storage operations and seven of the wells are abandoned. The integrity of each well that penetrates the storage zone, including casing, cement, and abandonment records was reviewed. Enbridge is satisfied that the wells penetrating the Ladysmith Pool meet the requirements of CSA Z341.1-18 Clause 5.2(c).

In conclusion, the Ladysmith Pool has been safely operated as a natural gas storage pool since 1999 and is protected by an approved DSA. The technical information reviewed, indicates that there is minimal risk regarding the potential migration of natural gas between any known existing or abandoned wells within 1 km, and existing operations within 5 km, of the Ladysmith Pool. All active wells that penetrate the storage zone within the Ladysmith Pool are utilized as part of storage operations.

All the active wells are operated and maintained in accordance with CSA Z341.1-18 Storage of Hydrocarbons in Underground Formations and in accordance with the Oil, Gas and Salt Resources Act, its regulations and Provincial Operating Standards. Enbridge is satisfied that the drilling of an A-1 observation well (TL 8) will not compromise the integrity of the Ladysmith Pool or any associated facilities.

Executive Summary

Date: June 2021

**Title: "What if" Analysis of Hazards and Operability Issues
Delta Pressuring Project 2020 - Ladysmith Pool + TL 08 Drilling Project 2018**

Author: Gordon Cowan, P.Eng., U G M Engineering Ltd. (UGM)

Introduction

U G M Engineering was contracted to prepare a "What if" Analysis for the Ladysmith Pool concerning the Delta Pressuring Project 2020. A "What if" Analysis was also performed in 2018 for the drilling of TL 08.

This Executive Summary June 2021 edition incorporates specific information concerning the currency of the original TL 08 work in light of the passage of time from the original 2018 work to the present. Comments from this consideration can be found in the later portions of this work.

Summary of Two Qualitative Risk Assessments

UGM qualitative HAZOP assessments consider the Ladysmith Pool facilities as a whole, in its examination of natural gas storage reservoir risk. Qualitative HAZOP assessments are modelled from, and derivatives of, qualitative risk assessment methodologies used in the chemical process industry that have been adapted for natural gas storage application. Such assessments are focused on large scale releases of natural gas through upset events.

The activities examined by "What if" Analysis for the Ladysmith Pool were covered by two Z31.1-18 exercises. The first were the September 25th, 2018 sessions. These sessions covered the drilling of I/W TL 9H and observation well TL 08. The second set of sessions were the virtual DP20 sessions held August 10, 11, and 12, 2020. Both the Ladysmith Pool session sets used similar methodology to previous CSA Z341.1-18 Delta Pressuring and Drilling Project qualitative risk assessments.

These sessions were attended by the "What if" Leader and up to nine technical experts, the number being variable according to project set. The preparation for the sessions, selection of the project scope systems, subsystems, session conduction, and reporting function for the "What if" analysis was performed by UGM team leader Gordon W. Cowan, P.Eng., using PHA Pro 8.8 software for recording, organizing and reporting functions.

The first 2018 drilling sessions generated a total of 250 "What ifs." The second set of delta pressuring oriented sessions generated a total of 260 "What ifs." These "What ifs" were generated from the scope of the CSA Z341.1-18 and examined in the respective sessions. Relative risk expression, in the form of risk ranking, was performed for each "What if," using the 5x5 Natural Gas Storage Reservoir Risk Matrix for the 2018 sessions, and the 7+7 Enbridge Standardized Operational Risk Matrix for the DP20 sessions.

The risk matrices provided a qualitative expression made up of the session group's assignment of values for likelihood and severity, which are then multiplied or added to provide an expression of risk.

The operability, and storage aspects of the project were of primary concern for the "What if" examinations. Financial, safety, environmental, public impact, and personnel protection issues were also addressed. For all the systems examined, the group as a whole determined whether the system/question/topic had been covered in adequate depth.

It was concluded that the "What if" sessions records and risk rankings, consideration of the development location, and the review of qualitative aspects of the Corunna Pool formed a complete study of (first) the 2018 drilling project, and (second) the 2020 Pool Delta Pressuring Project, within the scope of the CSA Z341.1-18 regulation. It was agreed that the sessions had examined safety, operability and technical integrity in a responsible and diligent manner.

TL 08 - Validity of 2018 Work

The qualitative risk assessment performed for TL 08 drilling in 2018 noted that "TL 08 is expected to have little to no flow, as its purpose is to be an A-1 observation well defining the extent of the interaction beyond the limit of the A-1 that interacts with the reef. Minor flow of 2 to 10 Mcf/d may be experienced."¹ This is an important detail for consideration of the 2018 work validity with respect to potential large scale natural gas releases and other aspects examined in the 2018 work.

The TL 08 wellhead does not expose public entities or Enbridge sites to significant thermal radiation in the event of an ignited uncontrolled full reservoir incident.

No significant changes in drilling or maintenance activity have been identified from the date of the original work such that volumetric related consequences of natural gas release can be anticipated.

With respect to HAZOP oriented qualitative review as outlined by Z341.1-18 regulation, the previous 2015 and 2020 HAZOP sessions remain valid for the purpose of present day evaluation.

¹ direct quotation from the 2018 Qualitative Ladysmith Z341.1 report.

ENVIRONMENTAL MATTERS

Environmental Report

1. An Environmental Report (“ER”) for the Project was prepared for Enbridge Gas by Aecom Canada Ltd. (“Aecom”). The ER conforms to the OEB’s *Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario, 7th Edition, 2016* (the “Guidelines”). A copy of the ER is set out at Attachment 1 to this Exhibit.
2. The objectives of the ER are to:
 - Describe the proposed work necessary for the Project;
 - Describe the procedures that will be followed during the construction of facilities;
 - Identify potential environmental impacts and recommend measures to minimize/mitigate those impacts; and
 - Describe the consultation activities undertaken for the Project.
3. Enbridge Gas retained Aecom to undertake an environmental screening to identify potential environmental and socio-economic impacts associated with the Project. The results of the environmental screening are documented in the ER. Mitigation measures designed to minimize environmental and socio-economic impacts were also developed as part of the screening and are documented in the ER.
4. The ER did not result in any significant environmental or socio-economic features being identified. Site visits were conducted in November 2020 and March 2021 to characterize any suitable species at risk (“SAR”) habitats within the vicinity (120 metres) of TC 8 and TL 8 for the species listed in Table 6 of the ER. The Study Areas for TC 8 and TL 8 are both actively managed agricultural fields consisting of row crops. The Study Area for TC 8 also includes a small 2 metre buffer between

agricultural fields that consists of weedy species. Based on field investigations, no suitable habitat was identified for the SAR outlined in Table 6 of the ER.

5. With the implementation of the recommendations in the ER, ongoing landowner communication, and adherence to permit and regulatory requirements, the proposed Project will be constructed in a manner that protects the environment and mitigates potential impacts.
6. The ER was provided to the Ontario Pipeline Coordinating Committee (“OPCC”) and other relevant stakeholders/agencies on June 17, 2021. The ER was subject to a 42 day review period and comments were directed to Aecom. A summary of OPCC comments is set out at Attachment 8 to this Exhibit.

Archaeological Assessment

7. Stage 1 and Stage 2 Archaeological Assessments (“AA”) for the Project were completed by Aecom. The Stage 1 AA Report was submitted to the Ministry of Heritage, Sport, Tourism and Cultural Industries (“MHSTCI”) on September 29, 2020 and a revised report was submitted to the MHSTCI on April 16, 2021. The Stage 1 AA Report was screened by the MHSTCI and was accepted into the Ontario Public Register of Archaeological Reports on April 29, 2021.
8. The Stage 2 AA Report for TC 8 was submitted to the MHSTCI on June 28, 2021 and was accepted into the Ontario Register of Archaeological Reports on June 30, 2021. The Stage 2 AA survey for TC 8 did not identify any artifacts.
9. The Stage 2 AA Report for TL 8 was submitted to the MHSTCI on February 3, 2021. The Stage 2 AA survey for TL 8 resulted in identification of one archaeological location (Location 1), a 19th to 20th century Euro-Canadian artifact scatter. Given the

presence of at least 20 diagnostic artifacts that date to a period of use before 1900, Location 1 fulfills the criteria for further Stage 3 archaeological investigation as per Section 2.2, Standard 1c of the *Standards and Guidelines for Consultant Archaeologists*. The Stage 2 AA Report was screened by the MHSTCI and was accepted into the Ontario Public Register of Archaeological Reports on May 7, 2021. The Stage 3 AA survey will be completed in summer 2021.

10. The Stage 1 AA Report and Stage 2 AA Reports for TL 8 and TC 8 are set out at Attachments 2-4 to this Exhibit. The corresponding clearance letters from the MHSTCI are set out at Attachments 5-7 to this Exhibit.

Enbridge Gas Inc.

Environmental Report

Corunna and Ladysmith A-1 Observation Well Drilling Project

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Executive Summary

Enbridge Gas Inc. (Enbridge Gas) is proposing to development of the Corunna (TC8) and Ladysmith (TL8) A-1 Observation Well Drilling Project (the Project). One well, TC8, will be drilled in the Corunna Designated Storage Area (DSA) and the other well, TL8, will be drilled in the Ladysmith DSA. The observation wells are required to monitor the gas content and pressure in the underground storage area and will assist with the continued safe and reliable delivery of natural gas to existing and future customers. The proposed well TC8 is located southwest of the intersection of Petrolia Line and Tecumseh Road, Township of St. Clair, Lambton County, Ontario. The proposed well TL8 is located southwest of the intersection of Courtright Line and Tecumseh Road, Township of St. Clair, Lambton County, Ontario.

The work to prepare the well pads will begin in summer 2021. The drilling of wells TC8 and TL8 is anticipated to occur during fall 2021.

Enbridge Gas retained AECOM Canada Ltd. (AECOM) to prepare an Environmental Report for the Project and prepare this Environmental Report (ER). A desktop review has been completed to identify physical, natural and socio-economic features within the Project Study Areas at TC8 and TL8. A review of the potential effects of the Project on these features is provided in the ER. Mitigation measures are recommended to minimize the effects identified.

The proposed Project will be constructed and operated in a manner that protects the environment and manages potential effects. The disturbance is limited in size and scope and is restricted to agricultural lands. Potential environmental effects are anticipated to be managed and protected through the implementation of the proposed mitigation measures outlined in this report.

Acronyms

cm	centimetre
DFO	Department of Fisheries and Oceans Canada
DSA	Designated Storage Area
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species at Risk in Ontario
EASR	Environmental Activity Sector Registry
ESC	Erosion and Sediment Control
ER	Environmental Report
km	kilometre
L	litres
m	metres
m ²	square metres
mASL	metres Above Sea Level
MECP	Ministry of the Environment, Conservation and Parks
MHSTCI	Ministry of Heritage, Sport, Tourism and Culture Industries
mm	Millimetre
MNRF	Ministry of Natural Resources and Forestry
NHIC	Natural Heritage Information Centre
OBBA	Ontario Breeding Bird Atlas
OEB	Ontario Energy Board
ORAA	Ontario Reptile and Amphibian Atlas
O. Reg.	Ontario Regulation
PTTW	Permit to Take Water
ROW	Right of Way
SAR	Species at Risk
SARA	<i>Species at Risk Act</i>
SARO	Species at Risk in Ontario
SCRCA	St. Clair Region Conservation Authority
SWH	Significant Wildlife Habitat

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Appendix A. Figures

Appendix B. Typical Drawings

1. Introduction

This Environmental Report (ER) has been prepared for the development of the Corunna (TC8) and Ladysmith (TL8) A-1 Observation Well Drilling Project (the Project), as proposed by Enbridge Gas Inc. (Enbridge Gas). The Project involves work at the Corunna Designated Storage Area (DSA) and Ladysmith DSA to allow Enbridge Gas to monitor the gas content and pressure in the underground storage area and will assist with the continued safe and reliable delivery of natural gas to existing and future customers.

This ER will document a plan for the protection of the environment during the completion of the following activities:

- Drilling of one A-1 observation well in the Corunna DSA boundary (TC8);
- Drilling of one A-1 observation well in the Ladysmith Storage Pool (TL8); and
- Construction of roadways and drilling pads to facilitate access to the well locations.

Specifically, this ER will:

- Describe the proposed work necessary for the Project;
- Describe the procedures that will be followed during construction of the facilities;
- Identify potential environmental impacts and recommend measures to minimize those impacts; and
- Describe the public consultation opportunities.

In addition to providing a formal plan for the protection of the environment, this ER will also be included with Enbridge Gas' application filed with the Ministry of Natural Resources and Forestry (MNR) which will be reviewed by the Ontario Energy Board (OEB). This will provide the OEB with detailed documentation of the various environmental protection measures that will be implemented by Enbridge Gas during the development of the Project.

1.1 Project Background and Purpose

Enbridge Gas currently operates approximately 280 billion cubic feet of gas storage in 35 DSAs. Thirty-two of the DSAs are in Lambton County, one in Chatham-Kent, one in Huron County and one in the Niagara Region. The gas storage operation includes 268 injection/delivery wells and 96 observation wells.

The Corunna DSA is located in Lambton County and has been in operation since 1964. Enbridge Gas operates 5 natural gas storage wells and 1 Guelph formation observation well in the Corunna DSA. The Ladysmith DSA is also located in Lambton County and has been in operation since 1999. Enbridge Gas operates two natural gas storage wells, one Guelph formation observation well and one stratigraphic test well in the Ladysmith DSA. Maps showing the Corunna DSA and Ladysmith DSA are shown on **Figures A-1 and A-2 in Appendix A** of this report.

The TC8 well will be drilled on previously disturbed lands owned by Enbridge Gas that are leased to a tenant farmer. The TL8 well will be drilled on third party lands that Enbridge Gas has the right to enter into and upon for the purposes of its natural gas storage operations. Temporary gravel pads will be installed for the drilling of both wells, which is expected to occupy approximately 8,100 m² each. Once the wells are completed, the access roads and a small gravelled area around each well will remain in place permanently. Each final well site is expected to measure approximately 60 m². No pipeline is required for these observation wells. The work to prepare the well pads will begin in fall 2021. The drilling of wells TC8 and TL8 is anticipated to occur during fall 2021.

As Enbridge Gas is the operator of the Corunna and Ladysmith DSAs, all aspects of the Project will be completed by Enbridge Gas. This includes determining the locations of the new well, developing and adhering to well drilling specifications, operating and maintaining the facilities, and identifying and mitigating any environmental concerns.

Enbridge will be filing an application with the MNRF to drill the wells. In accordance with the *OEB Act*, the MNRF shall refer to the OEB every application for the granting of a license relating to a well of a DSA, and the OEB shall report to the MNRF on it.

The drilling of two new A-1 observation wells and the construction of roadways and drilling pads to facilitate access to the well locations is necessary to allow Enbridge Gas to monitor the gas content and pressure in the underground storage area and will assist with the continued safe and reliable delivery of natural gas to existing and future customers.

Please see **Appendix A** of this report for detailed maps of the proposed facilities located in the Corunna DSA and Ladysmith DSA.

1.2 Key Planning Activities

Table 1 provides a summary of the key planning activities for the development of the Project:

Table 1: Key Planning Activities for Project Development

Activity	Anticipated Timing
Pre-planning Activities	
Determine Well Locations	■ Winter 2020
Complete ER for the Project	■ Spring 2021
Submit MNRF Application	■ Spring/Summer 2021
MNRF Decision	■ Fall 2021
Construction Activities	
Access Road Construction	■ Summer/Fall 2021
Drilling Pad Construction	■ Summer/Fall 2021
Well Drilling	■ Fall 2021
Clean-up Restoration	■ Fall 2021 and Spring 2022

1.3 Definition of the Study Area

TC8 is located southwest of the intersection Petrolia Line and Tecumseh Road (Lot 19, Concession 10), Township of St. Clair, Lambton County, Ontario. TL8 is located southwest of the intersection of Courtright Line and Tecumseh Road, part of Lot 19, Concession 4, Township of St. Clair, Lambton County, Ontario. For this ER, the Study Area extends approximately 120 metres (m) from the proposed workspace at each site. The Study Areas are comprised of agricultural fields, access roads, existing oil and gas infrastructure, and agricultural drains.

The Study Areas are shown on **Figures A-3 and A-4** in **Appendix A**.

1.4 Approval Process and Regulatory Requirements

The Environmental Report for this Project was prepared following the Environmental Requirements for Distribution System Expansion Projects, as outlined in the OEB's E.B.O. 188 Report. The ER was prepared with consideration for the OEB's Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario (OEB Guidelines, 2016). Environmental and socio-economic features were reviewed in

accordance with the guidelines set out in the Enbridge Reference Manual for the Environmental Screening Checklist, July 2012 (2012).

The following environment permits, and regulatory approvals may be required for the Project:

- Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) Letter.
- St. Clair Township
 - If the Project will impact traffic, a Traffic Control plan may be required to be submitted to the Township for approval.
- By-Law Number 44 of 2014 of the Corporation of the Township of St. Clair, being a by-law regulating and prohibiting within the Township of St. Clair noise or noises likely to disturb the inhabitants.
- Permits from the St. Clair Region Conservation Authority for work in the Regulated Area, if required.

2. Project Description

2.1 Landowner Input

A copy of the application will be sent to all landowners in the Corunna DSA and Ladysmith DSA that have requested a copy of the environmental documentation. They will have an opportunity to participate in the hearing process. Landowners in the DSAs are aware of Enbridge Gas' ongoing storage-related operations and activities.

If the Project is approved, Enbridge Gas will implement a Landowner Relations Program. This program provides the adjacent landowners with quick access to Enbridge Gas personnel in the event there are concerns or complaints. This program also includes a complaint tracking system to ensure that complaints and commitments are documented and resolved as quickly as possible.

2.2 Project Development

2.2.1 Access Road Construction

Enbridge Gas proposes to use existing access roads where possible. However, it will also be necessary to construct new "all weather" access roads to allow Enbridge Gas access to the new observation wells. Permanent access roads allow Enbridge Gas to perform routine maintenance such as dead weight testing, corrosion logging, well stimulations and pressure tests without disturbing agricultural soils and crops.

The procedure for construction of an access road is as follows:

- Determine the locations of the access roads;
- Topsoil is stripped from the road right-of-way;
- Geotextile material is laid down on the road right-of-way; and
- Granular material is placed on the geotextile material to a depth of approximately 35 cm.

The stripped topsoil for the permanent access roads will be hauled to another location on the properties or will be taken to an approved site.

The locations of the existing and proposed access roads are shown in **Appendix A** and a cross section of a typical access road is shown in **Appendix B**.

2.2.2 Drilling Pad Construction and Well Drilling

The new well locations were determined by Enbridge Gas's Underground Storage Department using existing well data, geophysical logs and operational data.

Rotary rigs, and potentially cable tool rigs, will be used for drilling, which will take place on temporary granular drilling pads approximately 8,100 m² each. The drilling pad for both TC8 and TL8 will require construction of a new gravel drilling pad.

Rotary rig drilling will proceed on a 24-hour day / 7 day per week basis throughout the drilling process. If cable tool rig drilling is necessary, it will proceed on a 24-hour day / 5 to 7 day per week basis. Rotary drilling is expected to

take two to three weeks per well to complete and cable tool drilling is expected to take two to three months to complete, per well.

Tanks will be placed adjacent to the rig to collect drilling fluids and cuttings. The tanks will be monitored and emptied as required. Fluids will be recirculated during the drilling process and the drilling fluids/cuttings will be disposed of at an approved location after drilling has been completed.

The following is a summary of the activities associated with well drilling:

- Establishing the well site location is generally the first activity associated with well drilling. Locations are selected based on interpretation of the geological information, a review of the surface features associated with that location and landowner input.
- Once the location of the well is determined, access roads and drilling pads centred on the well location are topsoil stripped. Following topsoil stripping, the entire work area is overlain with geotextile and
- granular material to ensure the site has adequate equipment bearing capabilities.
- Typical well site layouts for cable tool and rotary drilling rigs are shown in **Appendix B**.
- During drilling, a number of vehicles must service the rig including cement trucks, water trucks and other service vehicles.
- When drilling has been completed, the rig is moved off the site, the granular drilling pad is reduced to approximately 60 m² surrounding the wellhead, and the topsoil is replaced. Areas disturbed by drilling are restored by chisel ploughing, discing or subsoiling during dry conditions.

2.2.3 Operation and Maintenance Practices

Like any system, once the observation wells are operational, they have to be maintained and serviced on a regular basis. Maintenance and servicing activities include: dead weight testing, corrosion logging, well stimulations and pressure tests.

3. Environmental Analysis and Recommended Mitigation Measures

This ER describes the physical, natural environment and socio-economic features that occur within the Study Areas (**Figures A-5 to A15 in Appendix A**) and predicts the potential impacts on these features associated with well drilling and construction of access roads and drilling pads. Where potential impacts are anticipated, mitigation measures are recommended.

The following physical, natural, or socio-economic features were not identified within the Study Areas during this desktop screening exercise and are not discussed in this ER:

- Significant Geological Features, including Pits, Quarries, Mineral Deposits and Mines;
- Significant Geological Features, including Scenic Vistas, Escarpments, Slopes;
- Bedrock Outcroppings;
- Forest Resources;
- Valleylands;
- Wetlands;
- Areas of Natural and Scientific Interest and Designated Environmental Sensitive Areas;
- Recreation Areas and Outdoor Education Areas;
- Special Policy Areas;
- Waste Disposal Sites;
- Transportation Corridors and Facilities;
- Land Easements (excluding Enbridge Gas easements and landowner lease agreements);
- Sensitive Agricultural Operations (specialty crop lands and intensive livestock/poultry and horses);
- Areas of Potential Contamination;
- Ornamental Vegetation; and
- Fencing.

A preliminary screening for cultural heritage resources within 50 m of the Corunna DSA and Ladysmith DSA was undertaken. The background historical research, including preliminary historic map review, consultation with St. Clair Township, and completion of the MHSTCI's *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes, a Checklist for the Non-Specialist* (2016), indicates that the Study Areas do not contain Listed or Designated Part IV cultural heritage resources.

If features identified above are identified in the future during a site visit, this ER will be updated to include those features.

3.1 Physical Features

3.1.1 Geology

The overburden within the Study Areas overlies Upper Devonian aged shale of the Kettle Point Formation (OGS, 1991). The Kettle Point Formation can be described as brown to black, laminated, organic-rich shales and siltstones with minor green, bioturbated shales, siltstones and carbonate concretions in the lower part. TC8 is overlain by St. Joseph Till, while TL8 is overlain by Glaciolacustrine deposits (silt and clay).

Enbridge well information at the Corunna DSA and Ladysmith DSA confirms that the bedrock depth average at each DSA is 155 metres above sea level (mASL) and 133 mASL, respectively.

3.1.1.1 Mitigation Measures

Mitigation measures for the handling of soil are described in **Table 2** below.

3.1.2 Vulnerable Soils and Agricultural Resources

The Project is in the St. Clair Clay Plains physiographic region and is dominated by relatively flat Bevelled Till Plains that were over-ridden by a glacial event following their initial deposition (Chapman and Putnam, 1984). The Corunna DSA is overlain by clayey/silty till, while the Ladysmith DSA is overlain by fine-textured glaciolacustrine deposits comprised of silt and clay with minor sand and gravel and is considered to be massive and well-laminated. In addition, the topography within the Study Areas is generally flat to slightly undulating towards the St. Clair River and Lake Huron. Ground elevation ranges from approximately 207 mASL, near the Ladysmith DSA to 185 mASL near the Corunna DSA.

The Canada Land Inventory categorizes land into seven classes of soil, which reflect the soil's capability to produce field and forage crops. Lands classified as Class 1 are considered the most productive, while those classified as Class 7 are less productive. It should be noted that Class 1 to 4 agricultural lands are generally considered arable lands. The classification system reflects limitations such as slope, shallow soils, climate, drainage and fertility.

Soils within the Study Areas have been classified as Class 2 and 3 (OMAFRA, 2017). Dark-Grey Gleysolic soils (poor drainage and have developed under the presence of a high-water table during most of the year) and Grey-Brown Podzolic soils (typically have good drainage) are the dominant soil groups within the Study Areas.

The agricultural features within the Study Areas as illustrated on **Figures A-8 and A-9** in **Appendix A**.

3.1.2.1 Potential Impacts

Each well development will include access roads and drilling pads. The infrastructure will require construction within agricultural lands and therefore has potential to affect agricultural soils.

Potential environmental effects on soil resources in active agricultural areas during construction and operation of the Project include:

- Reduction in soil capability (quality) from mixing, compaction and rutting risk, accidental contaminant spills, and erosion;
- Reduction in soil thickness and change in soil distribution from wind and water erosion and soil handling;
- Changes to surface and subsurface drainage patterns from changes in topography; and
- Effects to surface water drainage patterns as a result of crushing or severing agricultural tiles.

Construction activities (e.g., excavation, use of heavy equipment, stripping and stockpiling of soil and dewatering discharge) may cause changes in soil quality through processes such as mixing, compaction, rutting, and wind and water erosion. These processes may alter soil capability, thickness and structure, resulting in reduced soil productivity because of impaired soil fertility and rooting zone. Also, construction activities that damage existing agricultural tiles, changes the topography, or results in inadequate control of surface runoff and dewatering discharge has the potential to cause soil erosion of adjacent agricultural areas.

General construction activities such as vehicle and machinery operation also has the potential to change soil quality through minor contaminant releases. Spills consisting of materials that constitute a contaminant may affect soils and will therefore have to be managed.

3.1.2.2 Mitigation Measures

Table 2 identifies potential effects and proposed mitigation on soil resources that might occur during the construction and operation of the Project.

Table 2: Potential Effects and Proposed Mitigation on Soil Resources

Potential Effect	Proposed Mitigation Measures
Reduction in topsoil quantity and quality due to mixing and compaction	<ul style="list-style-type: none"> ■ Consult with landowners regarding preferred topsoil handling measures (e.g. no stripping or additional stripping and potential storage preferences to avoid mixing of topsoil and subsoil). ■ During periods of high wind, apply mitigation measures to limit the erosion of topsoil (e.g. suspending earth moving, use of dust suppressants and protection of stockpiles). ■ Avoid construction activities during seasonally wet periods (i.e., spring), high volume rain events (20 millimetres (mm) in 24 hours) and significant snow melts / thaws, where possible, to avoid risk of erosion, soil mixing and compaction or the potential for sediment release into the surrounding area. ■ If excessively wet soil conditions are encountered, temporarily halt construction per Enbridge's standard wet soils shutdown practice. ■ Keep all equipment within identified work areas and confine construction activities to the narrowest area practical to minimize disturbance of adjacent soils. ■ If compaction occurs, a qualified individual should determine if compaction relief is necessary. Relief measures should be discussed with landowners prior to taking place.
Reduction in soil quality and quantity due to erosion and sedimentation resulting from use of heavy equipment and stockpiling of cleared materials.	<ul style="list-style-type: none"> ■ Develop plans for erosion and sediment control to minimize the potential for construction related sediment release (Erosion and Sediment Control Plan Guideline). ■ Re-vegetate or stabilize exposed sites as soon as possible following disturbance using species native to the area to limit the duration of soil exposure. ■ Maintain roadside ditches in good condition to avoid diversion of drainage ditch water into the construction area. ■ Grade disturbed or remediated slopes or stockpiles to a stable angle to avoid slope instability and reduce erosion. ■ Keep all equipment within identified work areas and confine construction activities to the narrowest area practical to minimize disturbance of adjacent soils. ■ Remove construction debris from the site and stabilize it to prevent it from entering the nearby waterbodies. ■ Avoid construction activities during seasonally wet periods (i.e., spring), high volume rain events (20 mm in 24 hours) and significant snow melts / thaws, where possible to avoid risk of erosion, soil compaction or the potential for sediment release into the surrounding area.
Reduction in soil quality due to accidental release of contaminants during construction.	<ul style="list-style-type: none"> ■ Apply the following general mitigation measures to avoid soil contamination: <ul style="list-style-type: none"> – Ensure machinery is maintained free of fluid leaks. – All stationary equipment, such as generators shall have secondary containment to prevent spills. Potential contaminate storage will not occur within 50 m of a wetland or watercourse. – Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done in specified areas at least 50 m away from wetlands and/or waterbodies or as required by regulatory authority. Where it is impracticable to maintain the 50 m buffer (such as in the case of an operating pump), the following fuelling measures will be followed: <ul style="list-style-type: none"> • The equipment will be positioned as far away as possible on a secure and level surface; • The equipment will have a secondary containment system in place; • Two (2) workers will refuel the equipment such that one person is positioned at the fuel truck close to the emergency shut off, while the second person handles to nozzle/hose to refuel the equipment; and • An emergency spill kit will be set out in the open for immediate use, if required. ■ Develop and implement a Spill Prevention and Response protocol outlining steps to prevent and contain any chemicals and to avoid soil contamination. This plan will include, for example: <ul style="list-style-type: none"> – In the event of a contaminant spill, all work will stop until the spill is cleaned up.

Potential Effect	Proposed Mitigation Measures
	<ul style="list-style-type: none"> – Reporting procedures to meet federal, provincial and local requirements (e.g., reporting spills and verification of clean-up), emergency contact and project management phone numbers. – Spill control and containment equipment/materials shall be readily available on site. – Protocols for access to additional spill clean-up materials, if needed. – Contaminated materials to be handled in accordance with relevant federal and provincial guidelines and standards. – Include the use of Material Safety Data Sheets, which provide information on proper handling of chemicals readily available for the types of chemicals that will be used on site. – Proper training of operational staff on associated emergency response plan and spill clean-up procedures. – Spills to be cleaned up as soon as possible, with contaminated soils/water removed to a licenced disposal site, if required. – Materials contained in spill clean-up kits are restocked as necessary. – Any soil encountered during soil stripping that has visual staining odours or other visual evidence of contamination effects should be analyzed to determine its quality in order to identify the appropriate disposal method. <p>■ Waste and excess materials management (including excess soil) to be completed in accordance with relevant regulatory guidelines and standards</p>
Contaminated soil discovered during construction	<p>■ Site-specific Soil Management Plans for excess soils, waste collection and disposal management should be developed by the Contractor.</p> <p>■ Should excess soil be generated on-site during construction activities that require off-site management, or if contaminated soils are suspected (e.g., odour, film, sheen, staining, previous known contamination issues in the vicinity), representative soil samples should be collected and submitted for chemical analysis to determine management options and appropriate handling and health and safety guidelines.</p>

3.1.3 Artificial Agricultural Drainage

Land use across the Study Areas are dominated by a mixture of crop cultivation and livestock agriculture, which has been made possible by the installation of dredged ditches and tile under-drains to provide satisfactory moisture conditions within the imperfectly drained soils. TL8 and TC8 are located within agricultural fields. Agricultural fields may have tile drainage installed to increase agricultural productivity within these fields. Also, there are constructed Drains (Wellington Drain and the Ford Drain) located within the Study Areas. Mitigation measures for potential effects to surface water of constructed drains are described in **Table 5**.

3.1.3.1 Mitigation Measures

Table 3 identifies potential effects and proposed mitigation on agricultural tiles/drains that might occur during the construction of the Project.

Table 3: Potential Effects and Proposed Mitigation on Artificial Agricultural Drainage

Potential Effect	Proposed Mitigation Measures
Effects to surface water drainage patterns as a result of crushing or severing agricultural tiles	<ul style="list-style-type: none"> ■ Discuss areas of concern with the landowner to identify potential tile drainage systems. ■ Pre-construction tiling will be undertaken prior to the start of any operations, if necessary. ■ Disrupted or broken tiles will be recorded, flagged and repaired following Enbridge's documented procedures for tile repair. Prior to completing repairs, landowners will be invited to inspect and approve repairs.

3.1.4 Hydrogeology

MECP Well Water Records indicate that there are no water wells located within the Study Areas at TC8 and TL8 (MECP, 2020) (**Figures A-10 and A-11 in Appendix A**). The Study Areas are not within a significant groundwater

recharge, highly vulnerable aquifer, or intake protection zone (Thames-Sydenham and Region Source Protection Committee, 2015).

Potential environmental effects on groundwater resources during construction of the Project include:

- Changes in groundwater quality.

General construction activities such as vehicle and machinery operation and use of drilling fluids have the potential to change groundwater quality through minor contaminant releases. Spills consisting of materials that constitute a contaminant may affect groundwater and will therefore have to be managed. It is important to implement the mitigation measures outlined in **Table 4** to minimize any effects.

3.1.4.1 Mitigation Measures

Although no well water records were identified within the Study Areas for TC8 and TL8, additional mitigation measures have been outlined in **Table 4**.

Table 4: Potential Effects and Proposed Mitigation on Groundwater Resources

Potential Effect	Proposed Mitigation Measures
Reduction in groundwater quality due to accidental release of contaminants during construction.	■ Refer to mitigation measures in Table 2 for “Reduction in soil quality due to accidental release of contaminants during construction.”

3.2 Natural Environment Features

3.2.1 Watercourses

There is one watercourse identified within the Study Area of TC8. A constructed drain (Wellington Drain) runs east to west through the Study Area on the south side of Petrolia Line. The Wellington Drain is classified as a ‘Class F’ drain in accordance with DFO’s drainage classification (2017), which indicates intermittent flow regimes and requires no authorization if work can be done when the drain is dry, frozen or there is no flow. Nevertheless, a site-specific review is required if in-water work occurs during a period of flow (i.e., spring) as the drain may provide indirect or seasonal fish habitat. However, in-water work and potential impacts to the Wellington Drain are not anticipated as an existing access road from Petrolia Line will be used to cross the Wellington Drain to access TC8, as seen on **Figure A-12** in **Appendix A**.

There is one watercourse identified within the Study Area of TL8. A constructed drain (Ford Drain) runs east and west through the Study Area on the south side of Courtright Line outside the workspace, as seen on **Figures A-4** and **A-13** in **Appendix A**.

Mapping, which is available online, indicates that the proposed work areas may be within the regulated area of the SCRCA. Consultation will be completed with the SCRCA to confirm requirements for permitting under Regulation 171/06.

3.2.1.1 Potential Impacts

Potential effects on surface water during construction and operation include:

- Changes in surface water quality; and
- Changes in surface water quantity.

Changes to surface water quality could occur wherever erosion is possible. Erosion of soils into nearby waterbodies and watercourses could occur as a result of dewatering discharge, and equipment use. Site preparation activities near waterbodies, such as vegetation clearing and soil grading, may result in unstable soils that are susceptible to erosion.

In addition to change in levels of suspended sediment, contamination of surface water could occur through accidental spills from vehicle and machinery operation (e.g., drilling fluids, leaks) near waterbodies and watercourses. Washing equipment (e.g., excavator) could also potentially result in contaminant releases to surface water.

Changes to surface water quantity during construction resulting from changes to overland surface water flow direction and volume may occur as a result of loss of vegetation and changes in surficial topography.

3.2.1.2 Mitigation Measures

Although no in-water work will be required, the mitigation measures presented in **Table 5** are recommended for work near watercourses and potential effects this may have on surface water.

Table 5: Potential Effects and Proposed Mitigation on Surface Water

Potential Effects	Proposed Mitigation Measures
Changes in surface water quality due to water contamination (e.g., oils, gasoline, grease and other hazardous materials) and as a result of sedimentation.	<ul style="list-style-type: none"> ■ Develop plans for spill prevention and response prior the start of construction to provide a detailed response system to respond to the release of petroleum, oils, lubricants and/ or other hazardous materials released into the environment. Site supervisors must keep a spill kit on-site at all times and train workers in the use of this kit. ■ Operate construction equipment (i.e., back hoes, etc.) in a manner that minimizes disturbance to the banks of waterbodies (e.g., avoiding unnecessary travel, machine rotations, etc.) and ensure equipment is kept out of waterbodies. ■ All vehicles, machinery and other construction equipment shall not enter the water. ■ Restrict construction equipment to designated controlled vehicle access routes to minimize the potential contamination. ■ Construction equipment should arrive on site in a clean condition. Frequent checks and maintenance should ensure that no fluid leaks occur. All stationary equipment, such as generators shall have secondary containment to prevent spills. ■ Construction equipment must be refuelled, washed, and serviced a minimum of 50 m away from all waterbodies and other drainage features to prevent any deleterious substances from entering a water resource, or as designated by the local regulatory authority. Where it is impracticable to maintain the 50 m buffer (such as in the case of an operating pump), the following fuelling measures will be followed: <ul style="list-style-type: none"> – The equipment will be positioned as far away as possible on a secure and level surface; – The equipment will have a secondary containment system in place; – Two workers will refuel the equipment such that one person is positioned at the fuel truck close to the emergency shut off, while the second person handles to nozzle/hose to refuel the equipment; and – An emergency spill kit will be set out in the open for immediate use, if required. ■ Fuel and other construction related fuels/lubricants must be stored securely in a designated area that is a minimum of 50 m away from any waterbody or drainage feature, or as designated by the local regulatory authority. ■ For mitigation measure associated with erosion and sedimentation, refer to mitigation measures for “Reduction in soil quality and quantity due to erosion, sedimentation and compaction resulting from use of heavy equipment and stockpiling of cleared materials” in Table 2.
Changes to surface water quality due to working near watercourses	<ul style="list-style-type: none"> ■ Implement necessary erosion and sediment control (ESC) measures (i.e., silt fencing) to prevent erosion and sedimentation into nearby watercourses, where necessary.

Potential Effects	Proposed Mitigation Measures
Changes in surface water quantity due to alterations to local drainage patterns.	<ul style="list-style-type: none"> ■ Clearly delineate work area using erosion fencing or other barriers, to avoid effecting hydrological functions associated with permanent open water. ■ Control quantity and quality of stormwater discharge using best management practices. ■ Minimize grading activities to maintain existing drainage patterns as much as possible. ■ Develop plans to deal with on-site flooding in order to mitigate any possible effects.

3.2.2 Designated Natural Heritage Features

A background review of the Study Areas did not identify any known Areas of Natural and Scientific Interest, seasonal concentration areas, wooded areas, potentially significant woodlands, significant valleylands or significant wetlands.

3.2.3 Significant Wildlife Habitat and Vulnerable, Threatened and Endangered Species

No significant wildlife habitat (SWH) was identified through background review and confirmed through an assessment of existing conditions during field investigations.

A list of Species at Risk (SAR) designated under the Ontario *Endangered Species Act, 2007* (ESA, 2007) and/or federal *Species at Risk Act* (SARA) as endangered or threatened, with potential to occur in or adjacent to the Study Areas at TC8 and TL8, was developed by reviewing the following sources and is provided in **Table 6**:

- Ontario Breeding Bird Atlas (OBBA) (BSC *et al.*, 2006)
- Ontario Reptile and Amphibian Atlas (ORAA) (Ontario Nature, 2019)
- Natural Heritage Information Centre (NHIC) database (2020)
- Species at Risk in Ontario Recovery Strategy Range Maps
- Bat Conservation International Range Maps (BCI, 2020)
- Department of Fisheries and Oceans Canada (DFO) Aquatic Species at Risk Mapping (DFO, 2020)
- Ontario Butterfly Atlas (Macnaughton *et al.*, 2020)
- MNRF Make-a-Map: Natural Heritage Areas Application (2020)

Table 6: Threatened and Endangered Species Records for the Vicinity of the Study Areas

Common Name	Scientific Name	COSEWIC (SARA) Status ¹	COSSARO (ESA) Status ²
Bank Swallow ³	<i>Riparia riparia</i>	THR	THR
Barn Swallow ⁴	<i>Hirundo rustica</i>	THR	THR
Bobolink ⁴	<i>Dolichonyx oryzivorus</i>	THR	THR
Chimney Swift ³	<i>Chaetura pelagica</i>	THR	THR
Eastern Meadowlark ⁴	<i>Sturnella magna</i>	THR	THR
Butler's Gartersnake ^{3,5}	<i>Thamnophis butleri</i>	END	END
Massasauga (Carolinian Population) ⁶	<i>Sistrurus catenatus</i>	END	END

Notes:

¹COSEWIC 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:

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.

²ESA 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.

³Record obtained through MECP Correspondence (2021)

⁴Record obtained from the OBBA (BSC et al., 2006).

⁵Record obtained from the ORAA (Ontario Nature, 2019).

⁶Record obtained from the NHIC database (2020).

Species listed as endangered or threatened on the Species at Risk in Ontario (SARO) List are protected by the Endangered Species Act, 2007. The Act provides protection for both the individuals and their habitat. The record for Massasauga (Carolinian Population) outlined in **Table 6** occurred in 1962 and is therefore considered historical; it is unlikely that this species persists within the vicinity of the PSA. Although the historical range was much larger, Massasaugas (Carolinian Population) can now only be found at the Ojibway Prairie in Windsor/LaSalle and at Wainfleet Bog near Port Colborne (COSEWIC, 2012). Although bat SAR ranges include the Study Areas for TC8 and TL8 (BCI, 2020), no treed ecosites were present within the Study Areas.

Two site visits were conducted in November 2020 and March 2021 to characterize any suitable SAR habitat within the vicinity (120 m) of TC8 and TL8 for the species listed in **Table 6**. The Study Areas for TC8 and TL8 were both actively managed agricultural fields consisting of row crops. The Study Area for TC8 also includes a small 2 m buffer between agricultural fields that consisted of weedy species (e.g., Teasel; *Dipsacus fullonum*). Based on the field investigations, no suitable habitat was identified for the SAR outlined in **Table 6** as described above.

Bank Swallow

No suitable stream banks or vertical faces with exposed soils are present within the Study Areas for TC8 and TL8.

Barn Swallow

No suitable nesting structures (e.g., barns, culverts, bridges) were identified within the Study Areas for TC8 and TL8.

Bobolink and Eastern Meadowlark

No suitable grassland habitat, hayfields, or pastures were identified within the Study Areas for TC8 and TL8. Agricultural fields within the Study Areas consisted of row crops and are actively managed. Agricultural land-use was assessed based on existing field conditions but may require yearly confirmation as crops may be rotated annually.

Chimney Swift

No suitable nesting structures (e.g., open cap chimneys) were identified within the Study Areas for TC8 and TL8.

Butler's Gartersnake

No suitable fallow fields, dense grasslands, or open habitats were present within the Study Areas for TC8 and TL8. Further, no habitat within the Study Areas provided connectivity or movement corridors for Butler's gartersnake between suitable habitat. No suitable hibernation sites, including terrestrial crayfish chimneys, were identified within the Study Areas for TC8 and TL8.

3.2.3.1 Mitigation Measures

Although no suitable SAR habitat was identified within the Study Areas for TC8 and TL8, additional mitigation measures have been outlined in **Table 7**.

Table 7: Potential effects and proposed mitigation measures for Species at Risk Habitat.

Potential Effect	Proposed Mitigation Measures
Impacts to Bird SAR (Bank Swallow, Barn Swallow, Bobolink, Chimney Swift, and Eastern Meadowlark)	<ul style="list-style-type: none"> Construction is occurring on land used for agricultural purposes so minimal vegetation removal will occur. Where vegetation is present and needs to be removed, it will occur outside of the bird nesting period (April 1st to August 30th) to avoid incidental take.
Impacts to SAR individuals during construction	<ul style="list-style-type: none"> Fact sheets will be provided and readily available to all construction personnel to outline species and habitat identification for potentially occurring SAR including Bobolink, Eastern Meadowlark, and Butler's Gartersnake. Site speed limits will be followed and construction equipment / vehicles must yield the right of way to wildlife. The construction footprint will be clearly delineated, and wildlife exclusion fencing will be implemented to prevent wildlife (specifically reptile SAR) from entering.

3.3 Socio-Economic Features

3.3.1 Utility Corridors and Facilities

The Petrolia Line Right of Way (ROW) and Courtright Line ROW may contain some public utilities (i.e., water, sewer, hydro telephone). It should be noted that the proposed permanent access road to TL8 crosses under hydro transmission lines.

Potential environmental effects on utilities during construction of the Project include:

- utility service disruptions; and
- decreases in infrastructure integrity.

Construction activities could affect the operation of existing underground and overhead utilities resulting in disruptions to a number of utilities to local residents. It is important to implement the mitigation measures outlined in **Table 8** to minimize any effects.

3.3.1.1 Mitigation Measures

Although no impacts to existing infrastructure is anticipated, **Table 8** identifies best practice guidelines Enbridge Gas employs to mitigate potential effects.

Table 8: Potential Effects and Proposed Mitigation on Infrastructure

Potential Effect	Proposed Mitigation Measures
Utility service disruptions and/or decreases in infrastructure integrity	<ul style="list-style-type: none"> Prior to construction, consultation with municipalities and all local utility companies should occur to determine the exact location of all utilities in the area of construction activities. Heavy construction machinery should cross underground utilities to the least extent possible, and machine operators should be advised of the location of all underground utilities prior to commencing with construction activities.

3.3.2 Archaeological Resources

A Stage 1 archaeological assessment was conducted to meet the requirements of the MHSTCI's *Standards and Guidelines for Consultant Archaeologists* in accordance with the *Ontario Heritage Act*, R.S.O. 1990, c. 0.18. The

Stage 1 background study identified known archaeological sites, areas subject to previous assessments and evaluated the potential for archaeological resources to be present on undisturbed land according to provincial criteria.

A Stage 1 archaeological assessment report was written and submitted to the Ontario MHSTCI for review and acceptance into the register of archaeological reports. This document provides the results of the background study, property inspection and evaluation of archaeological potential. The report concluded with a recommendation of a Stage 2 archaeological assessment and advised of the appropriate Stage 2 assessment strategy as well as indicated what areas are cleared of archaeological concerns.

The subsequent Stage 2 archaeological assessment is currently ongoing. The fieldwork has been completed for the proposed work at TL8 and TC8 to meet the requirements of the MHSTCI's *Standards and Guidelines for Consultant Archaeologists* in accordance with the *Ontario Heritage Act*, R.S.O. 1990, c. 0.18. The Stage 2 field investigation consisted of the physical inspection of the land to be impacted by the development that was identified in the Stage 1 archaeological assessment as having potential for archaeological resources to be present.

The Stage 2 archaeological assessment report is underway and will be submitted to the MHSTCI for review and acceptance into the Provincial Register of archaeological reports. This report will provide the results of the background study and field investigation and will detail any archaeological resources identified on the property should they exist. The report will conclude with a recommendation on whether additional Stage 3 archaeological assessment is required and will identify which areas are clear of archaeological concerns.

3.3.2.1 Mitigation Measures

The Stage 1 Archaeological Assessment determined that the Project has archaeological potential for the recovery of pre- and post-contact First Nation resources and Euro-Canadian archaeological resources. Enbridge will undertake a Stage 2 Archaeological Assessment of undisturbed areas with archaeological potential that will be directly affected by the Project prior to construction. The Stage 2 Archaeological Assessment will be independently reviewed by MHSTCI. Should any archaeological sites be identified during the Stage 2 fieldwork, further Stage 3 archaeological assessment may be required. Construction activities will not proceed in these areas until they are cleared of archaeological concern and acceptance has been received from the MHSTCI.

3.3.3 Sensitive Social Receptors

Sensitive social receptors are not located within the Study Areas; however, there appears to be four residences within 1 km of TC8 and six residences within 1 km of TL8. During construction, residents may experience temporary disruption in the use and enjoyment of their property. Potential environmental effects during construction of the Project include:

- Temporary increases in noise, dust and air emissions;
- Increased construction traffic volumes; and
- Restricted land access.

The most comment source of noise during construction are associated with the movement of heavy machinery and work equipment.

Given the mitigation measures described below, it is not anticipated that there will be noise related restrictions to construction activity.

A common nuisance from any construction project is fugitive dust generation as a result of movement of soils and movement of heavy machinery.

The delivery of construction materials, equipment and daily movement of construction works in and out of the area is expected to cause slight increases in traffic in the Study Areas. Temporary traffic interruptions during the construction phase may occur should lane closures be required to accommodate delivery of heavy machinery and / or construction materials and supplies.

3.3.3.1 Mitigation Measures

Table 9 identifies potential effects and proposed mitigation on sensitive receptors that might occur during the construction and operation of the Project

Table 9: Potential Effects and Proposed Mitigation on Sensitive Receptors

Potential Effect	Proposed Mitigation Measures
Temporary increases in noise, dust and air emissions	<ul style="list-style-type: none"> ■ The idling of vehicles should be avoided, and vehicles and/or equipment should be turned off when not in use. ■ Apply dust suppressants to unpaved areas, when necessary, as determined by inspection staff. Application frequency and method will vary, but should be determined by site-specific weather conditions, including recent precipitation, temperatures and wind speeds. Input from the construction team may warrant an increased frequency of dust suppression. ■ Implement a speed limit for construction equipment and trucks on construction roads. ■ Where possible, construction activities will follow applicable noise by-laws. In the event that construction activities may cause excessive noise, consultation with St. Clair Township is recommended. ■ During construction, practices to reduce and limit air emissions should include: <ul style="list-style-type: none"> – Maintaining equipment in compliance with regulatory requirements. – Protecting stockpiles of friable material with barriers and/or widescreens during dry conditions and covering friable material during transportation. – Dust suppression of source areas.
Social effects (i.e., impairment of the use and enjoyment of property)	<ul style="list-style-type: none"> ■ Contact information for a designated Enbridge representative will be made available prior to and throughout construction activities in order to address any questions or concerns.

4. Cumulative Effects

The following section considers the cumulative effects of construction on the lands due to the Project. The definition of cumulative effects used in this report is: “changes to the environment that are likely to result from a particular project in combination with other projects or activities that have been or will be carried out”.

It is expected that the Project will result in both minor positive and negative cumulative effects. There may be cumulative effects between this Project and other projects in the area, although Enbridge Gas is unaware of any projects that would interact with this proposal.

Additional noise, dust, and traffic could be an issue should construction occur concurrently with a separate project; however, the benefits of the new wells will be a positive effect in the long-term as it is being constructed to maintain continued safe and reliable delivery of natural gas to existing and future customers.

5. Conclusion and Recommendations

This ER provides a strategy for the protection of the environment during the Corunna (TC8) and Ladysmith (TL8) A-1 Observation Well Drilling Project. This ER has been developed to identify the features of the physical, natural and socio-economic environment within the Study Areas and to identify potential impacts from construction. The ER also recommends mitigation measures, where applicable, intended to alleviate the effects of the anticipated Project related impacts.

Enbridge Gas's complaint tracking system will also be implemented for this Project. This process ensures that landowners and tenants have access to Enbridge Gas personnel to address any concerns that may arise during construction.

With the implementation of the recommendations in this ER, ongoing landowner communication, and adherence to permit / regulatory requirements, the proposed Project will be constructed in a manner that protects the environment and mitigates potential effects.

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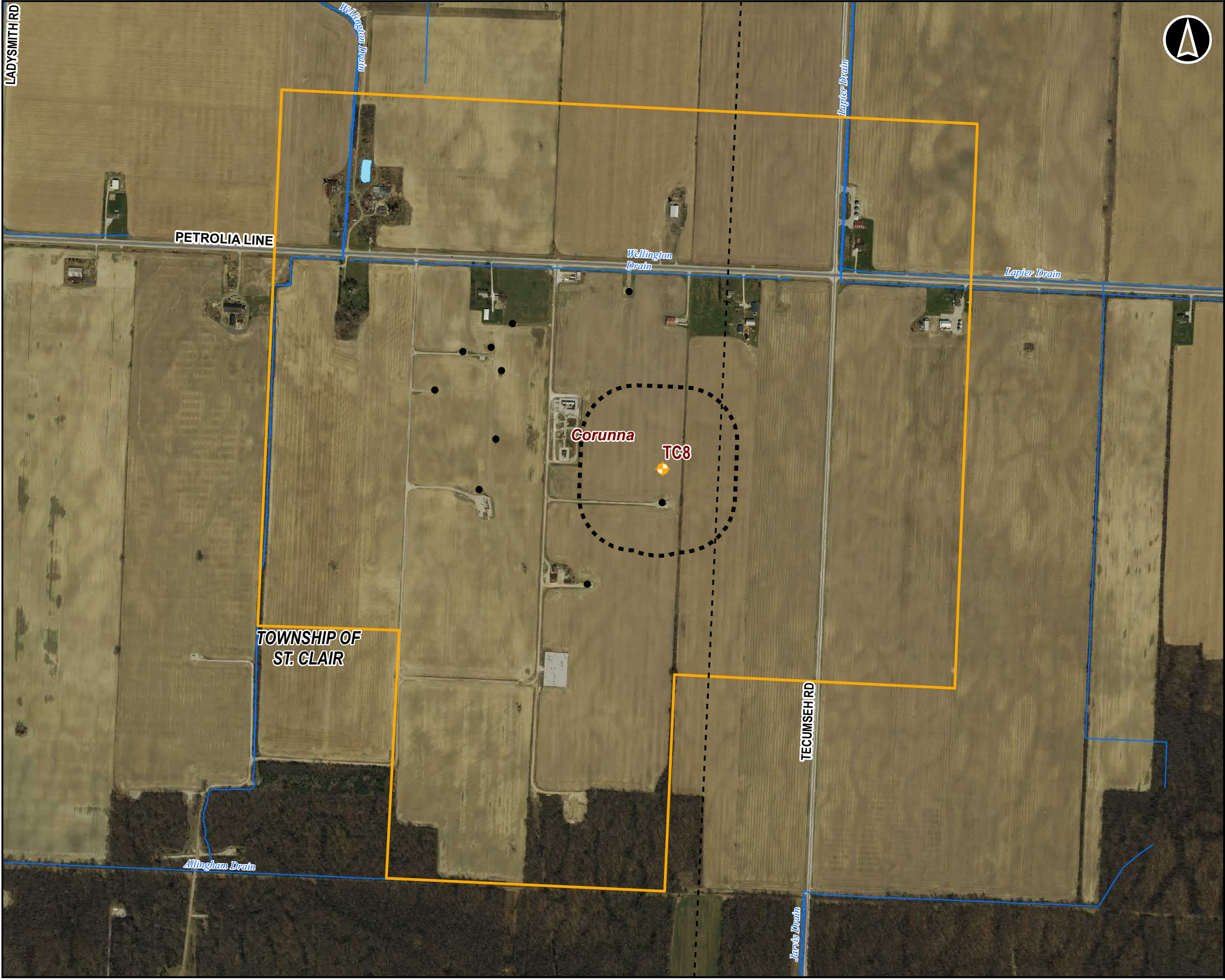
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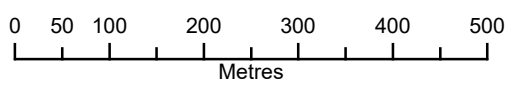
Appendix **A**

Figures



Legend

- Existing Gas Well
- Proposed New Gas Well
- Existing Gas Pipeline
- Watercourse
- Major Road
- Local Road
- Storage Pool Area
- Study Area
- Municipal Boundary



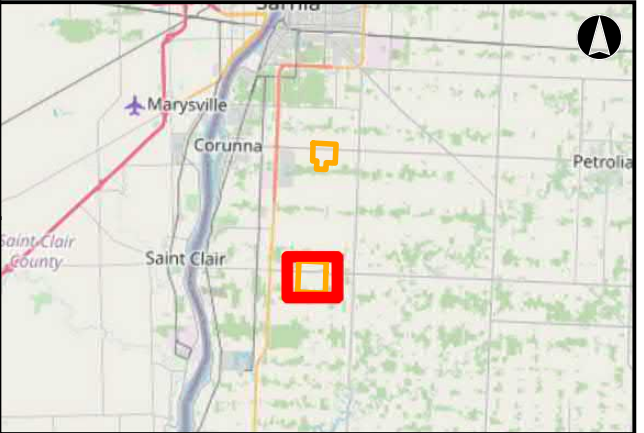
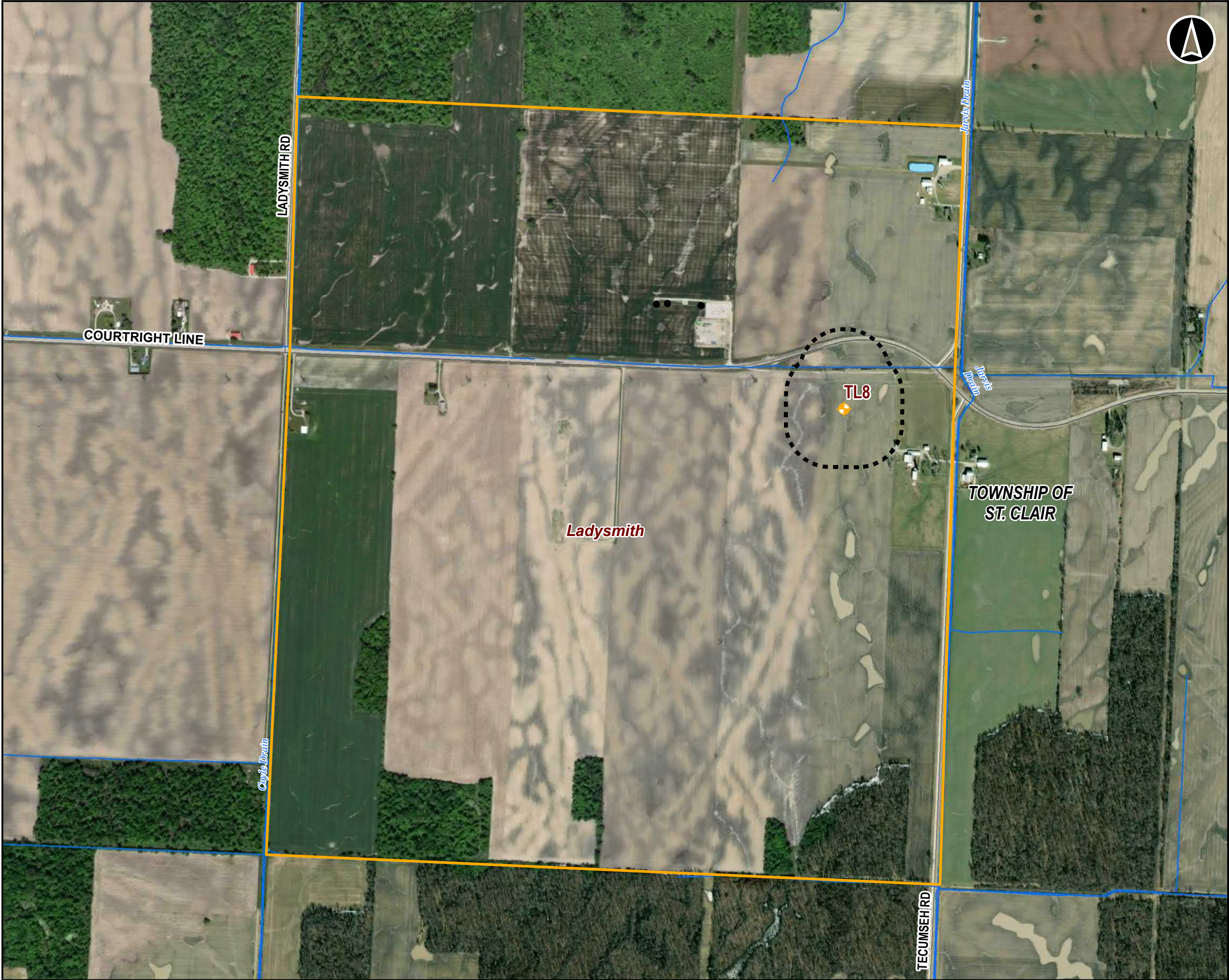
Corunna and Ladysmith A-1 Observation Well Drilling Project

Corunna Designated Storage Pool

May, 2021	1:8,000	Datum: NAD 1983 UTM Zone 17N Source: MNR, SWOOP 2015
P#: 60633149		* when printed 11"x17"

Figure A-1

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Legend

- Existing Gas Well
- Proposed New Gas Well
- Watercourse
- Major Road
- Local Road
- Storage Pool Area
- Study Area
- Municipal Boundary

Corunna and Ladysmith A-1 Observation Well Drilling Project

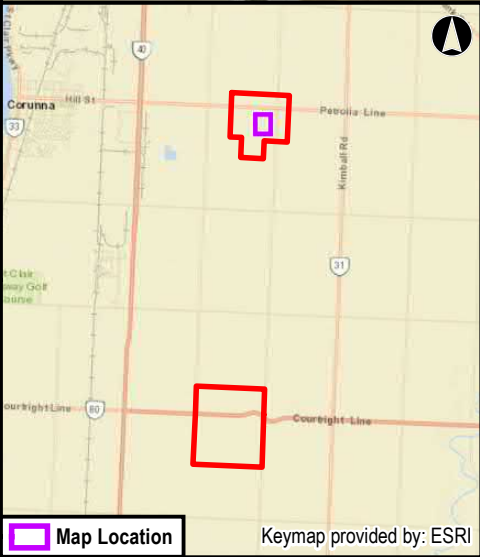
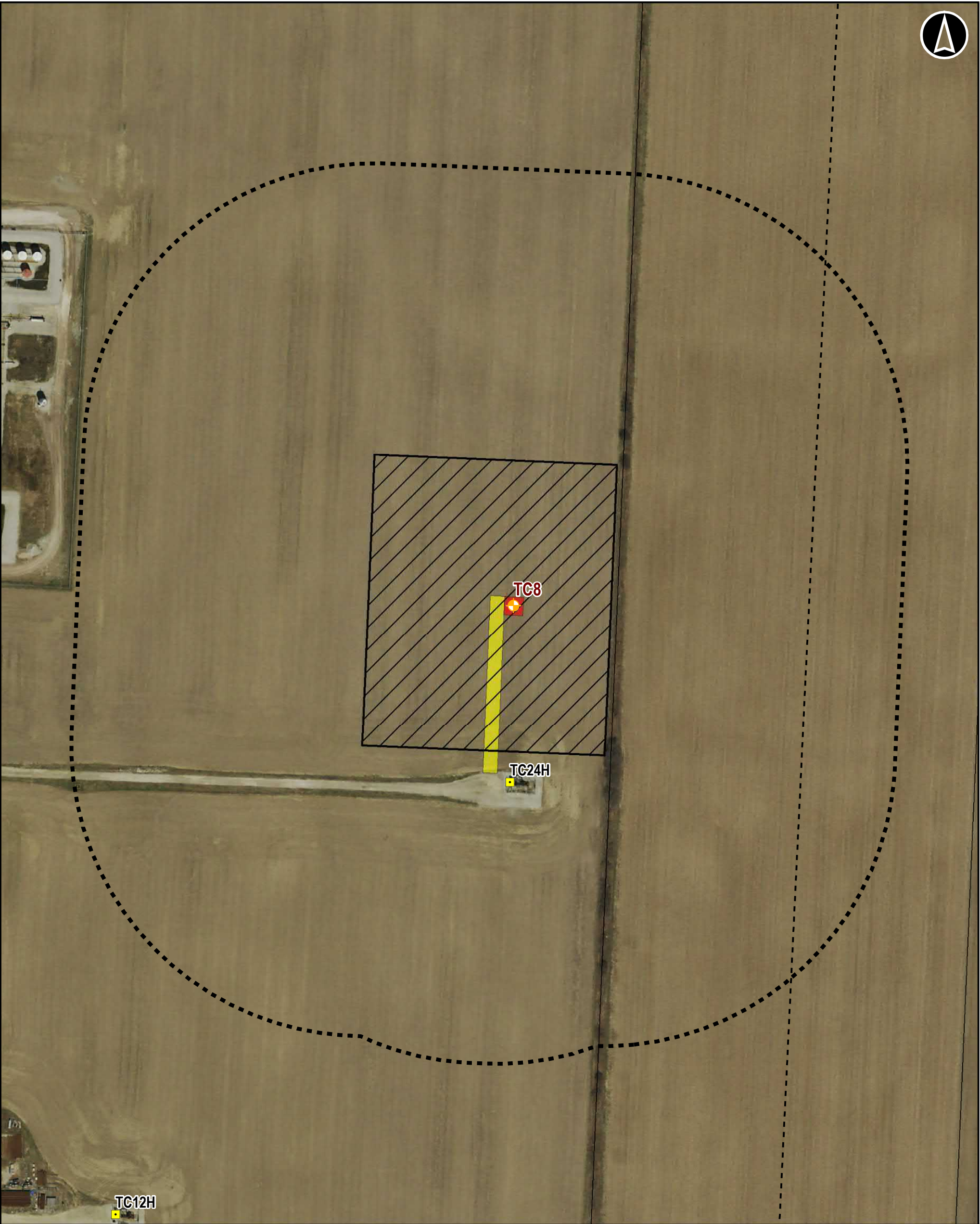
Ladysmith Designated Storage Pool

May, 2021	1:10,000 <small>* when printed 11"x17"</small>	Datum: NAD 1983 UTM Zone 17N Source: MNRF
P#: 60633149		Figure A-2

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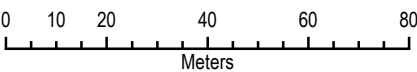
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- Legend**
- Proposed New Gas Well
 - Existing Oil Wells Pressure Testing
 - Existing Gas Pipeline
 - Property Boundary
 - Study Area
 - Permanent Pad 60m²
 - Proposed 6.0m Access Laneway
 - Temporary Pad

**Corunna and Ladysmith A-1
Observation Well Drilling**

TC8 Site Location

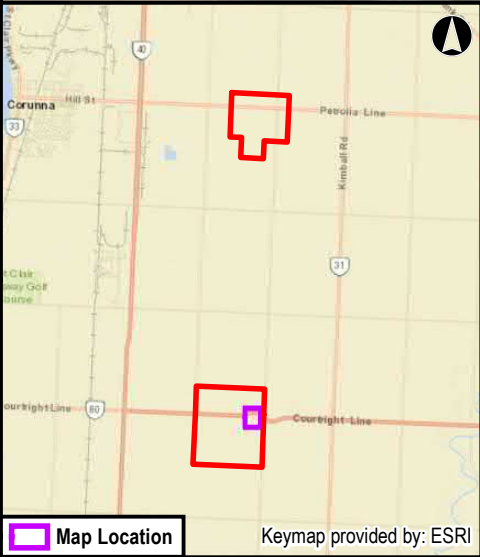
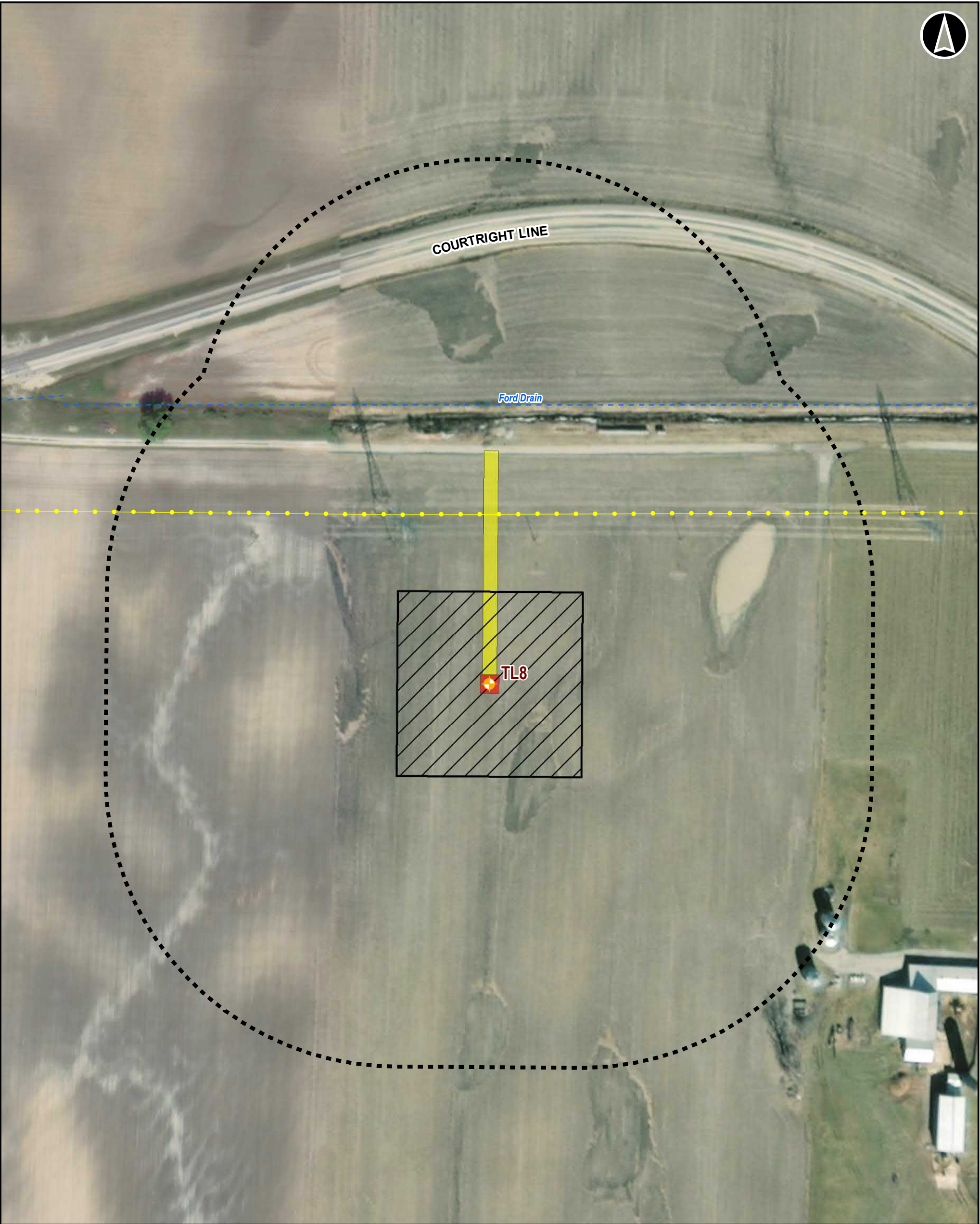


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P#:60633149	REV: 00	

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Figure A-3

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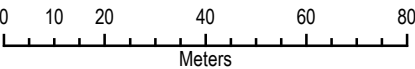


Legend

- Proposed New Well
- Hydro Line
- Constructed Drain
- Study Area
- Permanent Pad 60m²
- Proposed 6.0m Access Laneway
- Temporary Pad

**Corunna and Ladysmith A-1
Observation Well Drilling**

TL8 Site Location



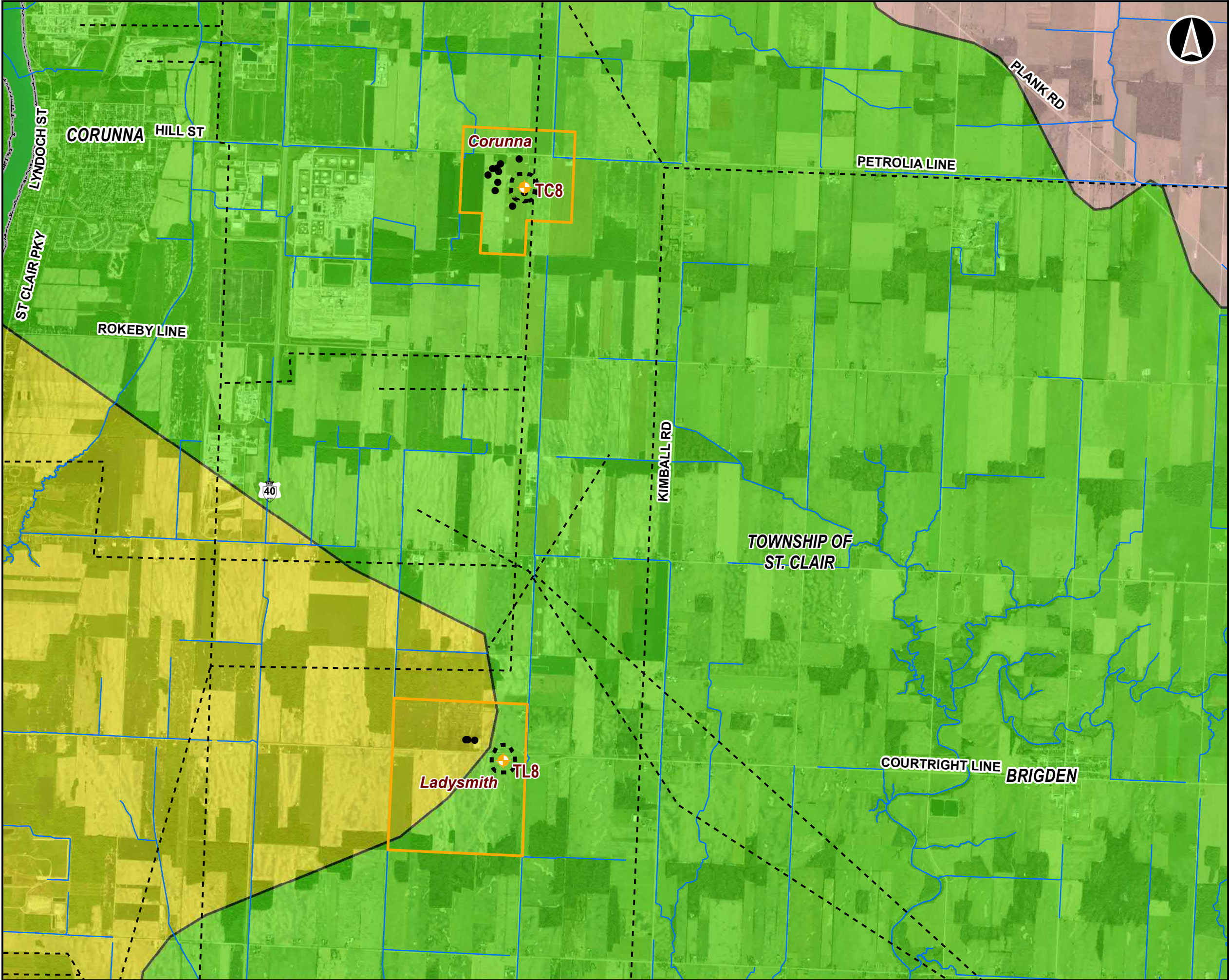
Datum: NAD 1983 UTM Zone 17N

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P#:60633149	REV: 00	

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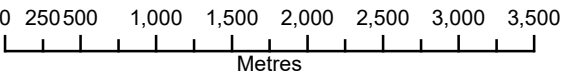


Legend

- Existing Gas Well
- ⊕ Proposed New Gas Well
- - - - Existing Gas Pipeline
- Watercourse
- Storage Pool Area
- Study Area
- Municipal Boundary

Bedrock Geology

- 59a: Limestone, dolostone, shale - Hamilton Group
- 60a: Shale - Kettle Point Formation
- 61: Shale - Port Lambton Group



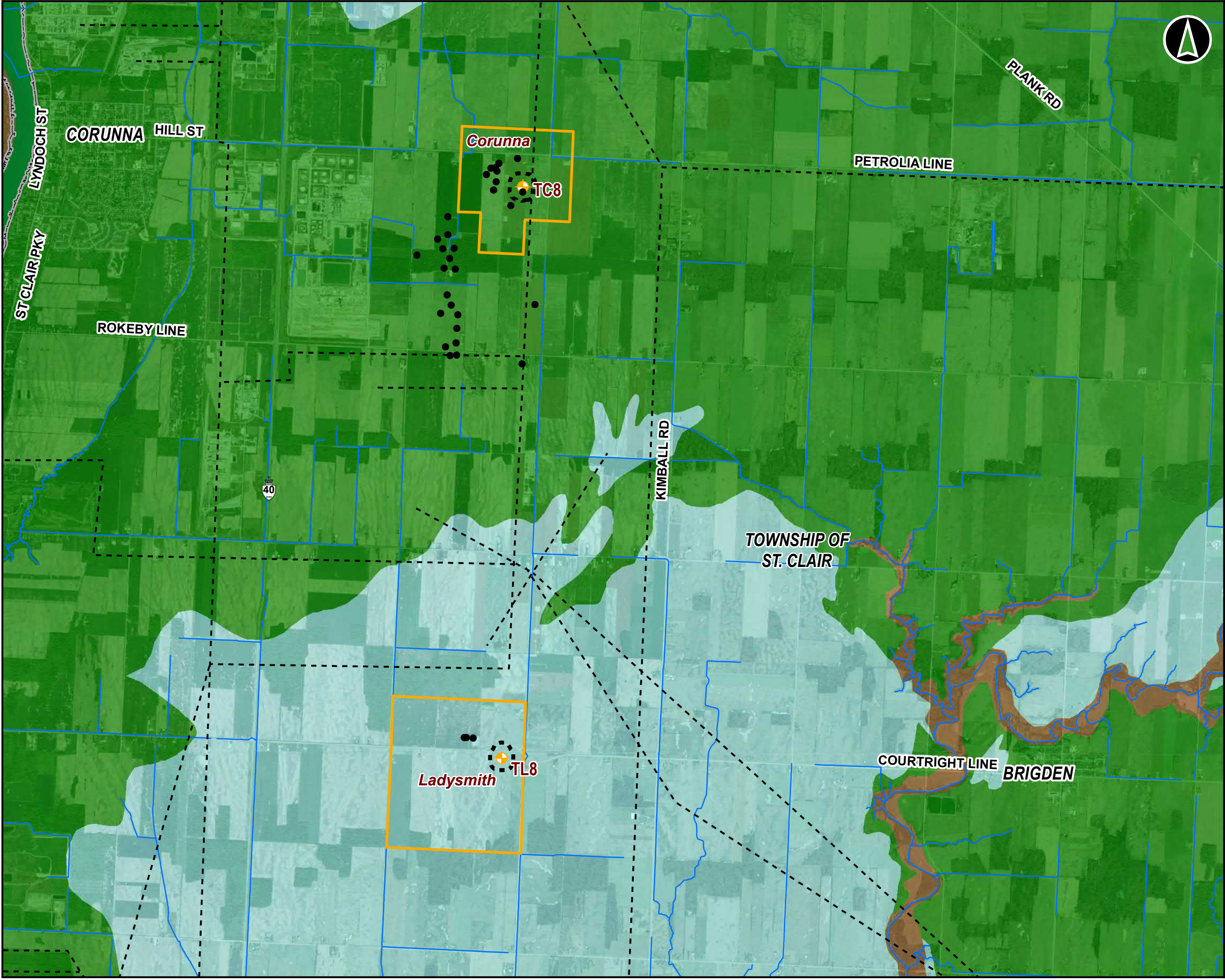
Corunna and Ladysmith A-1 Observation Well Drilling Project

Bedrock Geology

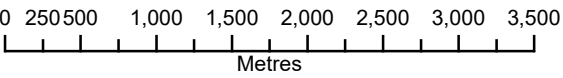
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P#: 60633149		Figure A-5



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- Legend**
- Existing Gas Well
 - ★ Proposed New Gas Well
 - - - Existing Gas Pipeline
 - Watercourse
 - Storage Pool Area
 - Study Area
 - Municipal Boundary
 - 5d: Glaciolacustrine-derived silty to clayey till
 - 8a: Massive-well laminated
 - 12: Older alluvial deposits
 - 19: Modern alluvial deposits



Corunna and Ladysmith A-1 Observation Well Drilling Project

Surficial Geology

May, 2021	1:50,000 <small>* when printed 11"x17"</small>	Datum: NAD 1983 UTM Zone 17N Source: MNR, MNDM (MRD128)
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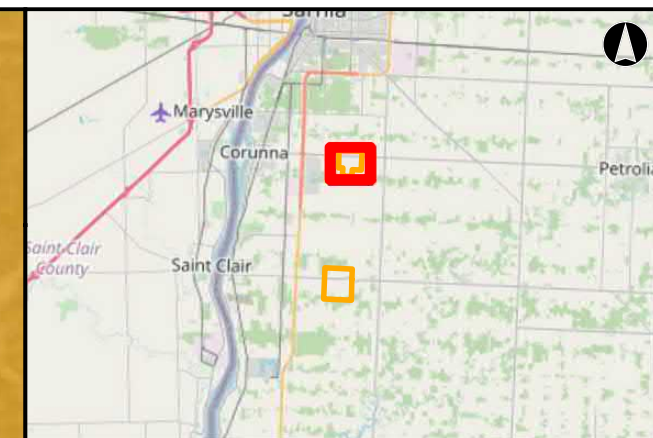
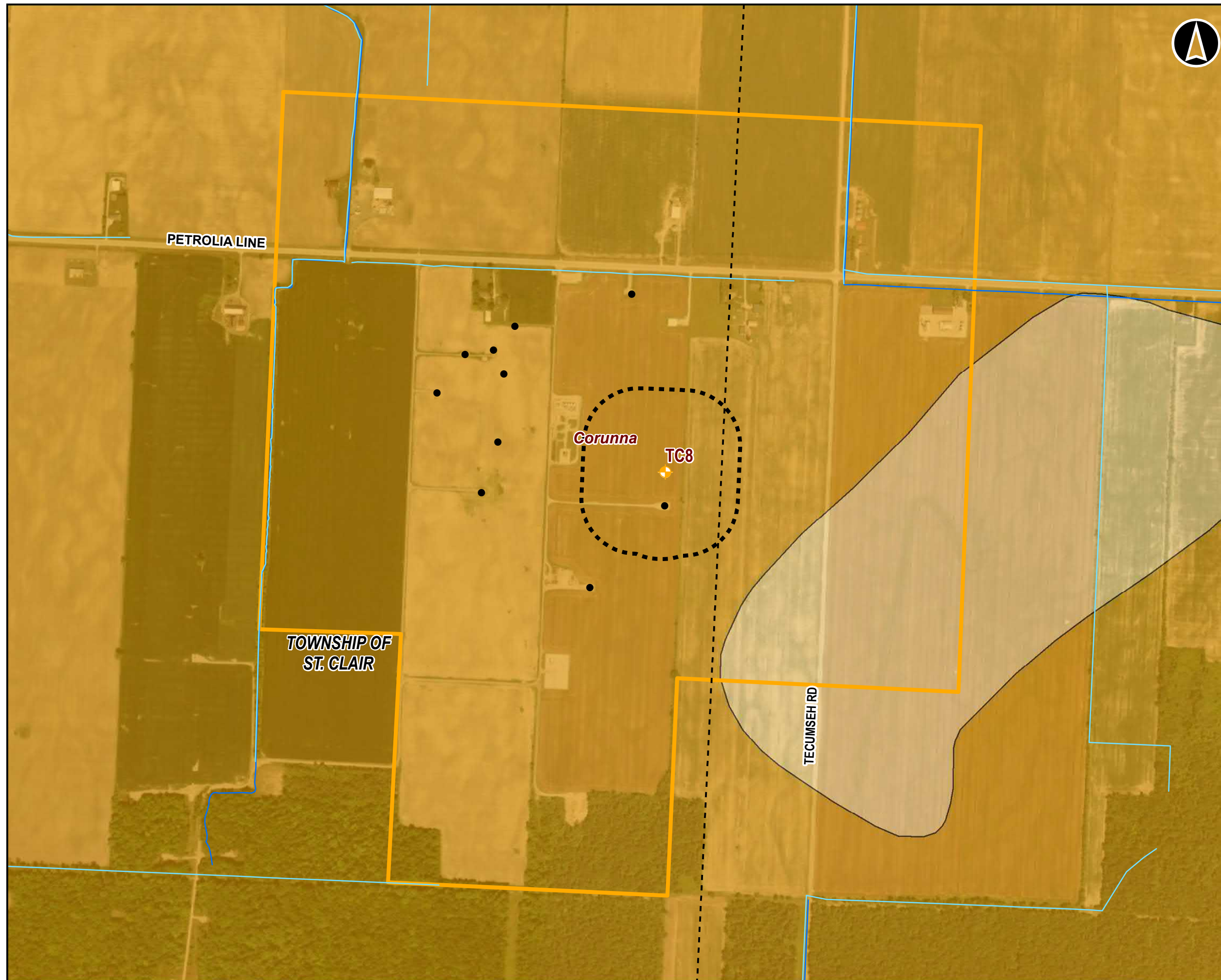
P#: 60633149

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Figure A-7

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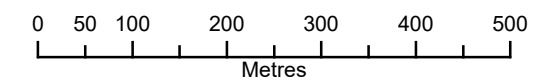


Legend

- Existing Gas Well
- ✚ Proposed New Gas Well
- - - Existing Gas Pipeline
- Watercourse
- Constructed Drain
- Storage Pool Area
- Study Area
- Municipal Boundary

Soil Class

-  CLASS 2 - Moderate Limitations
 CLASS 3 - Moderately Severe Limitations



Corunna and Ladysmith A-1 Observation Well Drilling Project

TC8 Agricultural Features

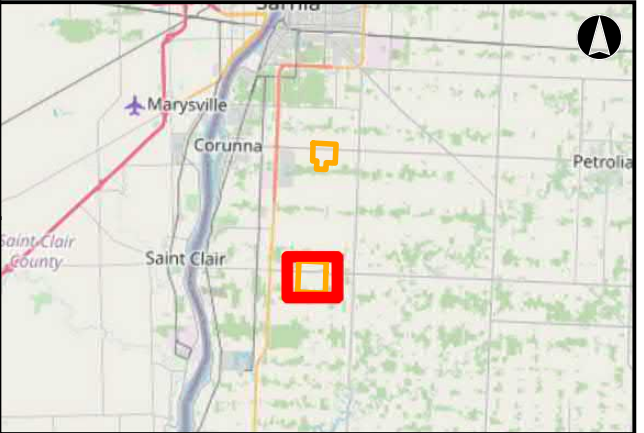
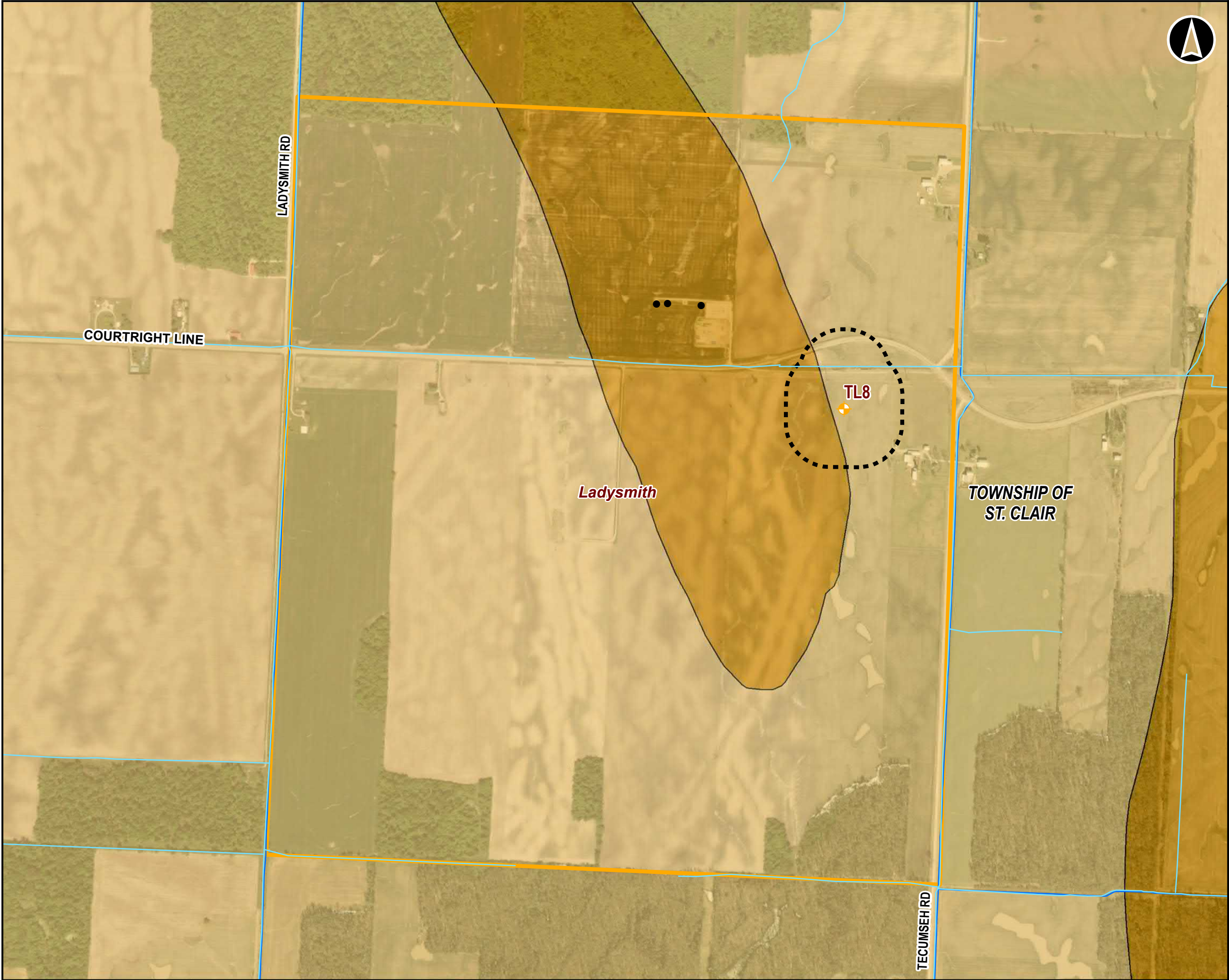
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P#: 60633149

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Figure A-8

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Legend

●

Existing Gas Well

⬮

Proposed New Gas Well

—

Watercourse

—

Constructed Drain

▭

Storage Pool Area

⬮

Study Area

▭

Municipal Boundary

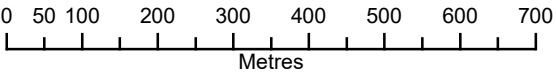
Soil Class

▭

CLASS 2 - Moderate Limitations

▭

CLASS 3 - Moderately Severe Limitations



Corunna and Ladysmith A-1 Observation Well Drilling Project

TL8 Agricultural Features

May, 2021	1:10,000	Datum: NAD 1983 UTM Zone 17N Source: MNRF
P#: 60633149	* when printed 11"x17"	

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Figure A-9

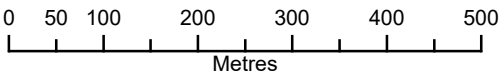
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Legend

- Environmental Activity and Sector Registrations (2020)
- Permit to Take Water (MECP, 2020)
- Water Well Record (MECP, 2020)
- Existing Gas Well
- Proposed New Gas Well
- Existing Gas Pipeline
- Watercourse
- Constructed Drain
- Storage Pool Area
- Study Area
- Municipal Boundary



Corunna and Ladysmith A-1 Observation Well Drilling Project

TC8 MECP Well Water Records

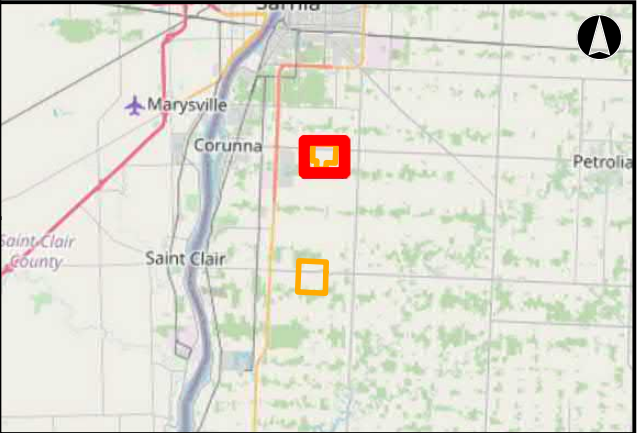
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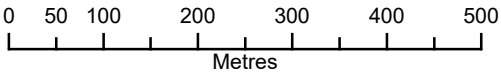
Figure A-10

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- Legend**
- Existing Gas Well
 - ✦ Proposed New Gas Well
 - - - Existing Gas Pipeline
 - Watercourse
 - Constructed Drain
 - Storage Pool Area
 - Study Area
 - Municipal Boundary
 - Wooded Area
 - Potentially Significant Woodlands
 - SCRCA Regulated Areas



Corunna and Ladysmith A-1 Observation Well Drilling Project

TC8 Natural Environment Features

May, 2021 1:8,000 Datum: NAD 1983 UTM Zone 17N
Source: MNRF, Upper Thames Conservation Authority

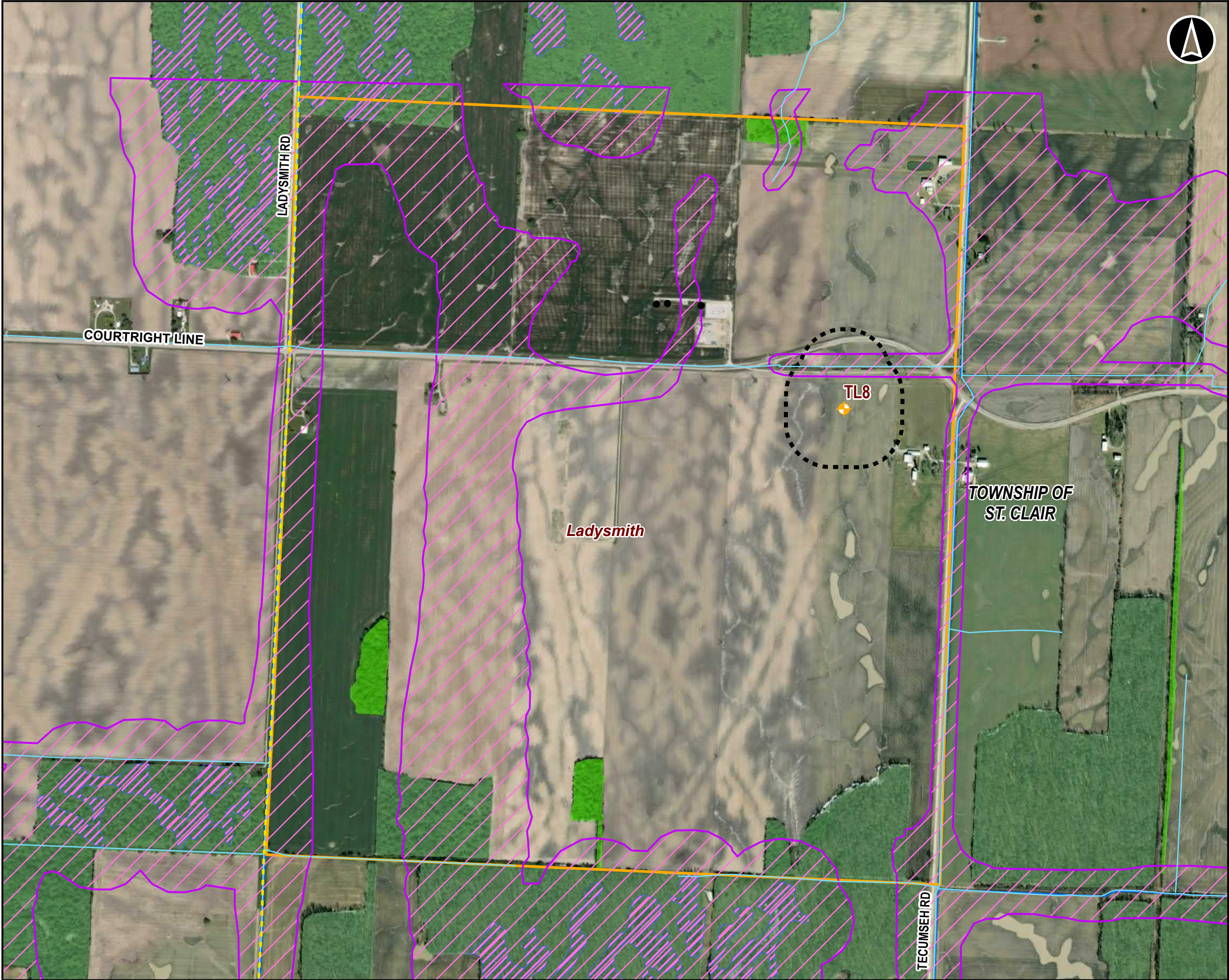
P#: 60633149



Figure A-12

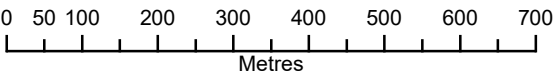
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Legend

- Existing Gas Well
- Proposed New Gas Well
- Watercourse
- Constructed Drain
- Silver Lamprey (SC) Habitat
- Storage Pool Area
- Study Area
- Municipal Boundary
- Wetland, Provincially Significant
- Wooded Area
- Potentially Significant Woodlands
- SCRCA Regulated Areas



Corunna and Ladysmith A-1 Observation Well Drilling Project

TL8 Natural Environment Features

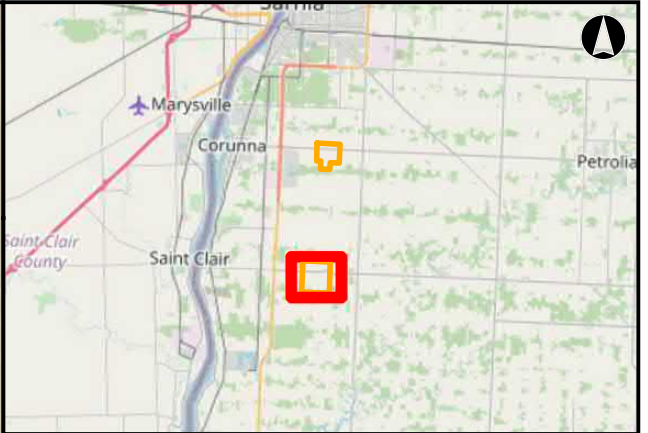
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P#: 60633149

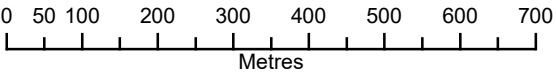
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Figure A-13

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- Legend**
- Building
 - Existing Gas Well
 - ⬮ Proposed New Gas Well
 - Hydro Line
 - ▭ Storage Pool Area
 - ⋯ Study Area
 - ▭ Municipal Boundary



Corunna and Ladysmith A-1 Observation Well Drilling Project

TL8 Socio-Economic Features

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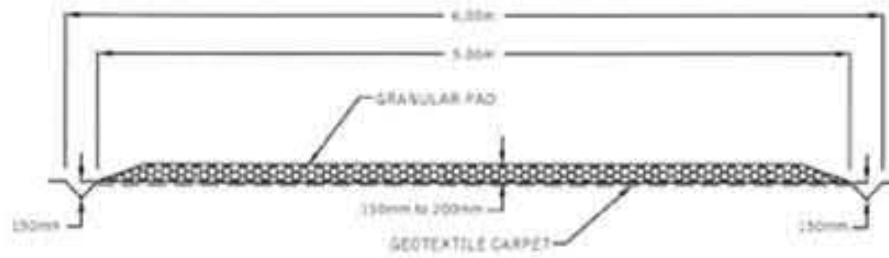
AECOM

Figure A-15

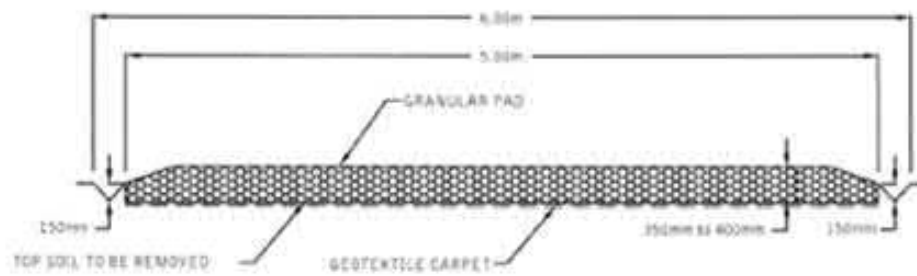
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Appendix **B**

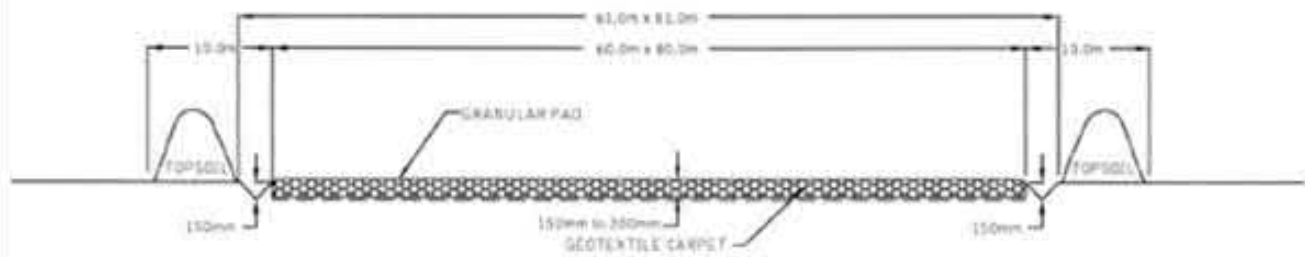
Typical Drawings



TYPICAL TEMPORARY ACCESS ROAD



TYPICAL PERMANENT ACCESS ROAD

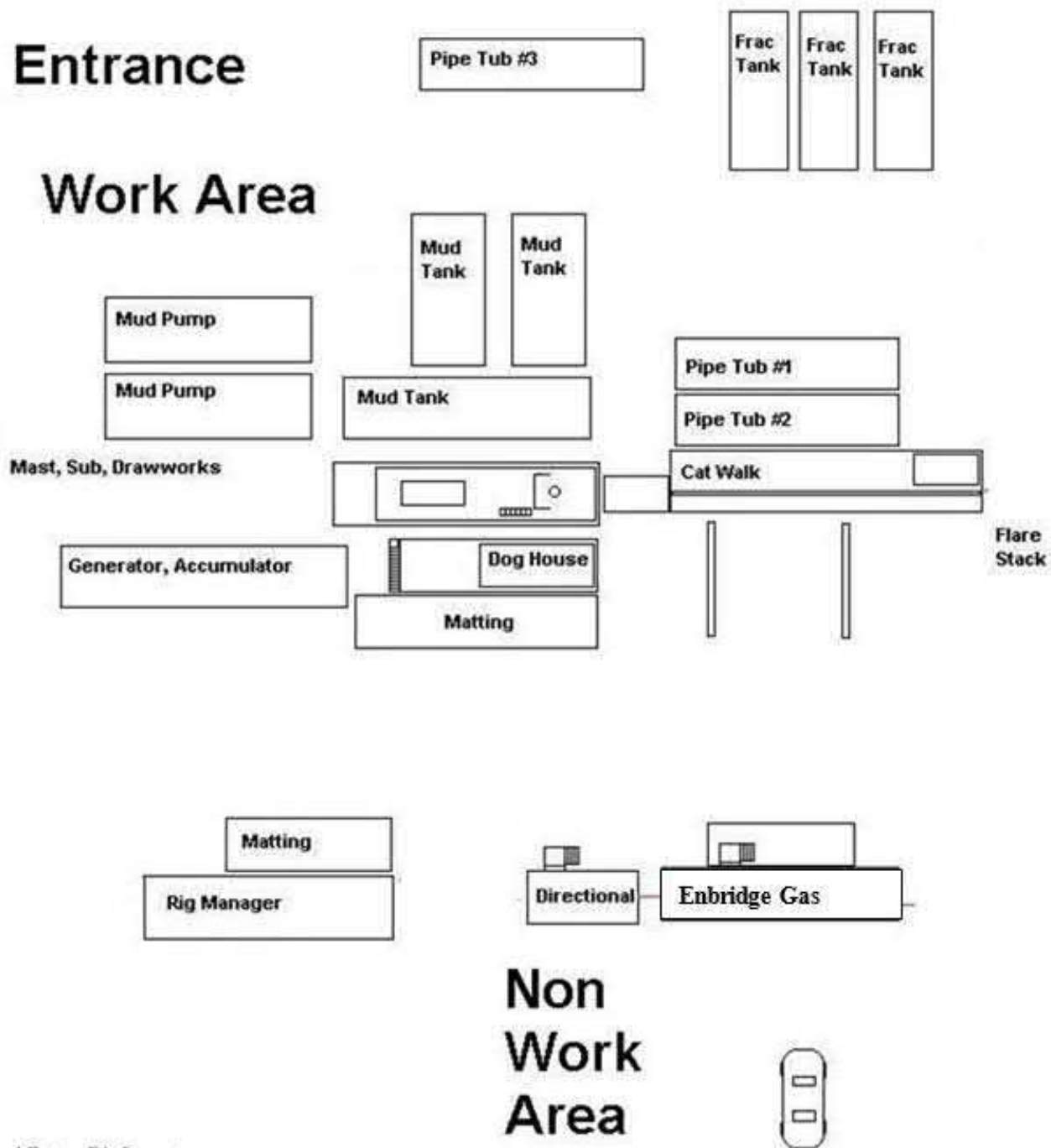


TYPICAL WELL DRILLING WORK AREA

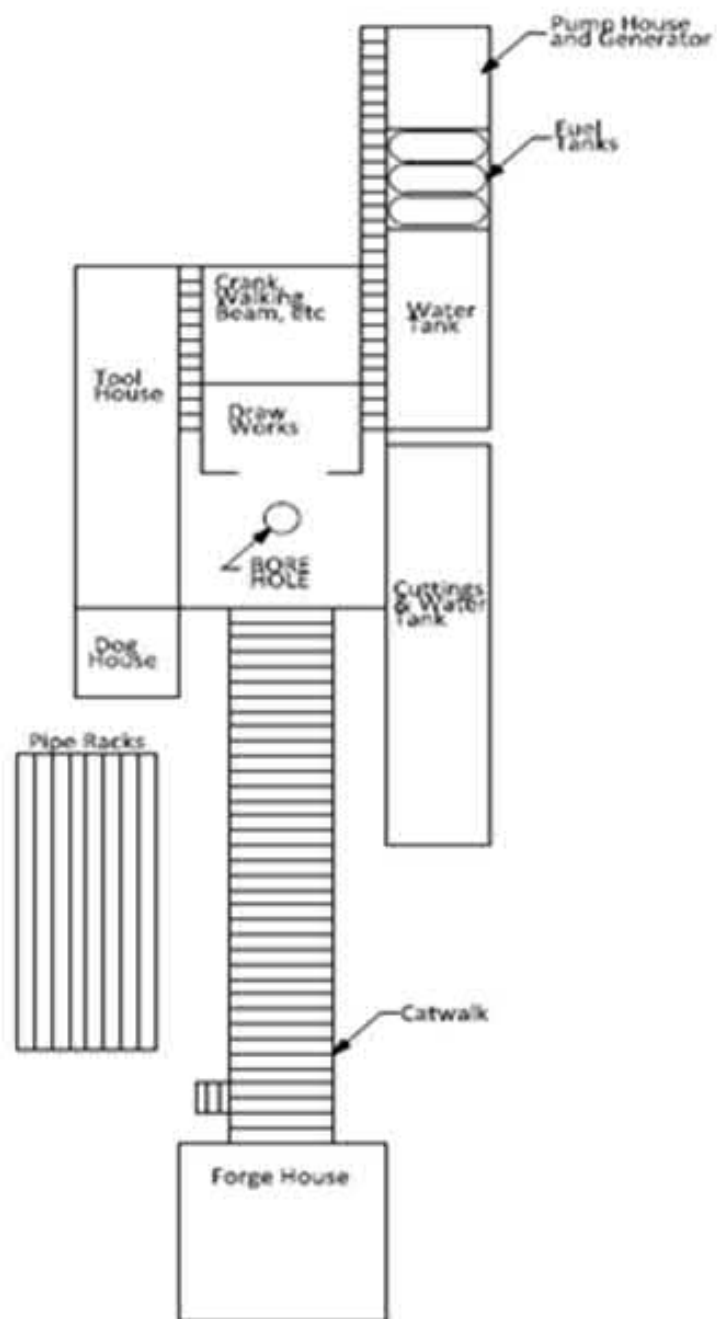
Typical Access Road and Drilling Pad Detail

Entrance

Work Area



Typical Rotary Rig Layout



Typical Cable Tool Rig Layout



Enbridge Gas Inc.

Stage 1 Archaeological Assessment 2021/2022 Storage Enhancement Project

**Part of Lots 19-21, Concessions 4-5, and Lots 18-22,
Concessions 7-11, Geographic Township of Moore,
Now Township of St. Clair, Lambton County, Ontario**

Prepared by:

AECOM

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London, ON, Canada N6A 6K2
www.aecom.com

519 673 0510 tel
519 673 5975 fax

Licensee: Samantha Markham, MES

License: P438

PIF Number: P438-0224-2020

April 16, 2021
Revised Report

Project Number: 60633149

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# Hard Copies	PDF Required	Association / Company Name
0	Yes	Enbridge Gas Inc.
0	Yes	Ministry of Heritage, Sport, Tourism and Culture Industries
0	Yes	AECOM Canada Ltd.

Revision History

Revision #	Date	Revised By:	Revision Description
0	Sept 25, 2020	S. Markham	Initial submission to MHSTCI
1	April 16, 2021	K. Nadal	Address revisions requested by MHSTCI

Statement of Qualifications and Limitations

The attached Report (the "Report") has been prepared by AECOM Canada Ltd. ("AECOM") for the benefit of the Client ("Client") in accordance with the agreement between AECOM and Client, including the scope of work detailed therein (the "Agreement").

The information, data, recommendations and conclusions contained in the Report (collectively, the "Information"):

- is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the "Limitations");
- represents AECOM's professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to AECOM which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
- in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time.

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Quality Information

Report Prepared By:



Kristen Nadal
Junior Archaeologist



Samantha Markham, MES
Professional Archaeologist

Report Reviewed By:



Adria Grant, MA, CAHP
Ontario Department Manager
Impact Assessment and Permitting (IAP)

Executive Summary

AECOM Canada Ltd. (AECOM) was retained by Enbridge Gas Inc. to conduct a Stage 1 archaeological assessment for the proposed 2021/2022 Storage Enhancement Project in Lambton County, Ontario, in advance of the proposed development of a natural gas pipeline, as well as accompanying storage enhancement works. The study area consists an area approximately 1,063.47 hectares (ha) in size and is located within multiple lots and concessions in the Geographic Township of Moore, Lambton County, Ontario.

This Stage 1 archaeological assessment was triggered by the requirements of the Ontario Energy Board's (OEB) *Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario* and conducted in accordance with Chapter 4, subsection 4.3.4 prior to implementation of the project (Ontario Energy Board 2016). This project is also subject to the *Ontario Heritage Act* (Government of Ontario 1990) and the *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011).

AECOM's Stage 1 background study for the 2021/2022 Storage Enhancement Project area has determined that the potential for the recovery of both First Nation and Euro-Canadian archaeological resources within the current study area is high. Based on these findings, **Stage 2 archaeological assessment is recommended for all areas identified to have archaeological potential in Figure 6 within the study area limits.**

The Stage 2 archaeological assessment must be conducted by a licensed archaeologist and must follow the requirements set out in the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011), including:

- The standard test pit survey method at 5 m intervals is to be conducted in all areas that will be impacted by the project where ploughing is not feasible (e.g. woodlots, overgrown areas, manicured lawns, small sections of agricultural land); and
- Pedestrian survey at 5 m intervals where ploughing is possible (e.g. agricultural fields). This assessment will occur when agricultural fields have been recently ploughed, weathered by rain, and exhibit at least 80% surface visibility.
- Poorly drained areas, areas of steep slope, and areas of confirmed previous disturbance (e.g. building footprints, roadways, areas with identifiable underground infrastructure) identified during the Stage 2 assessment are to be mapped and photo-documented but are not recommended for Stage 2 survey as they possess low to no archaeological potential (Section 2.1, Standard 2a and 2b).

Should additional land outside of the current study area boundaries be included as part of the 2021/2022 Storage Enhancement Project, the standard requirements for archaeological assessments to be conducted prior to land disturbance remain in place.

It is pertinent to note that the 2021/2022 Storage Enhancement Project study area evaluated in this report includes additional land that may not be impacted by the project. A large area was assessed as part of this Stage 1 archaeological assessment in order to accommodate areas of possible infrastructure improvements. Once the area of project impacts has been determined, only the land that will be impacted by this project will require Stage 2 archaeological assessment.

There are three registered archaeological sites located within the current study area limits, AfHo-49, AeHo-19 and AeHo-20. Once the land to be impacted by infrastructure improvements has been identified, should proposed construction activities impact any of the archaeological sites, further archaeological assessment must be completed prior to ground disturbing activities.

Archaeological site AfHo-49 was determined to retain cultural heritage value or interest and requires Stage 3 archaeological assessment following the requirements set out in Section 3.2 and Table 3.1 the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011) (Stantec 2012).

While 19th century archaeological sites AeHo-19 and AeHo-20 were identified in 1992 by ARA, the field methods were sufficient to fulfill the requirements set out in the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011). Therefore, further Stage 3 archaeological assessment is required for AeHo-19 and AeHo-20 following the requirements set out in Section 3.2 and Table 3.1 the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011). Given the age of the archaeological reports, it is possible the sites will not be easily relocated. If archaeological sites AeHo-19 and AeHo-20 cannot be successfully relocated, it is recommended that a Stage 2 archaeological assessment be conducted again for the area (see Figure 2 of the Supplementary Documentation) following the requirements set out in Section 2 of the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011).

The MHSTCI is asked to accept this report into the Ontario Public Register of Archaeological Reports thereby concurring with the recommendations presented herein. As further archaeological assessment is required, archaeological concerns for the 2021/2022 Storage Enhancement Project in the Township of Moore, Ontario have not been fully addressed.

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1. Project Context

1.1 Development Context

AECOM Canada Ltd. (AECOM) was retained by Enbridge Gas Inc. to conduct a Stage 1 archaeological assessment for the proposed 2021/2022 Storage Enhancement Project in Lambton County, Ontario, in advance of the proposed development of a natural gas pipeline, as well as accompanying storage enhancement works. The study area consists an area approximately 1,063.47 hectares (ha) in size and is located within multiple lots and concessions in the Geographic Township of Moore, Lambton County, Ontario.

This Stage 1 archaeological assessment was triggered by the requirements of the Ontario Energy Board's (OEB) *Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario* and conducted in accordance with Chapter 4, subsection 4.3.4 prior to implementation of the project (Ontario Energy Board 2016). This project is also subject to the *Ontario Heritage Act* (Government of Ontario 1990) and the *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011).

1.1.1 Objectives

The objective of the Stage 1 background study is to document the archaeological and land use history and present conditions within the study area. This information will be used to support recommendations regarding cultural heritage values or interests as well as assessment and mitigation strategies. The results of Stage 1 archaeological assessment presented in this report are drawn in part from:

- Recent and historical maps of the study area;
- Reports of previous archaeological assessments within 50 m of the study area;
- The Ministry of Heritage, Sport, Tourism and Culture Industries' (MHSTCI) Archaeological Sites Database (ASDB) for a listing of registered archaeological sites within a 1 km radius of the study area;
- Archaeological management plans or other archaeological potential mapping, where available.

The Stage 1 archaeological assessment has been conducted to meet the requirements of the MHSTCI *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011).

1.2 Historical Context

Years of archaeological research and assessments in southern Ontario have resulted in a well-developed understanding of the historic use of land in Lambton County from the earliest First Nation people to the more recent Euro-Canadian settlers and farmers. Table 1 provides a breakdown of the cultural and temporal history of past occupations in Lambton County.

Table 1: Cultural Chronology for Lambton County

Archaeological Period	Time Period	Characteristics
Early Paleo	9000-8400 BC	<ul style="list-style-type: none"> Fluted Points Arctic tundra and spruce parkland, caribou hunters
Late Paleo	8400-8000 BC	<ul style="list-style-type: none"> Holcombe, Hi-Lo and Lanceolate Points Slight reduction in territory size
Early Archaic	8000-6000 BC	<ul style="list-style-type: none"> Notched and Bifurcate base Points Growing populations
Middle Archaic	6000-2500 BC	<ul style="list-style-type: none"> Stemmed and Brewerton Points, Laurentian Development Increasing regionalization
Late Archaic	2000-1800 BC	<ul style="list-style-type: none"> Narrow Point Environment similar to present
	1800-1500 BC	<ul style="list-style-type: none"> Broad Point Large lithic tools
	1500-1100 BC	<ul style="list-style-type: none"> Small Point Introduction of bow
Terminal Archaic	1100-950 BC	<ul style="list-style-type: none"> Hind Points, Glacial Kame Complex Earliest true cemeteries
Early Woodland	950-400 BC	<ul style="list-style-type: none"> Meadowood Points Introduction of pottery
Middle Woodland	400 BC – AD 500	<ul style="list-style-type: none"> Dentate/Pseudo-scallop Ceramics Increased sedentism
	AD 550-900	<ul style="list-style-type: none"> Princess Point Introduction of corn horticulture
Late Woodland	AD 900-1300	<ul style="list-style-type: none"> Agricultural villages
	AD 1300-1400	<ul style="list-style-type: none"> Increased longhouse sizes
	AD 1400-1650	<ul style="list-style-type: none"> Warring nations and displacement
Contact Period	AD 1600-1875	<ul style="list-style-type: none"> Early written records and treaties
Historic	AD 1749-present	<ul style="list-style-type: none"> European settlement (French and English)

Notes: Taken from Ellis and Ferris (1990)

The following sections provide a detailed summary of the archaeological cultures that have settled in the vicinity of the study area. As Chapman and Putnam (1984) illustrate, the modern physiography of southern Ontario is largely a product of events of the last major glacial stage and the landscape is a complex mosaic of features and deposits produced during the last series of glacial retreats and advances prior to the withdrawal of the continental glaciers from the area. Southwestern Ontario was finally ice free by 12,500 years ago. With continuing ice retreat and lake regressions the land area of southern Ontario progressively increased while barriers to the influx of plants, animals, and people steadily diminished (Karrow and Warner 1990). The land within Lambton County has been extensively utilized by pre-contact First Nation people who began occupying southwestern Ontario as the glaciers receded from the land, as early as 11,000 BC.

1.2.1 Pre-Contact First Nation Settlement

The Paleo Period

In this area the first human settlement can be traced back to 11,000 BC; these earliest well-documented groups are referred to as Paleo which literally means old or ancient. During the Paleo period people were non-agriculturalists who depended on hunting and gathering of wild food, they moved their encampments on a regular basis to be in the locations where these resources naturally became available, and the size of the groups occupying any particular location would vary depending on the nature and size of the available food resources (Ellis and Deller 1990). The picture that has emerged for the early and late Paleo is of groups at low population densities who were residentially mobile and made use of large territories during annual cycles of resource exploitation.

The Archaic Period

The next major cultural period following the Paleo is termed the Archaic, which is broken temporally into the Early, Middle, and Late Archaic periods. There is much debate on how the term Archaic is employed; general practice bases the designation off assemblage content as there are marked differences in artifact suites from the preceding Paleo and subsequent Woodland periods. As Ellis *et al.* (1990) note, from an artifact and site characteristic perspective the Archaic is simply used to refer to non-Paleo manifestations that pre-date the introduction of ceramics. Ellis *et al.* (1990) stress that Archaic groups can be distinguished from earlier groups based on site characteristics and artifact content.

Early Archaic sites have been reported throughout much of southwestern Ontario and extend as far north as the Lake Huron Basin region and as far east as Rice Lake (Ellis *et al.* 1986). A lack of excavated assemblages from southern Ontario has limited understandings and inferences regarding the nature of stone tool kits in the Early Archaic and tool forms other than points are poorly known in Ontario; however, at least three major temporal horizons can be recognized and can be distinguished based on projectile point form (Ellis *et al.* 1990). These horizons are referred to as Side-Notched (ca. 8,000-7,700 BC), Corner-Notched (ca. 7,700-6,900 BC), and Bifurcated (ca. 6,900-6,000 BC) (Ellis *et al.* 1990). Additional details on each of these horizons and the temporal changes to tool types can be found in Ellis *et al.* (1990).

The Middle Archaic period (6,000-2,500 BC), like the Early Archaic, is relatively unknown in southern Ontario. Ellis *et al.* (1990) suggest that artifact traits that have come to be considered as characteristic of the Archaic period as a whole, first appear in the Middle Archaic. These traits include fully ground and polished stone tools, specific tool types including banner stones and net-sinkers, and the use of local and/or non-chert type materials for lithic tool manufacture (Ellis *et al.* 1990).

The Late Archaic begins around approximately 2,000 BC and ends with the appearance of ceramics and the Meadowood Phase at roughly 950 BC. Much more is known about this period than the Early and Middle Archaic and a number of Late Archaic sites are known. Sites appear to be more common than earlier periods, suggesting some degree of population increase. True cemeteries appear and have allowed for the analysis of band size, biological relationships, social organization, and health. Narrow and Small point traditions appear as well as tool recycling wherein points were modified into drills, knives, end scrapers, and other tools (Ellis *et al.* 1990). Other tools including serrated flakes used for sawing or shredding, spokeshaves, and retouched flakes manufactured into perforators, gravers, micro-perforators, or piercers. Tools on coarse-grained rocks such as sandstone and quartz become common and include hammerstones, net-sinkers, anvils, and cobble spalls. Depending on preservation, several Late Archaic sites include bone and/or antler artifacts which likely represent fishing toolkits and ornamentation. These artifacts include bone harpoons, barbs or hooks, notched projectile points, and awls. Bone ornaments recovered have included tubular bone beads and drilled mammal canine pendants (Ellis *et al.* 1990).

Throughout the Early to Late Archaic periods the natural environment warmed and vegetation changed from closed conifer-dominated vegetation cover, to the mixed coniferous and deciduous forest in the north and deciduous vegetation in the south we see in Ontario today (Ellis *et al.* 1990). During the Archaic period there are indications of increasing populations and decreasing size of territories exploited during annual rounds; fewer moves of residential camps throughout the year and longer occupations at seasonal campsites; continuous use of certain locations on a seasonal basis over many years; increasing attention to ritual associated with the deceased; and, long range exchange and trade systems for the purpose of obtaining valued and geographically localized resources (Ellis *et al.* 1990).

The Woodland Period

The Early Woodland period is distinguished from the Late Archaic period primarily by the addition of ceramic technology, which provides a useful demarcation point for archaeologists but is expected to have made less difference in the lives of the Early Woodland peoples. The settlement and subsistence patterns of Early Woodland people shows much continuity with the earlier Archaic with seasonal camps occupied to exploit specific natural resources (Spence *et al.* 1990). During the Middle Woodland well-defined territories containing several key environmental zones were exploited over the yearly subsistence cycle. Large sites with structures and substantial middens appear in the Middle Woodland associated with spring macro-band occupations focussed on utilizing fish resources and created by consistent returns to the same site (Spence *et al.* 1990). Groups would come together into large macro-bands during the spring-summer at lakeshore or marshland areas to take advantage of spawning fish; in the fall inland sand plains and river valleys were occupied for deer and nut harvesting and groups split into small micro-bands for winter survival (Spence *et al.* 1990). This is a departure from earlier Woodland times when macro-band aggregation is thought to have taken place in the winter (Ellis *et al.* 1988; Granger 1978).

The period between the Middle and Late Woodland period was both technically and socially transitional for the ethnically diverse populations of southern Ontario and these developments laid the basis for the emergence of settled villages and agriculturally based lifestyles (Fox 1990). The Late Woodland period began with some groups shifting settlement and subsistence patterns, involving an increasing reliance on corn horticulture. Corn may have been introduced into southwestern Ontario from the American Midwest as early as 600 AD. However, it did not become a dietary staple until at least three to four hundred years later. The first agricultural villages in southwestern Ontario date to the 10th century A.D. Unlike the riverine base camps of the Middle Woodland period, Late Woodland sites are located in the uplands, on well-drained sandy soils.

In the Late Woodland period, between 900-1300 AD, villages tended to be small settlements with nearby camps and hamlets that served as temporary spaces for hunting game and gathering resources outside of the villages. At this time, small village sites were characterized by the presence of longhouses with villages being occupied considerably longer than later in the Woodland period. Villages tended to be moved when nearby soils had been depleted by farming and conveniently collected firewood grew scarce. The Jesuits reported that the Huron moved their villages once every 10-15 years as they relied less heavily on corn than did later groups, and since their villages were much smaller, there was less demand on nearby resources. Small amounts of corn appear to have been a dietary component at this time; however, archaeological evidence suggests that its role was not as a dietary staple at this time but was possibly supplemental in nature.

Between 1300 and 1400 AD, village sizes grew significantly, resulting in the development of complex community political systems. This period also marks the emergence of fully developed horticulture, including the cultivation of corn, beans, and squash. Additionally, changes in ceramic styles may reflect increasing levels of inter-community communication and integration. This is supported by Michi Saagiig (Mississauga Anishinaabeg) oral histories, which speak to the coming of the corn growers and the symbiotic relationships that Algonkian speaking groups had with the Huron-Wendat in particular.

By the beginning of the fourteenth century, larger fortified village sites were often cleared to accommodate the cultivation of corn, beans, and squash as a result of an increasing reliance on horticulture. Longhouses also continued to grow in size until 1450 AD when a decrease in house length is observed. This decrease in house length may be partially attributed to large scale drops in population size associated with the introduction of European diseases.

1.2.2 Post-Contact Period Settlement

The post-contact Indigenous occupation of southern Ontario was heavily influenced by the dispersal of Iroquoian speaking peoples, including the Six Nations of the Iroquois – Mohawk, Cayuga, Oneida, Seneca, Onondaga, and Tuscarora. This was followed by the return of Algonkian speaking groups from northern Ontario, including the Michi Saagig, who had temporarily retreated to their wintering grounds in the mid-1600s to avoid warfare and disease as a result of colonial settlement. Algonkian speaking Ojibwe (Chippewa), Odawa (Ottawa), and Pottawatomi, known as the Three Fires Confederacy, remained in their traditional territory that covered a vast area of southern Ontario as well as eastern Michigan.

As European settlers encroached on their territory the nature of First Nation population distribution, settlement size and material culture changed. Despite these changes it is possible to correlate historically recorded villages with archaeological manifestations and the similarity of those sites to more ancient sites reveals an antiquity to documented cultural expressions that confirms a long historical continuity to systems of Indigenous ideology and thought (Ferris 2009).

It is important to note that, when discussing the historical documentation of the movement of Indigenous people, what has been documented by early European explorers and settlers represents only a very small snap-shot in time. Documentation of where Indigenous groups were residing during European exploration and settlement is restricted to only a very short period of time and does not reflect previous and subsequent movements of these groups. This brief history does not reflect the full picture of the pre- or post-contact period occupation of Indigenous groups or cultures. As such, relying on historic documentation in regards to Indigenous occupation and movement across the landscape can lead to misinterpretation. For example, noting the movement of Indigenous groups into an area may incorrectly suggest to the reader that these groups had not occupied the area previously; however, this is not the case. It is clear from Indigenous oral histories and the archaeological record that pre-contact Indigenous populations were extremely mobile and not tied to any one specific area. Over the vast period of time prior to the arrival of Europeans, Indigenous groups, language families, and cultures were fluid across the landscape.

The study area also falls within the part of Ontario that was purchased by the Crown as part of Treaty No. 27 ½ on April 25th, 1825 (Figure 3). Morris (1943) describes Treaty No. 27 ½ as follows:

... an agreement made at Amherstburg in the Western District of the Province of Upper Canada on the 26th of April, 1825, between James Givens, Esquire, Superintendent of Indian Affairs, on behalf of His Majesty King George the Fourth and the Chiefs and Principal Men of the part of the Chippewa Nation of Indians, inhabiting and claiming the tract of land Wawanosh Township in the County of Huron was named after Way-way-nosh the principal Chief of the Band making this Treaty.

Morris 1943: 26-27

Treaty Number 27½ was subsequently confirmed on July 10th, 1827 as Treaty Number 29 with only a minor change in the legal description of the boundaries of the land surrender (Morris 1943:27). The Chippewa Nation inhabiting and claiming this land was composed of 440 individuals, who would be entitled to equally share the yearly sum of 1,100 pounds. While it is difficult to delineate treaty boundaries on modern maps, Figure 3 provides an illustration of treaties and purchases taken from Morris (1943) with the approximate location of the current study area shown.

The British Parliament incorporated a large private chartered British land development company on July 27, 1825, called the Canada Company, to aid the colonization of Upper Canada (Lee 2004). The Upper Canada government sold the Canada Company 10,000 km² of land for 341,000 pounds. Slightly less than half of the land that was purchased comprised what would become the Huron Tract, located on the eastern shore of Lake Huron (Lee 2004).

1.2.3 Euro-Canadian Settlement

The Sarnia-Lambton Region and Lambton County

Euro-Canadian immigrants to the Sarnia-Lambton region began to settle the area as early as 1796, when French settlers first arrived and settled along the banks of the St. Clair river (Elford 1982). However, a significant wave of settlers would not begin to arrive until at least the 1830s. A subsequent wave followed in the 1850s during the potato famine in Ireland, resulting in a large population boom; by 1891, the population had risen to 58,810 individuals (Elford 1982). The principle crops grown in Sarnia-Lambton included wheat and peas, and farmers also supplemented their income by selling forestry products (City of Sarnia 2016). The early growth of Sarnia was stimulated by the wealth of stands of timber and the discovery of oil in the late 1850s. Lambton County became independent in 1853, following the Municipal Act of 1849 and the initial completion of surveying in 1835. It takes its name from Governor General John George Lambton, first Earl of Durham, who authored *The Report on the Affairs of British North America* (1839), often referred to as the Durham Report; this text investigated two armed uprisings known as the Rebellions of 1837-1838, and would later have a profound influence on the development of the *British North America Act, 1840* (Elford 1982), which established the Province of Canada in 1841.

In 1858, James M. Williams developed the world's first commercial oil well, which started an oil boom in the area. With the arrival of the Great Western Railway in 1858 and the Grand Trunk Railway in 1859, the shipping industry expanded and the rail lines were later linked to the United States by the opening of a rail tunnel under the St. Clair River in 1889. Later, ferry service to the U.S. was formed, bringing in prospectors from all over North America (City of Sarnia 2016).

Township of Moore

The Township of Moore takes its name from Sir John Moore, a general of the British Army killed at the 1829 Battle of Corunna (Elford 1982). The first Euro-Canadian settlements in this township were established along the St. Clair river, with surveyor Roswell Mount completing his work by 1829. A portion of land was ceded from the Aamjiwnaang First Nation in 1827 as part of Treaty 29, and a reserve was formed along the southern boundary of the Township of St. Clair (Plain 2017). In order to continue settlement expansion and agricultural activity, significant swamp drainage and forest clearing in the township needed to be undertaken, which would lead to a \$20,000 debt incurred by 1881 (Phelps 1973). Agriculture would remain an important industry for the township, and the land around the study area is still for the most part utilized for agricultural purposes.

Land Use and Settlement of the Study Area

The 1880 *Illustrated Historical Atlas of the County of Lambton* (H. Belden & Co.) was reviewed to determine the presence of 19th century settlement features within the study area as the presence of historic features elevates the potential for the recovery of 19th century archaeological resources. It should be noted that not all features of interest, particularly farmhouses and smaller homesteads, were mapped systematically as this would have been beyond the intended scope of the Ontario historical atlas series. In addition, given that atlases were funded by subscription, preference with regard to the level of detail included was given to subscribers. As such, the absence of structures or other features on historic atlas maps does not preclude the presence of historic features at the time the area was

surveyed. Table 2 contains details regarding the listed 19th century property owners and any illustrated historic features within, or in immediate proximity to, the study area for the Geographic Township of Moore, Lambton County.

Table 2: 1880 Landowners and Historic Features within the Study Area

Lot #	Conc. #	Geo. Township	Landowner(s)	Historic Feature(s)
19	4	Moore	No landowner(s) listed	St. Clair Div. of Canada Southern Railway
20	4	Moore	No landowner(s) listed	St. Clair Div. of Canada Southern Railway
21	4	Moore	No landowner(s) listed	St. Clair Div. of Canada Southern Railway
19	5	Moore	No landowner(s) listed	St. Clair Div. of Canada Southern Railway
20	5	Moore	No landowner(s) listed	St. Clair Div. of Canada Southern Railway
21	5	Moore	Chas. Reilly	St. Clair Div. of Canada Southern Railway
18	7	Moore	Jno. J. Eyre	1 feature (homestead/farmhouse)
19	7	Moore	J. H. Sipprell	1 feature (homestead/farmhouse)
20	7	Moore	No landowner(s) listed	No visible features
21	7	Moore	J. B. McKinnon	2 features (homestead/farmhouse)
22	7	Moore	No landowner(s) listed	No visible features
18	8	Moore	No landowner(s) listed	No visible features
19	8	Moore	No landowner(s) listed	Templar Hall
20	8	Moore	W. J. Courtney Jas. Cruickshank	2 features (homestead/farmhouse)
21	8	Moore	No landowner(s) listed	No visible features
22	8	Moore	Jno. Robbins	No visible features
18	9	Moore	No landowner(s) listed	No visible features
19	9	Moore	No landowner(s) listed	No visible features
20	9	Moore	No landowner(s) listed	No visible features
21	9	Moore	No landowner(s) listed	No visible features
22	9	Moore	No landowner(s) listed	1 feature (homestead/farmhouse)
18	10	Moore	No landowner(s) listed	No visible features
19	10	Moore	No landowner(s) listed	No visible features
20	10	Moore	No landowner(s) listed	No visible features
21	10	Moore	No landowner(s) listed	1 feature (homestead/farmhouse)
22	10	Moore	Peter Gallogly	1 feature (homestead/farmhouse)
18	11	Moore	No landowner(s) listed	No visible features
19	11	Moore	No landowner(s) listed	No visible features
20	11	Moore	No landowner(s) listed	No visible features
21	11	Moore	Peter Gallogly	1 feature (homestead/farmhouse)
22	11	Moore	No landowner(s) listed	No visible features

1.3 Archaeological Context

1.3.1 Natural Environment

The study area is situated within the St. Clair Clay Plain (Chapman & Putnam 1986:146-147).

Adjoining Lake St. Clair in Essex and Kent County Counties and the St. Clair River in Lambton County are extensive clay plains covering 2,270 square miles. The region is one of little relief, lying between 575 and 700 feet a.s.l., except for the moraine at Ridgetown and Blenheim which rises 50 to 500 feet higher....Glacial Lake Whittlesey, which deeply covered all of these lands, and Lake Warren which subsequently covered nearly the whole area, failed to leave deep stratified beds of sediment on the underlying clay till except around Chatham, between Blenheim and the Rondeau marshes, and in a few other smaller areas. Most of Lambton and Essex Counties, therefore, are essentially till plains smoothed by shallow deposits of lacustrine clay which settled in the depressions while the knolls were being lowered by wave action.

Chapman & Putnam 1986:147

The single most important environmental feature necessary for extended human occupation is potable water. As such, proximity to water is regarded as a useful index for the determination of potential for the presence of archaeological resources. The St. Clair river, a 65.2 km river flowing into Lake St. Clair from Lake Huron, is located adjacent to the study area.

These environmental characteristics would have provided an ideal environment for both temporary and permanent settlement throughout the pre-and post-contact periods. These water sources would have served as important pre-and post-contact transportation routes as well as sources of potable water and riverine resources.

1.3.2 Previous Archaeological Work

To inform the current Stage 1 archaeological assessment and further establish the archaeological context of the study area, a search of the ASDB was conducted by AECOM to determine if any previous archaeological work has been completed within the current study area or within 50 m of the study area boundaries. Table 3 lists reports regarding previous archaeological work relevant to the study area.

Table 3: Archaeological Reports with Relevant Background Information

Year	Title	Author	PIF Number
1992	<i>Archaeological Assessment Stage 1: Background Study Tecumseh Gas Storage Ltd Proposed Ladysmith Project Moore Township County of Lambton</i>	A.R.A.	92-023-8
1992	<i>Archaeological Assessment Tecumseh Gas Storage Ltd Proposed Ladysmith Project Moore Township County of Lambton</i>	A.R.A.	92-023-2
1999	<i>The 1999 Stage I-2 A. A. of the Proposed Enbridge Consumers Gas Ladysmith Connection Project, Lambton County, Ontario</i>	D.R. Poulton & Associates (D.P.A.)	1999-031-019

2012	<i>Stage 2 Archaeological Assessment NOVA 2020 Lots 22, 23, 24, 25 and 26 Concession 10; Lots 22, 23 and 24 Concession 9; Lots 25 and 26 Concession 8; and Lots 25 and 26 Concession 7, Geographic Township of Moore, Municipality of St. Clair Township, Lambton County</i>	Stantec Consulting (Stantec)	P001-684-2012
2019	<i>Stage 1-2 Archaeological Assessment: Ladysmith designated Storage Area (DSA) Well TL9H Lot 20, Concession 5, Geographic Township of Moore, now Township of St. Clair, Lambton County, Ontario</i>	Stantec	P256-0558-2018

In 1992, ARA completed a Stage 1 archaeological assessment of a small parcel of land in the Township of Moore, delineated by Concession Road 8 to the north, Regional Road 31 to the east, Concession Road 2 to the south, and Highway 40 to the west, in advance of proposed pipeline construction beginning on Lot 19, Concession 7, and ending on Lots 19 and 20, Concession 4. Stage 2 assessment was recommended as the background research conducted indicated moderate-to-high potential for the recovery of archaeological material. The subsequent Stage 2 archaeological assessment, also in 1992, identified four previously unknown archaeological sites: Tecumseh A (AeHo-19), Tecumseh B, Tecumseh C (AeHo-20), and Tecumseh D. Stage 2 archaeological methods included the pedestrian survey of ploughed agricultural field at 5 to 10 m intervals, with intensification at 1 m intervals when cultural material was identified. Tecumseh B and D were dense concentrations of 20th-century material and were not recommended for further work. However, Tecumseh A (AeHo-19) and Tecumseh C (AeHo-20) were determined to retain cultural heritage value or interest and further archaeological work was recommended, including a controlled surface collection of surface artifacts, followed by monitoring. A portion of this area is located within the current study area limits.

In 1999, Dana Poulton completed a Stage 1-2 assessment for the proposed Enbridge Consumers Gas Ladysmith Connection Project. This assessment did not identify any archaeological resources.

In 2012, Stantec conducted a Stage 2 archaeological assessment of the NOVA Chemicals Corunna and Moore facility properties as part of the NOVA 2020 project, east of the Town of Corunna, Lambton County. This assessment resulted in the identification of six archaeological sites: three Euro-Canadian surface scatters, two isolated precontact lithic artifacts, and one precontact lithic scatter. Only the Euro-Canadian sites Location 1 (AfHo-49, 30 artifacts), Location 4 (AfHo-40, 68 artifacts), and Location 6 (AfHo-51, 122 artifacts) were found to retain cultural heritage value or interest, and were recommended for Stage 3 archaeological assessment. Location 1 (AfHo-49) is located within the current study area limits..

In 2019, Stantec Consulting Ltd was retained by Enbridge Gas Inc. (Enbridge) to complete a Stage 1-2 archaeological assessment on two proposed work sites in the township of St. Clair, Lambton County, Ontario. One of these, an approximately 1 ha area is located on part of Lot 20, Concession 5, Geographic Township of Moore, now township of St. Clair, Lambton County, Ontario, and is directly adjacent to the study area being reported on in this document. Their Stage 1 assessment determined that the study area retained potential for the identification of archaeological resources, and they performed a Stage 2 archaeological assessment on Dec 13, 2018. This Stage 2 archaeological assessment did not result in the identification or recovery of any archaeological materials.

To the best of our knowledge, there are no other reports concerning archaeological work conducted within or in close proximity (i.e. within 50 m) of the study area; however, it should be noted that the MHSTCI does not maintain a database of all properties that have had past archaeological investigations and searches of the MHSTCI's public register do not always result in a complete listing of all archaeological work conducted in a given area. In consequence, in some cases the only way a consulting archaeologist will know that a past assessment has been conducted in a given area is if they have personal knowledge of it, or if the assessment resulted in the discovery and registration of one or more archaeological sites.

Archaeological Management Plans and Municipal Registers of Heritage Properties

There does not yet appear to be Archaeological Master Plans for Lambton County. This may be because the majority of the county is situated in predominantly rural settings with limited development that could be informed by a master plan study. A review of the Lambton County Inventory of Heritage Resources was completed to determine the presence of any heritage properties or historically significant sites within or in close proximity to the study area. The results of this search identified no listed properties, heritage plaques, or historic places within and/or in close proximity to the study area boundaries.

1.3.3 Known Archaeological Sites

AECOM conducted a data search of the ASDB to determine if any registered archaeological sites are located within the study area as well as within 1 km of the current study area boundaries. This search resulted in the identification of 5 registered archaeological sites within 1 km of the study area, with three registered sites located within the study area boundaries. Table 4 provides details on the registered archaeological sites within 1 km of the current study area, with the sites within the study area boundaries bolded.

Table 4: Registered Archaeological Sites within 1 km of the Study Area

Borden #	Site Name	Cultural Affiliation	Site Type	Development Status
AeHo-19	Tecumseh A	Euro-Canadian	homestead	Further CHVI
AeHo-20	Tecumseh B	Euro-Canadian	homestead	Further CHVI
AfHo-40	Not provided	Pre-contact, Early Woodland	findspot	Further CHVI
AfHo-49	Location 1	Euro-Canadian, mid-to-late 19th century	Not provided	Further CHVI
AfHo-51	Not provided	Pre-contact, Post-contact	Not provided	Further CHVI

*CHVI=Cultural Heritage Value or Interest

Tecumseh A (AeHo-19) and Tecumseh C (AeHo-20) were identified in 1992 by ARA. Tecumseh A (AeHo-19) consisted of a dense surface scatter of domestic and structural debris, mostly fragments of exterior red brick likely from a farmhouse dated to as early as 1980 and as late as post-WWII. Tecumseh C (AeHo-20) was identified directly north of Tecumseh A, consisting of a scatter of domestic debris dated to c. 1870-1890, including fragments of white ironstone, stoneware crockery, ball clay pipe stems (Bannerman/Montreal), and glazed red earthenware. If avoidance of the sites is not possible, further archaeological work was recommended, including a controlled surface collection of surface artifacts, followed by monitoring. Both Tecumseh A (AeHo-19) and Tecumseh C (AeHo-20) are located within the current study area limits.

Location 1 (AfHo-49) was identified in 2012 during a Stage 2 archaeological assessment completed by Stantec. It consisted of 30 artifacts dating to the mid to late 19th century. Further Stage 3 archaeological assessment is required on Location 1 (AfHo-49). Location 1 (AfHo-49) is located within the current study area boundaries.

Information concerning specific site locations is protected by provincial policy, and is not fully subject to the *Freedom of Information and Protection of Privacy Act (FIPPA)*. The release of such information in the past has led to looting or various forms of illegally conducted site destruction. Confidentiality extends to all media capable of conveying location, including maps, drawings, or textual descriptions of a site location. The MHSTCI will provide information concerning site location to the party or an agent of the party holding title to a property, or to a licensed archaeologist with relevant cultural resource management interests.

1.3.4 Existing Conditions

The study area consists of primarily agricultural fields. The topography is generally flat with areas of gently rolling hills. During the pre-contact and early contact periods, this area would have been an ideal location for settlement as it is located adjacent to the St. Clair river, which offered rich, cultivable soils and a mixture of deciduous trees interspersed with open areas. During the early 19th century, Euro-Canadian settlers began to clear the forests for agricultural purposes. Over the course of the 19th century, the study area would have been made up of agricultural land just outside of the rapidly expanding municipality and port of call of Mooretown along historically surveyed road allowances. Presently, the study area is used primarily for agriculture.

2. Analysis and Conclusions

2.1 Determination of Archaeological Potential

Archaeological potential is established by determining the likelihood that archaeological resources may be present on a subject property. Criteria commonly used by the MHSTCI to determine areas of archaeological potential are listed in Section 1.3.1 of the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011). Distance to modern or ancient water sources is generally accepted as the most important element for past human settlement patterns and when considered alone may result in a determination of archaeological potential. In addition, any combination of two or more of the listed criteria indicates archaeological potential.

Based on a review of the historical, environmental, and archaeological context of the study area, it has been determined that potential for the recovery of pre- and post-contact First Nation and 19th century Euro-Canadian archaeological resources within the study area is high based on the presence of the following features:

- Proximity to previously identified archaeological sites (including AeHo-19, AeHo-20 and AfHo-49, three Euro-Canadian sites, within study area boundaries);
- Distance to various types of water sources (St. Clair River);
- Soil texture and drainage (St. Clair plain);
- Glacial geomorphology, elevated topography and the general topographic variability of the area;
- Resource areas including food or medicinal plants, scarce raw materials and early Euro-Canadian industry;
- Areas of early Euro- Canadian settlement and early transportation routes (St. Clair Div. of Canada Southern Railway)

Distance to modern or ancient water sources is generally accepted as the most important element for past human settlement patterns and when considered alone may result in a determination of archaeological potential. In addition, any combination of two or more of the criteria listed above, such as well drained soils or topographic variability, may indicate archaeological potential.

The potential for pre-contact and contact period First Nation archaeological resources is determined to be high based on the proximity to the St. Clair river, which was an important thoroughfare and source of river resources and potable water. The study area also possesses a number of environmental characteristics that would have made this area attractive to pre-contact First Nation populations, including the once diverse forest life and well drained, cultivable soils. Archaeological potential is also increased in this area given the presence of two registered pre-contact First Nation and four registered Euro-Canadian archaeological sites within a 1 km radius. In addition, the historical documentary evidence of the first European settlers and surveyors to the area indicate the long history of occupation here by First Nations people. The potential for Euro-Canadian archaeological resources is also judged to be high based on the early settlement of the Township of St. Clair and City of Sarnia by Euro-Canadian pioneers as well as evidence of early urban development.

Certain features indicate that archaeological potential has been removed, such as land that has been subject to extensive and intensive deep land alterations that have severely damaged the integrity of any archaeological resources. This includes landscaping that involves grading below the topsoil level, building footprints, quarrying and sewage and infrastructure development (Ontario Government 2011).

2.2 Conclusions

AECOM's Stage 1 archaeological background study of the 2021/2022 Storage Enhancement Project has determined that the potential for the recovery of archaeological resources is high, given the proximity of the study area to previously identified Euro-Canadian archaeological sites (including three sites within the study area boundaries), proximity to the St. Clair river, and areas of early Euro-Canadian settlement and early transportation routes. Areas where archaeological potential has been removed include areas that have been subject to extensive land alterations that have significantly compromised the recovery of archaeological materials such as constructed roadways and existing Enbridge stations. Stage 2 archaeological assessment is recommended for all areas identified as retaining archaeological potential.

3. Recommendations

AECOM's Stage 1 background study for the 2021/2022 Storage Enhancement Project area has determined that the potential for the recovery of both First Nation and Euro-Canadian archaeological resources within the current study area is high. Based on these findings, **Stage 2 archaeological assessment is recommended for all areas identified to have archaeological potential in Figure 6 within the study area limits.**

The Stage 2 archaeological assessment must be conducted by a licensed archaeologist and must follow the requirements set out in the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011), including:

- The standard test pit survey method at 5 m intervals is to be conducted in all areas that will be impacted by the project where ploughing is not feasible (e.g. woodlots, overgrown areas, manicured lawns, small sections of agricultural land) and
- Pedestrian survey at 5 m intervals where ploughing is possible (e.g. agricultural fields). This assessment will occur when agricultural fields have been recently ploughed, weathered by rain, and exhibit at least 80% surface visibility.
- Poorly drained areas, areas of steep slope, and areas of confirmed previous disturbance (e.g. building footprints, roadways, areas with identifiable underground infrastructure) identified during the Stage 2 assessment are to be mapped and photo-documented but are not recommended for Stage 2 survey as they possess low to no archaeological potential (Section 2.1, Standard 2a and 2b).

Should additional land outside of the current study area boundaries be included as part of the 2021/2022 Storage Enhancement Project, the standard requirements for archaeological assessments to be conducted prior to land disturbance remain in place.

It is pertinent to note that the 2021/2022 Storage Enhancement Project study area evaluated in this report includes additional land that may not be impacted by the project. A large area was assessed as part of this Stage 1 archaeological assessment in order to accommodate areas of possible infrastructure improvements. Once the area of project impacts has been determined, only the land that will be impacted by this project will require Stage 2 archaeological assessment.

There are three registered archaeological sites located within the current study area limits, AfHo-49, AeHo-19 and AeHo-20. Once the land to be impacted by infrastructure improvements has been identified, should proposed construction activities impact any of the archaeological sites, further archaeological assessment must be completed prior to ground disturbing activities.

Archaeological site AfHo-49 was determined to retain cultural heritage value or interest and requires Stage 3 archaeological assessment following the requirements set out in Section 3.2 and Table 3.1 the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011) (Stantec 2012).

While 19th century archaeological sites AeHo-19 and AeHo-20 were identified in 1992 by ARA, the field methods were sufficient to fulfill the requirements set out in the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011). Therefore, further Stage 3 archaeological assessment is required for AeHo-19 and AeHo-20 following the requirements set out in Section 3.2 and Table 3.1 the *Standards and Guidelines for Consultant*

Archaeologists (Ontario Government 2011). Given the age of the archaeological reports, it is possible the sites will not be easily relocated. If archaeological sites AeHo-19 and AeHo-20 cannot be successfully relocated, it is recommended that a Stage 2 archaeological assessment be conducted again for the area (see Figure 2 of the Supplementary Documentation) following the requirements set out in Section 2 of the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011).

The MHSTCI is asked to accept this report into the Ontario Public Register of Archaeological Reports thereby concurring with the recommendations presented herein. As further archaeological assessment is required, archaeological concerns for the 2021/2022 Storage Enhancement Project in the Township of Moore, Ontario have not been fully addressed.

4. Advice on Compliance with Legislation

This report is submitted to the Ontario Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Heritage, Sport, Tourism and Culture Industries, a letter will be issued by the Ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act*.

Archaeological sites recommended for further archaeological fieldwork or protection remain subject to section 48 (1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological license.

The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 (when proclaimed in force in 2012) require that any person discovering human remains must notify the police or coroner and the Registrar of Burial Sites, War Graves, Abandoned Cemeteries, and Cemetery Closures.

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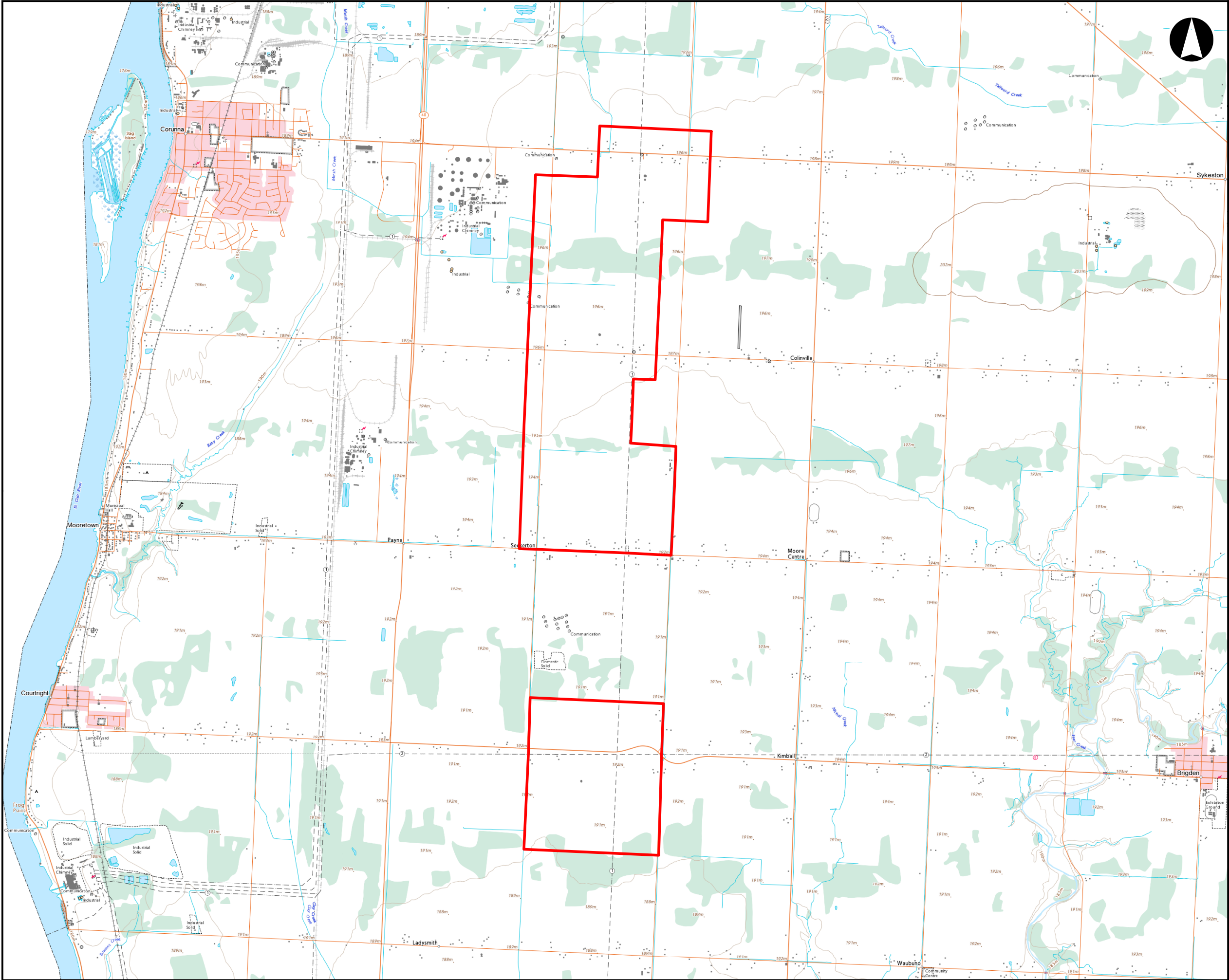
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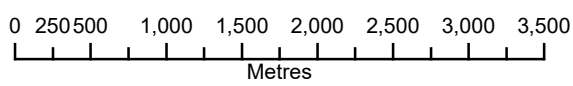
6. Figures

All figures pertaining to the Stage 1 archaeological assessment for the 2021/2022 Storage Enhancement Project are provided on the following pages.



Legend

 Study Area



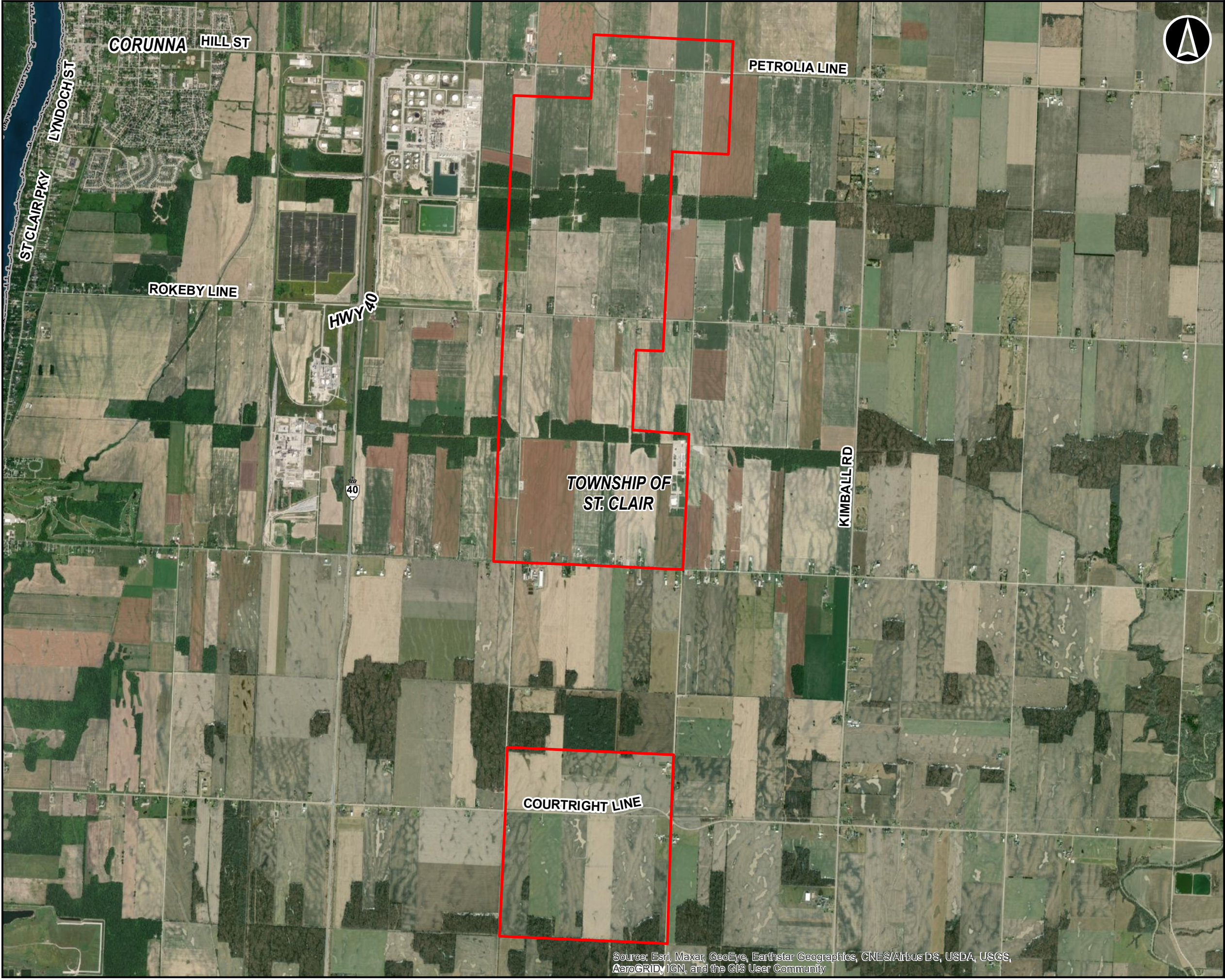
Stage 1 Archaeological Assessment
2021/2022 Storage Enhancement Project
Municipality of St. Clair, Lambton County, Ontario

Location of the Study Area

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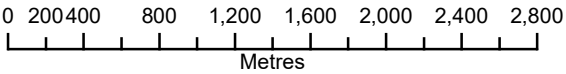
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Legend

- Study Area
- Municipal Boundary



Stage 1 Archaeological Assessment
2021/2022 Storage Enhancement Project
Municipality of St. Clair, Lambton County, Ontario

Study Area in Detail

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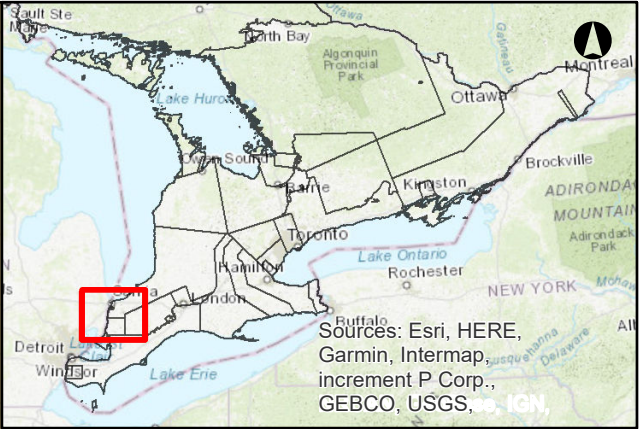
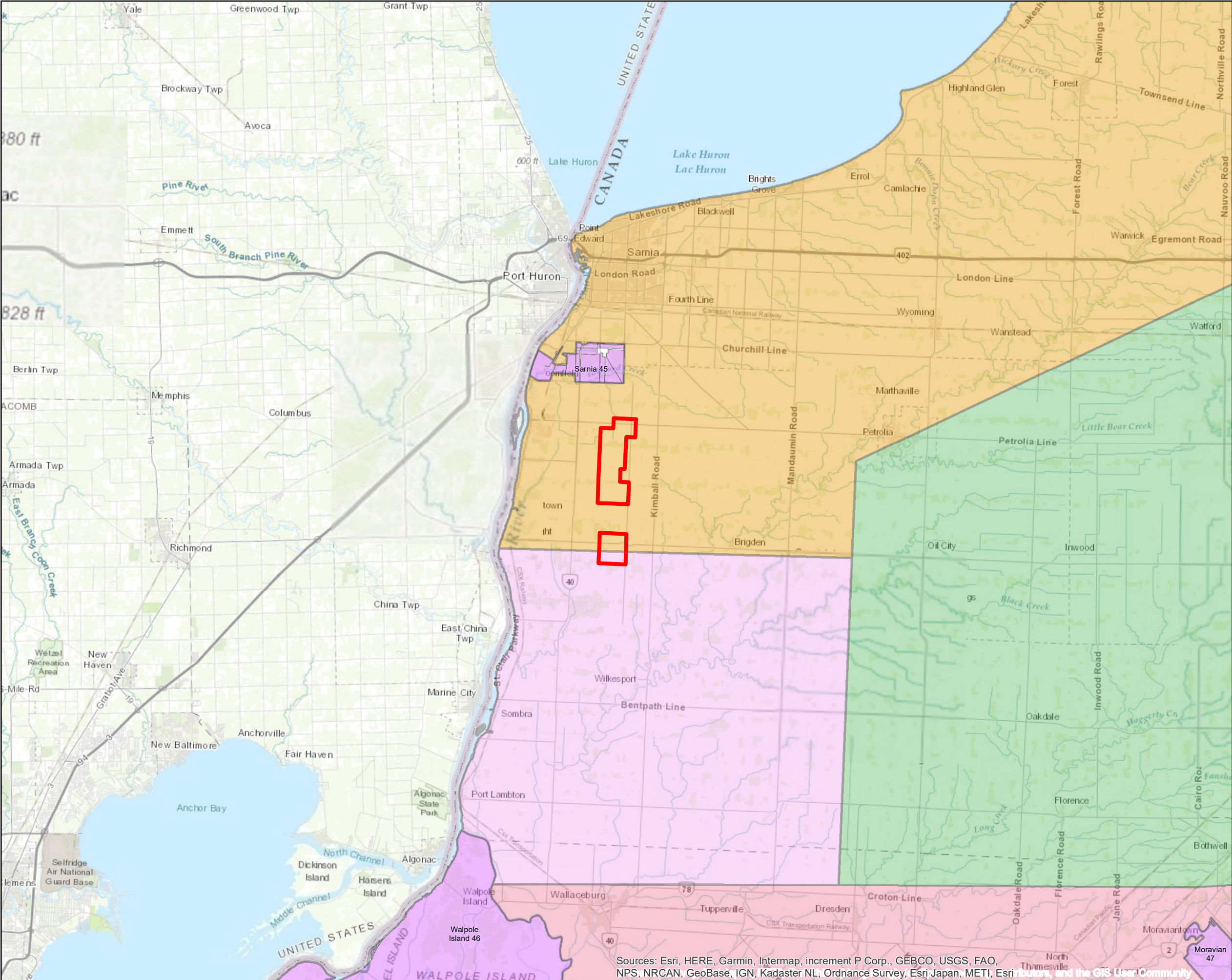
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Figure 2

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Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

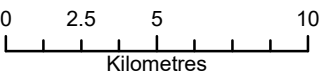


Legend

- Study Area
- First Nations Reserve Land

Treaty

- Huron Tract Purchase, Treaty 29, August 13, 1833
- Long Woods Purchase, Treaty 21, March 9, 1819
- McKee Purchase, Treaty 2, May 19, 1790
- Sombra Township Purchase, Treaty 7, September 7, 1796



Stage 1 Archaeological Assessment
Sarnia 2021/2022 Storage Enhancement Project
Municipality of St. Clair, Lambton County, Ontario

Ontario Treaties Map

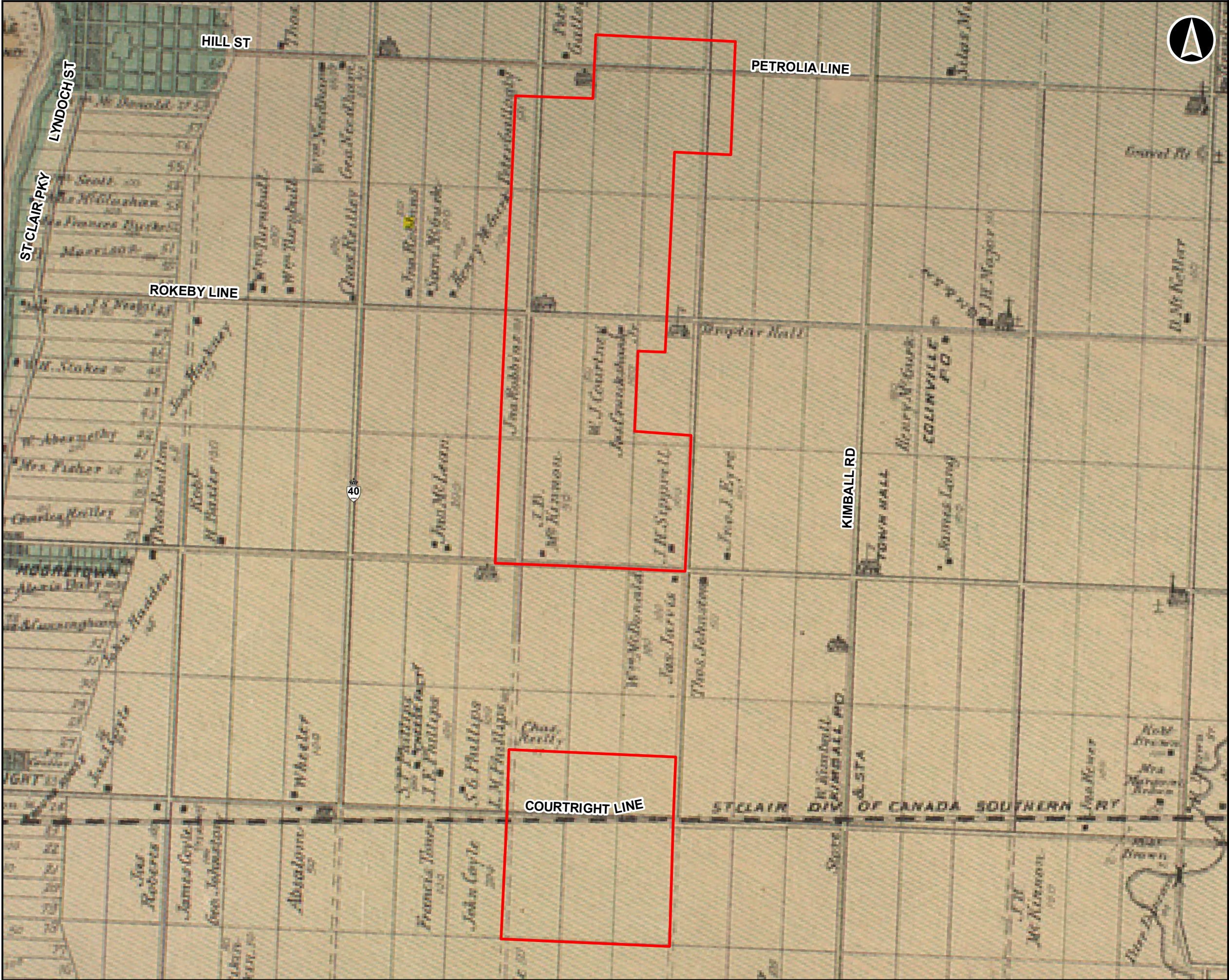
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Figure 3

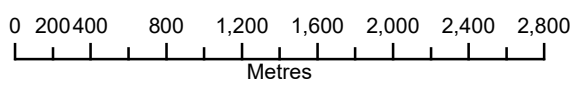
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Legend

 Study Area



Stage 1 Archaeological Assessment
2021/2022 Storage Enhancement Project
Municipality of St. Clair, Lambton County, Ontario

Portion of 1880 Illustrated Historical Atlas of the
County of Lambton

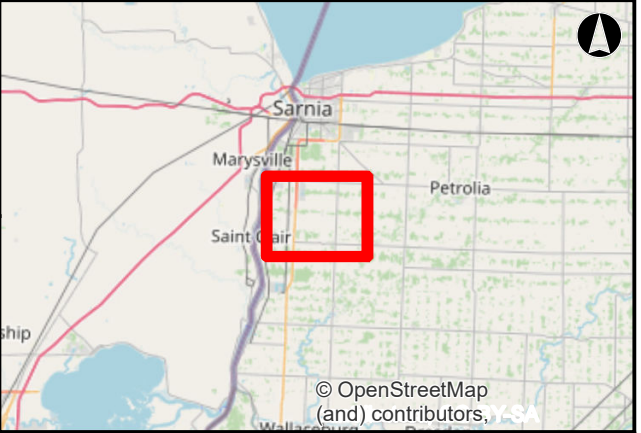
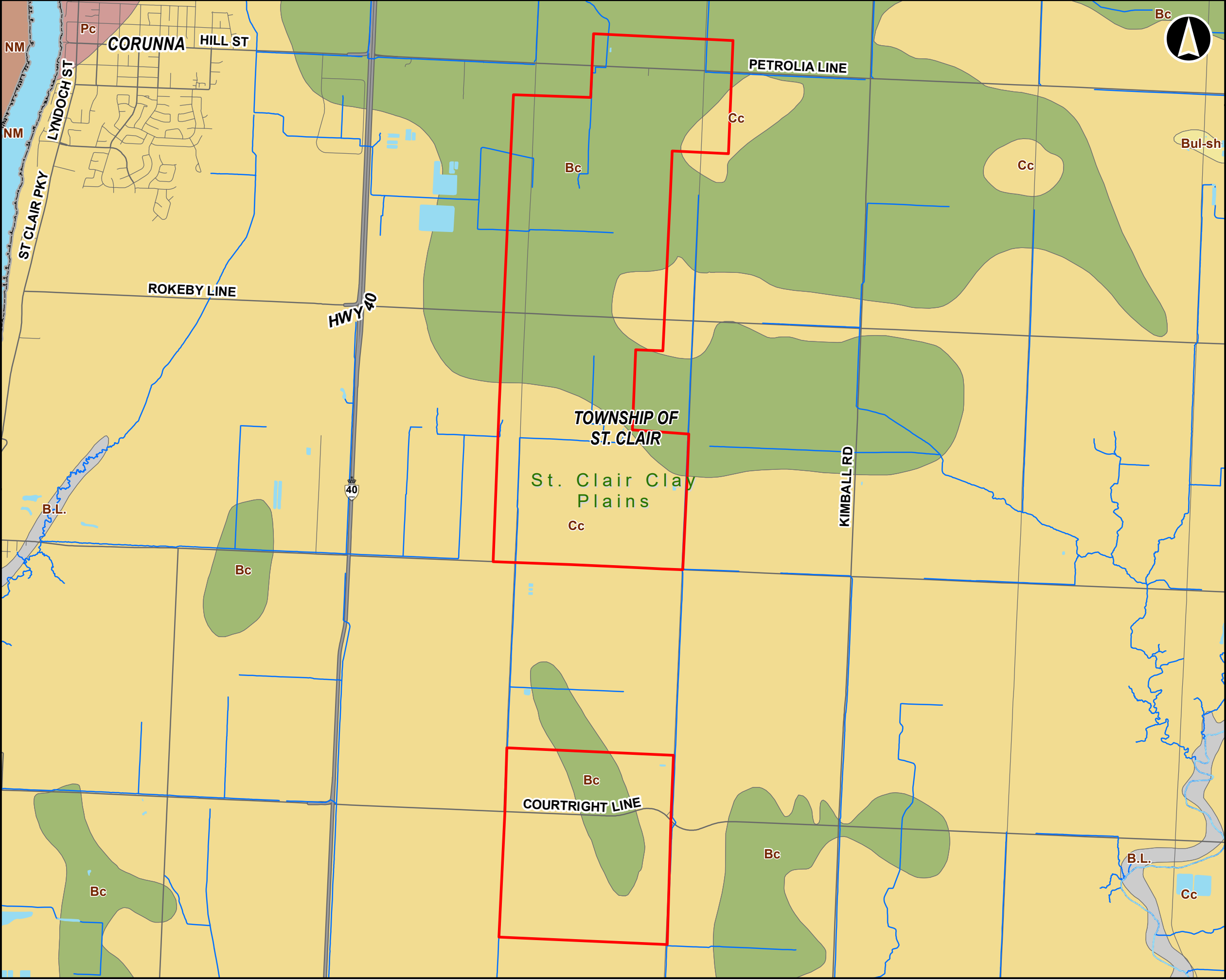
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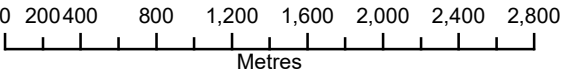
Figure 4

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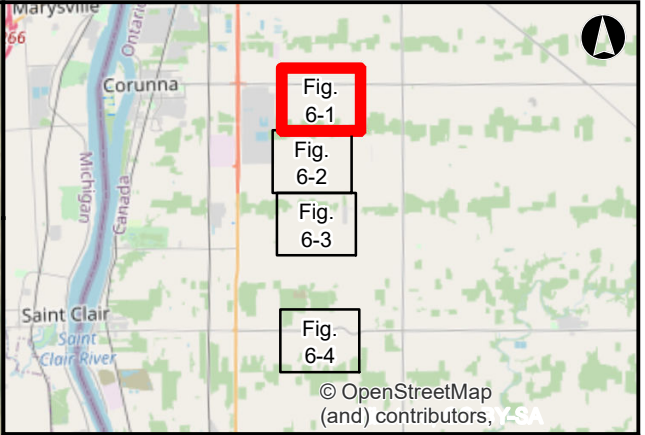
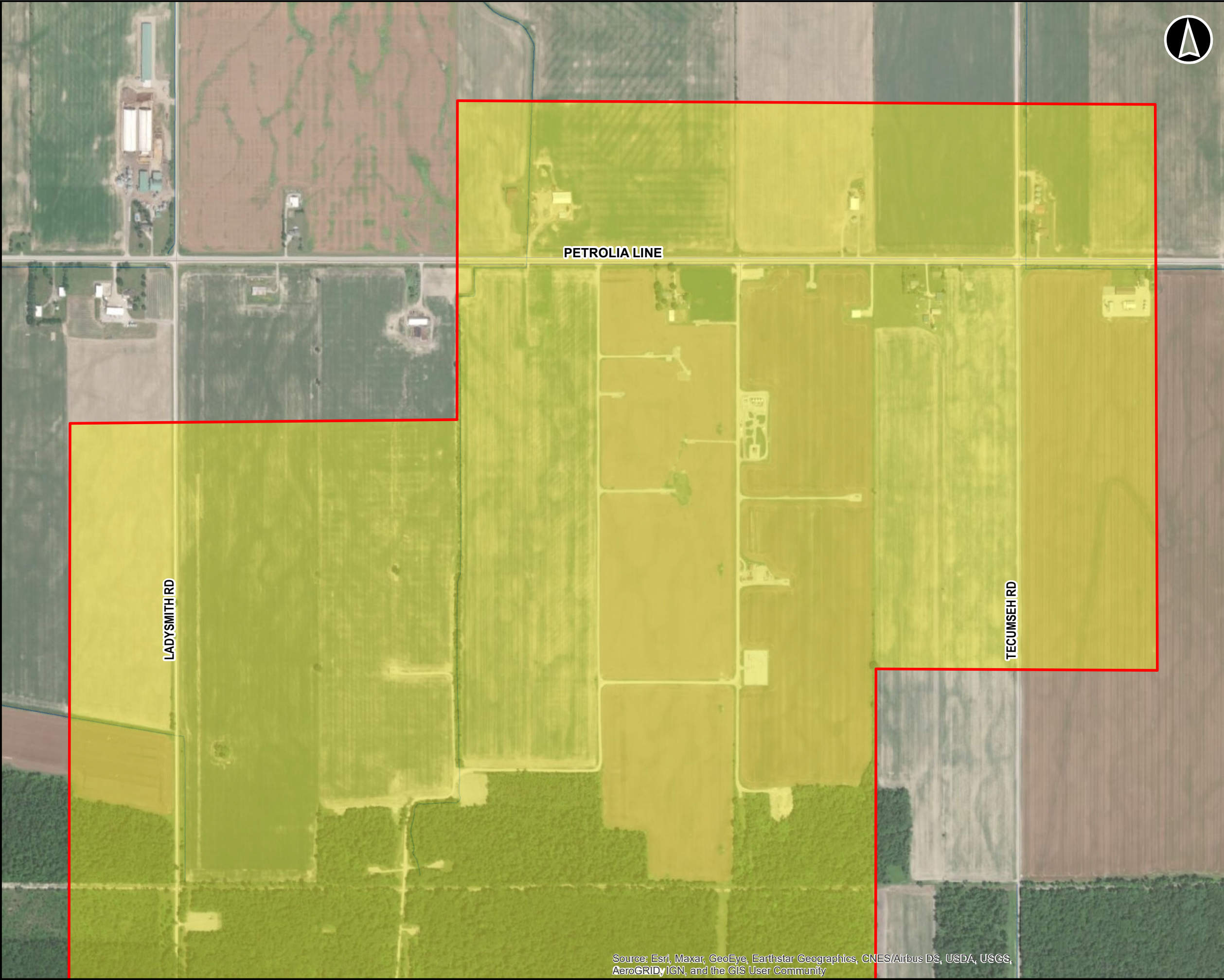
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- Study Area
- Municipal Boundary
- Physiographic Region
- Soils**
 - B.L. - Unclassified
 - Bc - Brookston, Clay
 - Bul-sh - Burford, Loam
 - Cc - Clyde, Clay
 - NM - Unclassified
 - Pc - Perth, Clay





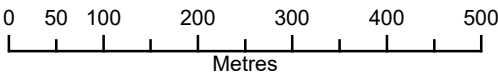
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Legend

-  Study Area
-  Stage 2 Archaeological Assessment Required



Stage 1 Archaeological Assessment
2021/2022 Storage Enhancement Project
Municipality of St. Clair, Lambton County, Ontario

Results of the Stage 1 Archaeological Assessment

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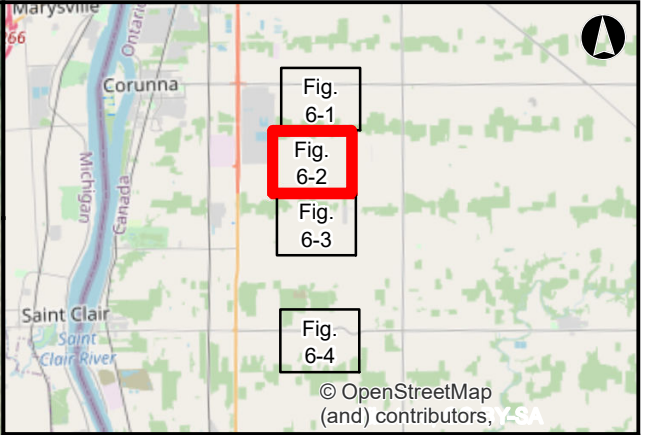
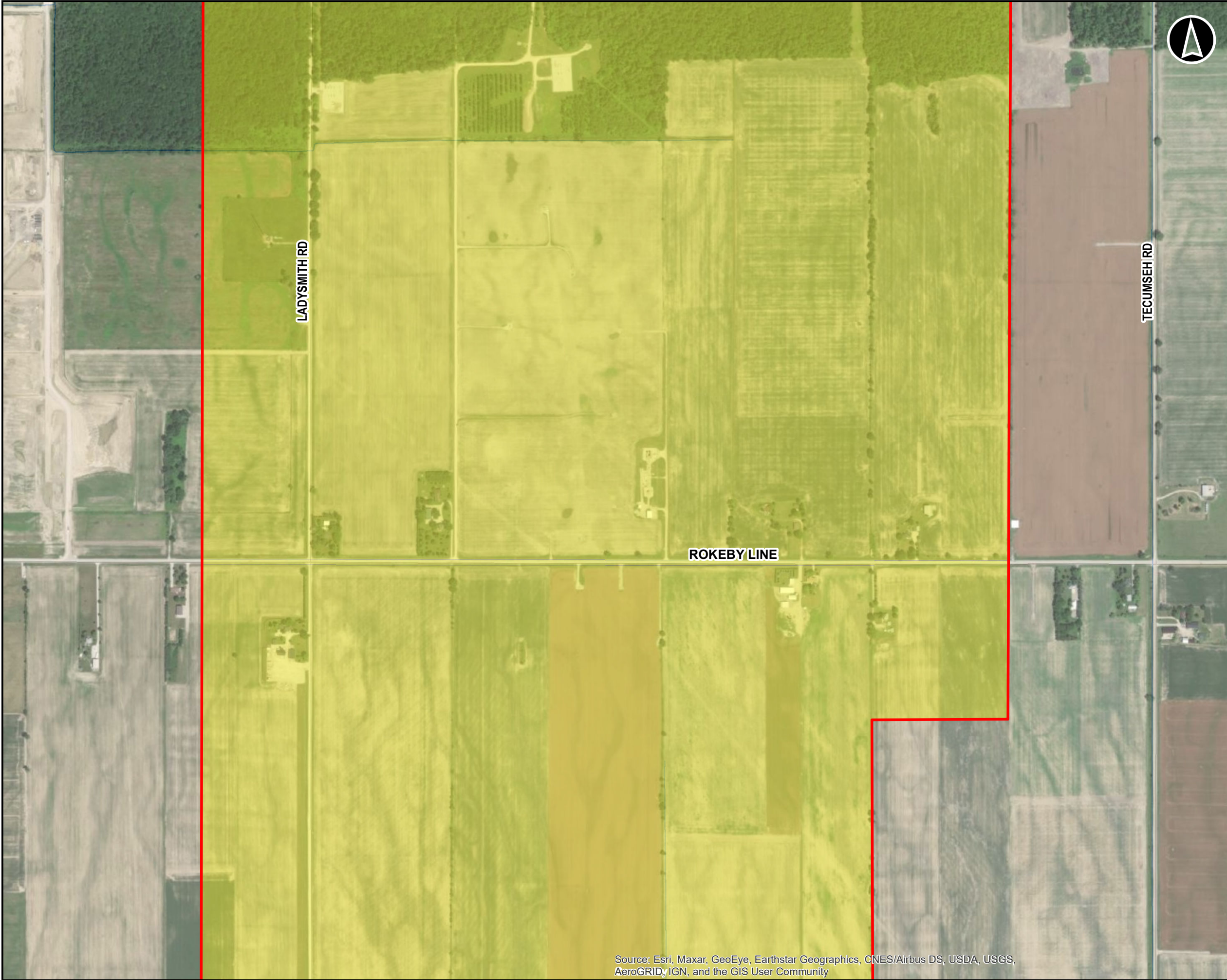
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
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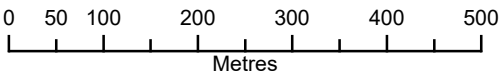
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-  Study Area
-  Stage 2 Archaeological Assessment Required



Stage 1 Archaeological Assessment
2021/2022 Storage Enhancement Project
Municipality of St. Clair, Lambton County, Ontario

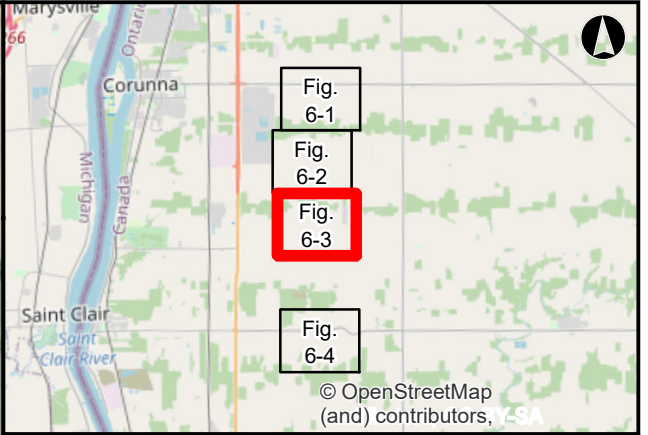
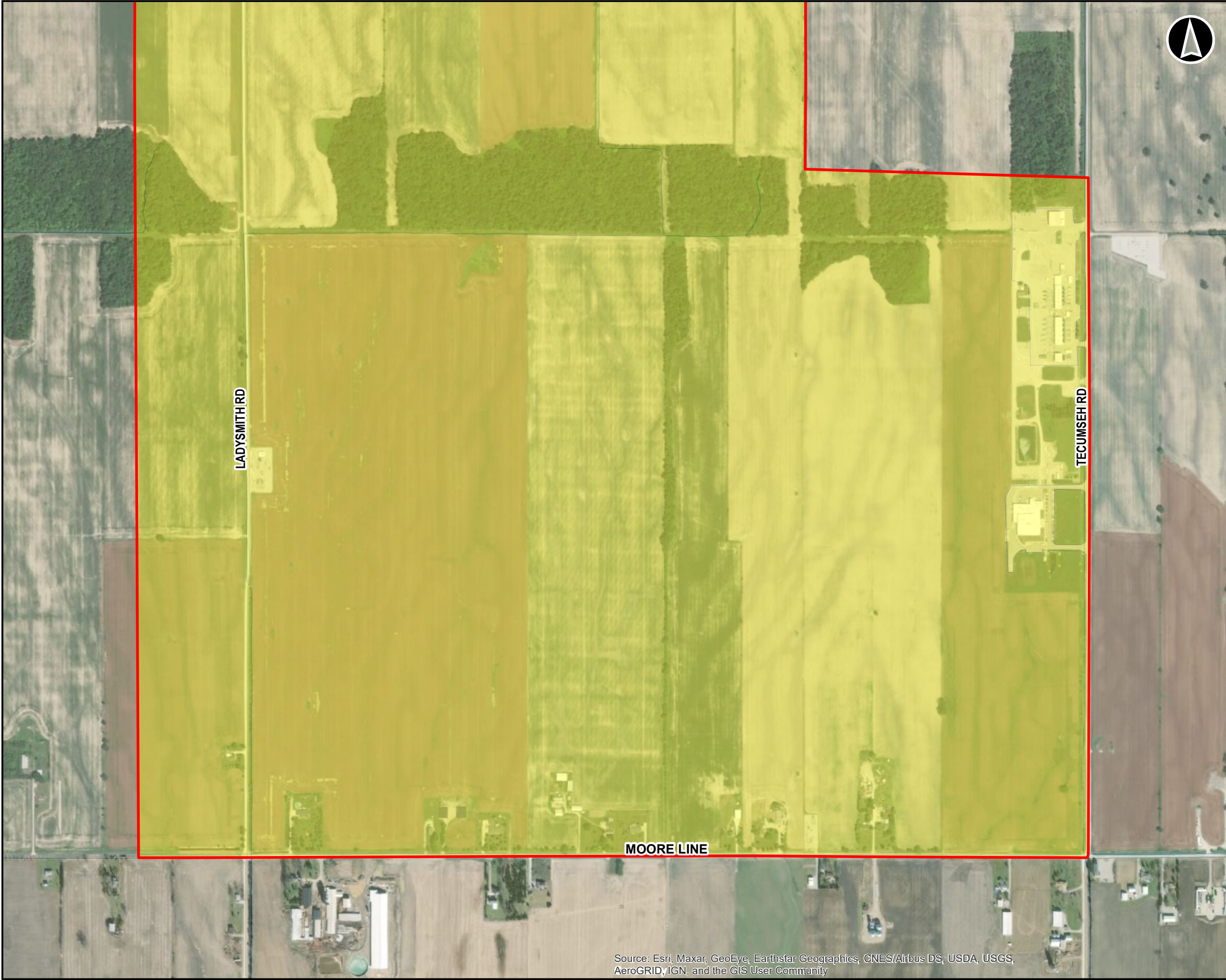
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
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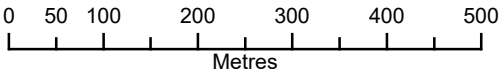
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Legend

-  Study Area
-  Stage 2 Archaeological Assessment Required



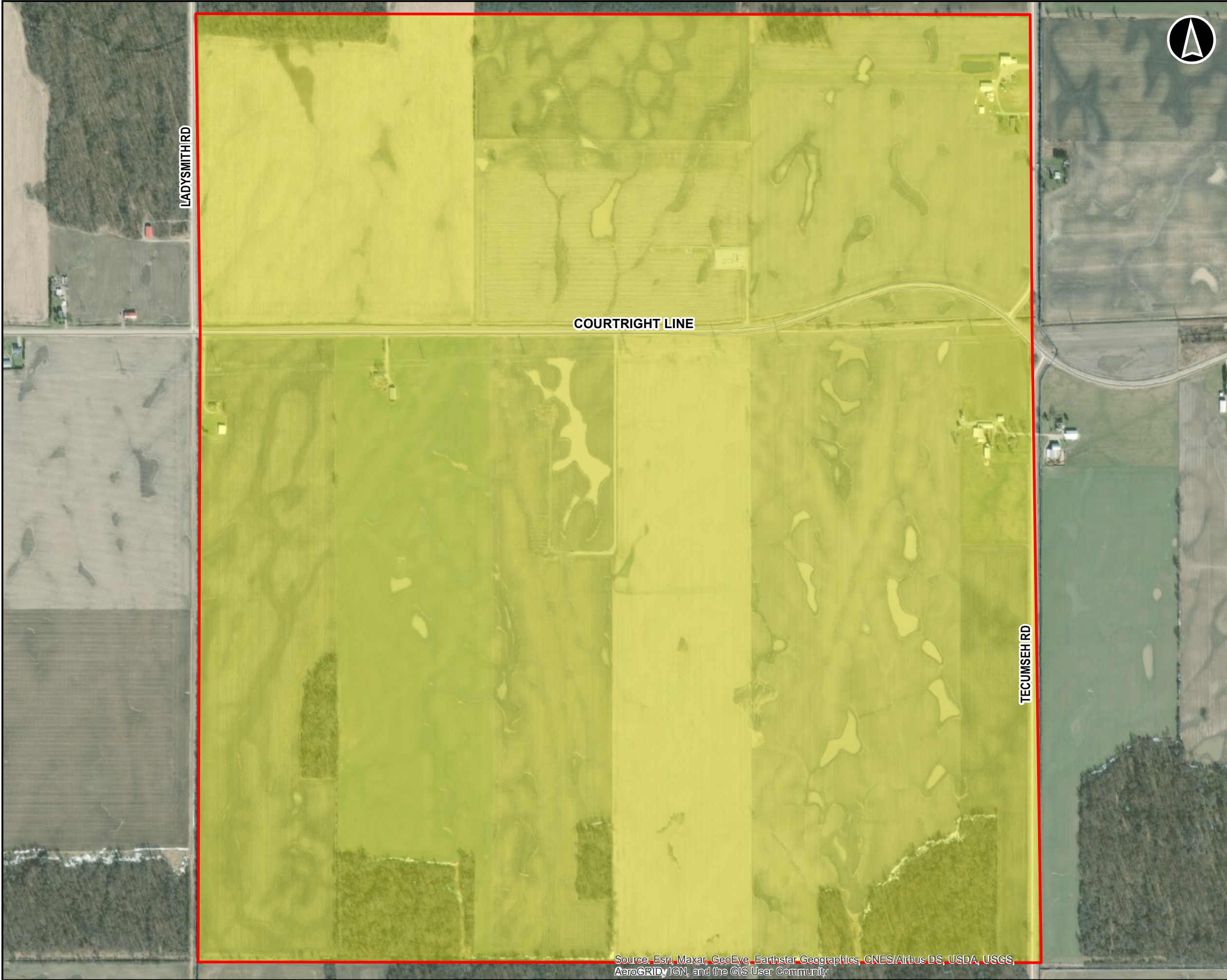
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2021/2022 Storage Enhancement Project
Municipality of St. Clair, Lambton County, Ontario

Results of the Stage 1 Archaeological Assessment

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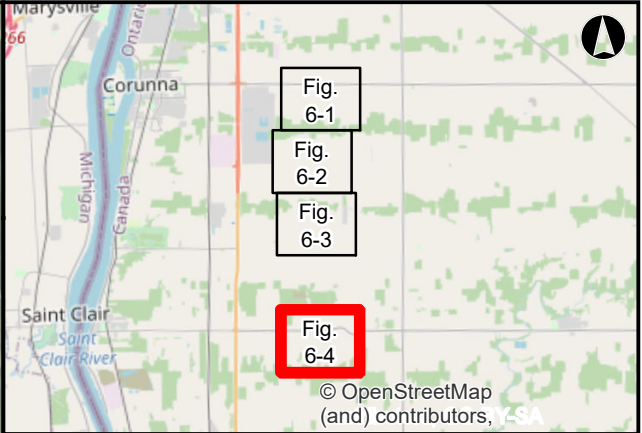
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
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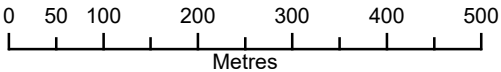
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TECUMSEH RD



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-  Study Area
-  Stage 2 Archaeological Assessment Required



Stage 1 Archaeological Assessment
2021/2022 Storage Enhancement Project
Municipality of St. Clair, Lambton County, Ontario

Results of the Stage 1 Archaeological Assessment

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As a fully integrated firm, we connect knowledge and experience across our global network of experts to help clients solve their most complex challenges.

From high-performance buildings and infrastructure, to resilient communities and environments, to stable and secure nations, our work is transformative, differentiated and vital. A Fortune 500 firm, AECOM companies had revenue of approximately US\$19 billion during the 12 months ended June 30, 2015.

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Enbridge Gas Inc.

Stage 2 Archaeological Assessment Corunna and Ladysmith A-1 Observation Well Drilling Project – Enbridge A-1 Observation Well TC8

**Part of Lot 19, Concession 10, Geographic Township
of Moore, Now the Township of St. Clair, Lambton
County, Ontario**

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June 28, 2021
Original Report

Project Number: 60658743

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Revision History

Revision #	Date	Revised By:	Revision Description

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Quality Information



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Junior Archaeologist



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Professional Archaeologist



Adria Grant, MA, CAHP
Associate Vice President
Impact Assessment and Permitting (IAP)

Executive Summary

AECOM Canada Ltd. (AECOM) was retained by Enbridge Gas Inc. to conduct a Stage 2 archaeological assessment in advance of proposed pipeline work at the Enbridge A-1 observation well TC8 site. This development is part of the larger Enbridge Corunna and Ladysmith A-1 Observation Well Drilling Project, which involves the drilling of two A-1 observation wells (TC8 and TL8) required to monitor the gas content and pressure in the Corunna and Ladysmith Designated Storage Areas in the Township of St. Clair, Lambton County, and will assist with the continued safe and reliable delivery of natural gas to existing and future customers. This report addresses archaeological concerns for well TC8; well TL8 and accompanying laneway will be addressed in a subsequent report by AECOM.

The study area is located on what is historically known as Part of Lot 19, Concession 10, Geographic Township of Moore, now the Township of St. Clair, Lambton County, Ontario (Figures 1 and 2). This Stage 2 archaeological assessment was triggered by the requirements of the Ontario Energy Board's (OEB) *Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario* and conducted in accordance with Chapter 4, subsection 4.3.4 prior to implementation of the project (Ontario Energy Board 2016). This project is also subject to the *Ontario Heritage Act* (Government of Ontario 1990) and *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011).

The current study area was previously subject to a Stage 1 archaeological assessment completed by AECOM in 2020. The Stage 1 archaeological assessment encompassed an approximately 1100-hectare parcel of land located in the Geographic Township of Moore, Lambton County, Ontario as part of the Enbridge 2021/2022 Storage Enhancement Project. The assessment determined high potential for the recovery of both First Nation and Euro-Canadian archaeological resources within the study area and recommended further Stage 2 archaeological assessment for any potentially undisturbed areas within the scope of the Stage 1 report. Wells TC8 and TL8 were originally part of the overarching 2021/2022 Storage Enhancement Project but were later separated into the Enbridge Corunna and Ladysmith A-1 Observation Well Drilling Project.

All archaeological consulting activities were conducted under PIF number P438-0248-2021 issued to Professional Archaeologist Samantha Markham, MES (P438) in accordance with the Ministry of Heritage, Sport, Tourism and Culture Industries' (MHSTCI) *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011). Permission to enter the property to conduct fieldwork, including the collection of artifacts when present, was provided by Enbridge Gas Inc., and no limitations were placed on access.

Project Personnel

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GIS Analyst	Ben Clark, BAA

Acknowledgements

Proponent Contact	Evan Tomek, BES, Enbridge Gas Inc.
Approval Authority	Zora Crnojacki, Ontario Energy Board

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1. Project Context

1.1 Development Context

AECOM Canada Ltd. (AECOM) was retained by Enbridge Gas Inc. to conduct a Stage 2 archaeological assessment in advance of proposed pipeline work at the Enbridge A-1 observation well TC8 site. This development is part of the larger Enbridge Corunna and Ladysmith A-1 Observation Well Drilling Project, which involves the drilling of two A-1 observation wells (TC8 and TL8) required to monitor the gas content and pressure in the Corunna and Ladysmith Designated Storage Areas in the Township of St. Clair, Lambton County, and will assist with the continued safe and reliable delivery of natural gas to existing and future customers. This report addresses archaeological concerns for well TC8; well TL8 and accompanying laneway will be addressed in a subsequent report by AECOM.

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1.1.1 Objectives

The objective of the Stage 2 archaeological assessment is to provide an overview of archaeological resources on the property, make a determination as to whether any of the resources might be artifacts or archaeological sites with cultural heritage value or interest requiring further assessment, and to recommend appropriate Stage 3 assessment strategies for any archaeological sites identified.

1.2 Historical Context

Years of archaeological research and assessments in southern Ontario have resulted in a well-developed understanding of the historic use of land in Lambton County from the earliest First Nation people to the more recent Euro-Canadian settlers and farmers. Table 1 provides a breakdown of the cultural and temporal history of past occupations in Lambton County.

Table 1: Cultural Chronology for Lambton County

Archaeological Period	Time Period	Characteristics
Early Paleo	9000-8400 BC	<ul style="list-style-type: none"> Fluted Points Arctic tundra and spruce parkland, caribou hunters
Late Paleo	8400-8000 BC	<ul style="list-style-type: none"> Holcombe, Hi-Lo and Lanceolate Points Slight reduction in territory size
Early Archaic	8000-6000 BC	<ul style="list-style-type: none"> Notched and Bifurcate base Points Growing populations
Middle Archaic	6000-2500 BC	<ul style="list-style-type: none"> Stemmed and Brewerton Points, Laurentian Development Increasing regionalization
Late Archaic	2000-1800 BC	<ul style="list-style-type: none"> Narrow Point Environment similar to present
	1800-1500 BC	<ul style="list-style-type: none"> Broad Point Large lithic tools
	1500-1100 BC	<ul style="list-style-type: none"> Small Point Introduction of bow
Terminal Archaic	1100-950 BC	<ul style="list-style-type: none"> Hind Points, Glacial Kame Complex Earliest true cemeteries
Early Woodland	950-400 BC	<ul style="list-style-type: none"> Meadowood Points Introduction of pottery
Middle Woodland	400 BC – AD 500	<ul style="list-style-type: none"> Dentate/Pseudo-scallop Ceramics Increased sedentism
	AD 550-900	<ul style="list-style-type: none"> Princess Point Introduction of corn horticulture
Late Woodland	AD 900-1300	<ul style="list-style-type: none"> Agricultural villages
	AD 1300-1400	<ul style="list-style-type: none"> Increased longhouse sizes
	AD 1400-1650	<ul style="list-style-type: none"> Warring nations and displacement
Contact Period	AD 1600-1875	<ul style="list-style-type: none"> Early written records and treaties
Historic	AD 1749-present	<ul style="list-style-type: none"> European settlement (French and English)

Notes: Taken from Ellis and Ferris (1990)

The following sections provide a detailed summary of the archaeological cultures that have settled in the vicinity of the study area. As Chapman and Putnam (1984) illustrate, the modern physiography of southern Ontario is largely a product of events of the last major glacial stage and the landscape is a complex mosaic of features and deposits produced during the last series of glacial retreats and advances prior to the withdrawal of the continental glaciers from the area. Southwestern Ontario was finally ice free approximately 12,500 years ago. With continuing ice retreat and lake regressions the land area of southern Ontario progressively increased while barriers to the influx of plants, animals, and people steadily diminished (Karrow and Warner 1990). The lands within Lambton County have been

extensively utilized by pre-contact First Nation people who began occupying southwestern Ontario as the glaciers receded from the land, as early as 11,000 BC.

1.2.2 Pre-Contact First Nation Settlement

In this period the first human settlement can be traced back to 11,000 BC; these earliest well-documented groups are referred to as *paleo* which literally means old or ancient. During the Paleo period people were non-agriculturalists who depended on hunting and gathering of wild food; they moved their encampments on a regular basis to be in the locations where these resources naturally became available, and the size of the groups occupying any particular location would vary depending on the nature and size of the available food resources (Ellis and Deller 1990). The picture that has emerged for the early and late Paleo is of groups at low population densities who were residentially mobile and made use of large territories during annual cycles of resource exploitation.

The Archaic Period

The next major cultural period following the Paleo is termed the Archaic, which is broken temporally into the Early, Middle, and Late Archaic periods. There is much debate on how the term Archaic is employed; general practice bases the designation on assemblage content as there are marked differences in artifact suites from the preceding Paleo and subsequent Woodland periods. As Ellis *et al.* (1990) note, from an artifact and site characteristic perspective the Archaic is simply used to refer to non-Paleo manifestations that predate the introduction of ceramics. Ellis *et al.* (1990) stress that Archaic groups can be distinguished from earlier groups based on site characteristics and artifact content.

Early Archaic sites have been reported throughout much of southwestern Ontario and extend as far north as the Lake Huron Basin region and as far east as Rice Lake (Deller *et al.* 1986). A lack of excavated assemblages from southern Ontario has limited understandings and inferences regarding the nature of stone tool kits in the Early Archaic and tool forms other than points are poorly known in Ontario; however, at least three major temporal horizons can be recognized and can be distinguished based on projectile point form (Ellis *et al.* 1990). These horizons are referred to as Side-Notched (ca. 8,000-7,700 BC), Corner-Notched (ca. 7,700-6,900 BC), and Bifurcated (ca. 6,900-6,000 BC) (Ellis *et al.* 1990). Additional details on each of these horizons and the temporal changes to tool types can be found in Ellis *et al.* (1990).

The Middle Archaic period (6,000-2,500 BC), like the Early Archaic, is relatively unknown in southern Ontario. Ellis *et al.* (1990) suggest that artifact traits that have come to be considered as characteristic of the Archaic period, first appear in the Middle Archaic. These traits include fully ground and polished stone tools, specific tool types including banner stones and net-sinkers, and the use of local and/or non-chert type materials for lithic tool manufacture (Ellis *et al.* 1990).

The Late Archaic begins around approximately 2,000 BC and ends with the beginning of ceramics and the Meadowood Phase at roughly 950 BC. Much more is known about this period than the Early and Middle Archaic and several Late Archaic sites are known. Sites appear to be more common than earlier periods, suggesting some degree of population increase. True cemeteries appear and have allowed for the analysis of band size, biological relationships, social organization, and health. Narrow and Small point traditions appear as well as tool recycling wherein points were modified into drills, knives, end scrapers, and other tools (Ellis *et al.* 1990). Other tools include serrated flakes used for sawing or shredding, spokeshaves, and retouched flakes manufactured into perforators, gravers, micro-perforators, or piercers. Tools on coarse-grained rocks such as sandstone and quartz become common and include hammerstones, net-sinkers, anvils, and cobble spalls. Depending on preservation, several Late Archaic sites include bone and/or antler artifacts which likely represent fishing toolkits and ornamentation. These artifacts include bone harpoons, barbs, or hooks, notched projectile points, and awls. Bone ornaments recovered have included tubular bone beads and drilled mammal canine pendants (Ellis *et al.* 1990).

Throughout the Early to Late Archaic periods the natural environment warmed, and vegetation changed from closed conifer-dominated vegetation cover, to the mixed coniferous and deciduous forest in the north and deciduous vegetation in the south we see in Ontario today (Ellis *et al.* 1900). During the Archaic period there are indications of increasing populations and decreasing size of territories exploited during annual rounds; fewer moves of residential camps throughout the year and longer occupations at seasonal campsites; continuous use of certain locations on a seasonal basis over many years; increasing attention to ritual associated with the deceased; and, long range exchange and trade systems for the purpose of obtaining valued and geographically localized resources (Ellis *et al.* 1990).

The Woodland Period

The Early Woodland period is distinguished from the Late Archaic period primarily by the addition of ceramic technology, which provides a useful demarcation point for archaeologists but is expected to have made less difference in the lives of the Early Woodland peoples. The settlement and subsistence patterns of Early Woodland people shows much continuity with the earlier Archaic with seasonal camps occupied to exploit specific natural resources (Spence *et al.* 1990). During the Middle Woodland well-defined territories containing several key environmental zones were exploited over the yearly subsistence cycle. Large sites with structures and substantial middens appear in the Middle Woodland associated with spring macro-band occupations focussed on utilizing fish resources and created by consistent returns to the same site (Spence *et al.* 1990). Groups would come together into large macro-bands during the spring-summer at lakeshore or marshland areas to take advantage of spawning fish; in the fall inland sand plains and river valleys were occupied for deer and nut harvesting and groups split into small micro-bands for winter survival (Spence *et al.* 1990). This is a departure from earlier Woodland times when macro-band aggregation is thought to have taken place in the winter (Ellis *et al.* 1988; Granger 1978).

The period between the Middle and Late Woodland period was both technically and socially transitional for the ethnically diverse populations of southern Ontario and these developments laid the basis for the emergence of settled villages and agriculturally based lifestyles (Fox 1990). The Late Woodland period began with some groups shifting settlement and subsistence patterns, involving an increasing reliance on corn horticulture. Corn may have been introduced into southwestern Ontario from the American Midwest as early as AD 600. However, it did not become a dietary staple until at least three to four hundred years later. The first agricultural villages in southwestern Ontario date to the AD 10th century. Unlike the riverine base camps of the Middle Woodland period, Late Woodland sites are in the uplands, on well-drained sandy soils.

In the Late Woodland period, between AD 900-1300, villages tended to be small settlements with nearby camps and hamlets that served as temporary spaces for hunting game and gathering resources outside of the villages. At this time, small village sites were characterized by the presence of longhouses with villages being occupied considerably longer than later in the Woodland period. Villages tended to be moved when nearby soils had been depleted by farming and conveniently collected firewood grew scarce. The Jesuits reported that the Huron moved their villages once every 10-15 years as they relied less heavily on corn than did later groups, and since their villages were much smaller, there was less demand on nearby resources. Small amounts of corn appear to have been a dietary component currently; however, archaeological evidence suggests that its role was not as a dietary staple at this time but was possibly supplemental in nature.

Between AD 1300 and 1400, village sizes grew significantly, resulting in the development of complex community political systems. This period also marks the emergence of fully developed horticulture, including the cultivation of corn, beans, and squash. Additionally, changes in ceramic styles may reflect increasing levels of inter-community communication and integration. This is supported by Michi Saagiig (Mississauga Anishinaabeg) oral histories, which speak to the coming of the corn growers and the symbiotic relationships that Algonkian speaking groups had with the Huron-Wendat in particular. By the beginning of the fourteenth century, larger fortified village sites were often cleared to accommodate the cultivation of corn, beans, and squash because of an increasing reliance on horticulture.

Longhouses also continued to grow until AD 1450 when a decrease in house length is observed. This decrease in house length may be partially attributed to large scale drops in population size associated with the introduction of European diseases.

1.2.3 Post-Contact Period Settlement

The post-contact Indigenous occupation of southern Ontario was heavily influenced by the dispersal of Iroquoian speaking peoples, including the Six Nations of the Iroquois – Mohawk, Cayuga, Oneida, Seneca, Onondaga, and Tuscarora. This was followed by the return of Algonkian speaking groups from northern Ontario, including the Michi Saagig, who had temporarily retreated to their wintering grounds in the mid-1600s to avoid warfare and disease as a result of colonial settlement. Algonkian speaking Ojibwe (Chippewa), Odawa (Ottawa), and Pottawatomi, known as the Three Fires Confederacy, remained in their traditional territory that covered a vast area of southern Ontario as well as eastern Michigan.

As European settlers encroached on their territory the nature of First Nation population distribution, settlement size and material culture changed. Despite these changes it is possible to correlate historically recorded villages with archaeological manifestations and the similarity of those sites to more ancient sites reveals an antiquity to documented cultural expressions that confirms a long historical continuity to systems of Indigenous ideology and thought (Ferris 2009).

It is important to note that, when discussing the historical documentation of the movement of Indigenous people, what has been documented by early European explorers and settlers represents only a very small snapshot in time. Documentation of where Indigenous groups were residing during European exploration and settlement is restricted to only a very short period and does not reflect previous and subsequent movements of these groups. This brief history does not reflect the full picture of the pre- or post-contact period occupation of Indigenous groups or cultures. As such, relying on historic documentation regarding Indigenous occupation and movement across the landscape can lead to misinterpretation. For example, noting the movement of Indigenous groups into an area may incorrectly suggest to the reader that these groups had not occupied the area previously; however, this is not the case. It is clear from Indigenous oral histories and the archaeological record that pre-contact Indigenous populations were extremely mobile and not tied to any one specific area. Over the vast period prior to the arrival of Europeans, Indigenous groups, language families, and cultures were fluid across the landscape.

The study area also falls within the part of Ontario that was purchased by the Crown as part of Treaty No. 27 ½ on April 25, 1825 (Figure 3). Morris (1943) describes Treaty No. 27 ½ as follows:

...an agreement made at Amherstburg in the Western District of the Province of Upper Canada on the 26th of April, 1825, between James Givens, Esquire, Superintendent of Indian Affairs, on behalf of His Majesty King George the Fourth and the Chiefs and Principal Men of the part of the Chippewa Nation of Indians, inhabiting and claiming the tract of land....Wawanosh Township in the County of Huron was named after Way-way-nosh the principal Chief of the Band making this Treaty.

Morris 1943

Treaty Number 27½ was subsequently confirmed on July 10th, 1827 as Treaty Number 29 with only a minor change in the legal description of the boundaries of the land surrender (Morris 1943). The Chippewa Nation inhabiting and claiming this land was composed of 440 individuals, who would be entitled to equally share the yearly sum of 1,100 pounds. While it is difficult to delineate treaty boundaries on modern maps, Figure 3 provides an illustration of treaties and purchases with the approximate location of the current study area shown.

1.2.4 Euro-Canadian Settlement

The Sarnia-Lambton Region and Lambton County

Euro-Canadian immigrants to the Sarnia-Lambton region began to settle the area as early as 1796, when French settlers first arrived and settled along the banks of the St. Clair river (Elford 1982). However, a significant wave of settlers would not begin to arrive until at least the 1830s. A subsequent wave followed in the 1850s during the potato famine in Ireland, resulting in a large population boom; by 1891, the population had risen to 58,810 individuals (Elford 1982). The principle crops grown in Sarnia-Lambton included wheat and peas, and farmers also supplemented their income by selling forestry products (City of Sarnia 2016). The early growth of Sarnia was stimulated by the wealth of stands of timber and the discovery of oil in the late 1850s. Lambton County became independent in 1853, following the Municipal Act of 1849 and the initial completion of surveying in 1835. It takes its name from Governor General John George Lambton, first Earl of Durham, who authored *The Report on the Affairs of British North America* (1839), often referred to as the Durham Report. This text investigated two armed uprisings known as the Rebellions of 1837-1838 and would later have a profound influence on the development of the *British North America Act, 1840* (Elford 1982), which established the Province of Canada in 1841.

In 1858, James M. Williams developed the world's first commercial oil well, which started an oil boom in the area. With the arrival of the Great Western Railway in 1858 and the Grand Trunk Railway in 1859, the shipping industry expanded and the rail lines were later linked to the United States by the opening of a rail tunnel under the St. Clair River in 1889. Later, ferry service to the U.S. was formed, bringing in prospectors from all over North America (City of Sarnia 2016).

Township of Moore

The Township of Moore takes its name from Sir John Moore, a general of the British Army killed at the 1829 Battle of Corunna (Elford 1982). The first Euro-Canadian settlements in this township were established along the St. Clair river, with surveyor Roswell Mount completing his work by 1829. A portion of land was ceded from the Aamjiwnaang First Nation in 1827 as part of Treaty 29, and a reserve was formed along the southern boundary of the Township of St. Clair (Plain 2017). To continue settlement expansion and agricultural activity, significant swamp drainage and forest clearing in the township needed to be undertaken, which would lead to a \$20,000 debt incurred by 1881 (Phelps 1973). Agriculture would remain an important industry for the township, and the land around the study area is still for the most part utilized for agricultural purposes.

Land Use and Settlement of the Study Area

The 1880 *Illustrated Historical Atlas of the County of Lambton* (H. Belden & Co.) was reviewed to determine the presence of 19th century settlement features within the study area as the presence of historic features elevates the potential for the recovery of 19th century archaeological resources. The study area is historically located on part of Lot 19, Concession 10, Geographic Township of Moore, Lambton County (Figure 4).

No landowners or historic structures are depicted on the mapping; however, it should be noted that not all features of interest, particularly farmhouses and smaller homesteads, were mapped systematically as this would have been beyond the intended scope of the Ontario historical atlas series. In addition, given that atlases were funded by subscription, preference regarding the level of detail included was given to subscribers. As such, the absence of structures or other features on historic atlas maps does not preclude the presence of historic features at the time the area was surveyed.

1.2.5 Reports with Relevant Background Information

To inform the current Stage 2 archaeological assessment and further establish the archaeological context of the study area, a search of the ASDB was conducted by AECOM to determine if any previous archaeological work has been completed within the current study area or within 50 m of the study area boundaries. The search did not result in the identification of any archaeological reports within 50 m of the study area; however, reports relevant to the Enbridge 2021/2022 Storage Enhancement Project are listed in Table 3 below.

Table 2: Archaeological Reports with Relevant Background Information

Year	Title	Author	PIF Number
2012	<i>Stage 2 Archaeological Assessment NOVA 2020 Lots 22, 23, 24, 25 and 26 Concession 10; Lots 22, 23 and 24 Concession 9; Lots 25 and 26 Concession 8; and Lots 25 and 26 Concession 7, Geographic Township of Moore, Municipality of St. Clair Township, Lambton County</i>	Stantec Consulting (Stantec)	P001-684-2012
2020	<i>Stage 1 Archaeological Assessment 2021/2022 Storage Enhancement Project Part of Lots 19-21, Concessions 4-5, and Lots 18-22, Concessions 7-11, Geographic Township of Moore, Now Township of St. Clair, Lambton County, Ontario</i>	AECOM	P438-0224-2020
2021	<i>Stage 2 Archaeological Assessment 2021/2022 Storage Enhancement Project, Parts of Lot 20, Concession 5, and Lot 19, Concession 4, Geographic Township of Moore, Now Township of St. Clair, Lambton County, Ontario</i>	AECOM	P438-0237-2020

In 2012, Stantec conducted a Stage 2 archaeological assessment of the NOVA Chemicals Corunna and Moore facility properties as part of the NOVA 2020 project, east of the Town of Corunna, Lambton County. This assessment resulted in the identification of six archaeological sites: three Euro-Canadian surface scatters, two isolated precontact lithic artifacts, and one precontact lithic scatter. Only the Euro-Canadian sites Location 1 (AfHo-49, 30 artifacts), Location 4 (AfHo-40, 68 artifacts), and Location 6 (AfHo-51, 122 artifacts) were found to retain cultural heritage value or interest, and were recommended for Stage 3 archaeological assessment (Stantec 2012).

In 2020, AECOM conducted a Stage 1 archaeological assessment of an approximately 1100-hectare parcel of land located in the Geographic Township of Moore, Lambton County, Ontario as part of the 2021/2022 Enbridge Storage Enhancement Project. The assessment determined high potential for the recovery of both First Nation and Euro-Canadian archaeological resources within the study area and recommended further Stage 2 archaeological assessment for any potentially undisturbed areas within the scope of the report. The current study area is within the Stage 1 land previously assessed by AECOM (2020, Figure 6).

In 2021, AECOM conducted a Stage 2 archaeological assessment as part of the 2021/2022 Enbridge Storage Enhancement Project on two parcels of land, TL8 and TL9, located on what is historically known as Part of Lot 20, Concession 5, and Lot 19, Concession 4, Geographic Township of Moore, now the Township of St. Clair, Lambton County, Ontario. The Stage 2 archaeological assessment of TL8 south of Courtright Line resulted in the identification of one archaeological site, and the assessment of TL9 north of Courtright Line did not recover archaeological material. As such, the archaeological site registered with the MHSTCI as Location 1 (AeHo-150) was determined to fulfill the criteria for further Stage 3 archaeological investigation, while the TL9 study area was determined to be free of archaeological concern, and no further work was recommended (AECOM 2021).

To the best of our knowledge, there are no other reports concerning archaeological work conducted within or in close proximity (i.e. within 50 m) of the study area; however, it should be noted that the MHSTCI does not maintain a database of all properties that have had past archaeological investigations and searches of the MHSTCI's public register do not always result in a complete listing of all archaeological work conducted in a given area. In consequence, in some cases the only way a consulting archaeologist will know that a past assessment has been conducted in a given area is if they have personal knowledge of it, or if the assessment resulted in the discovery and registration of one or more archaeological sites.

Archaeological Management Plans, Listed Properties, Heritage Plaques, and Historic Places

There does not yet appear to be Archaeological Master Plans for Lambton County. This may be because most of the county is situated in predominantly rural settings with limited development that could be informed by a master plan study. A review of the Lambton County Inventory of Heritage Resources was completed to determine the presence of any heritage properties or historically significant sites within or near the study area. The results of this search identified no listed properties, heritage plaques, or historic places within and/or near the study area boundaries.

1.3 Archaeological Context

1.3.1 Natural Environment

The modern physiography of Southern Ontario is largely a product of events of the last major glacial stage, the Wisconsin and Late Wisconsin time (ca. 25,000-10,000 BC). The landscape of Lambton County is made up of a complex arrangement of features and deposits produced during the last series of glacial advances and retreats by the Simcoe Lobe and Ontario Lobe of the North American Laurentide ice sheet prior to the withdrawal of the glacier from Southern Ontario (Ellis and Ferris 1990). Those features and deposits that were formed by glacial action are represented by till plains, end moraines, and drumlins.

The study area is situated within the St. Clair Clay Plain, as described by Chapman & Putnam (1986).

Adjoining Lake St. Clair in Essex and Kent County Counties and the St. Clair River in Lambton County are extensive clay plains covering 2,270 square miles. The region is one of little relief, lying between 575 and 700 feet a.s.l., except for the moraine at Ridgeway and Blenheim which rises 50 to 500 feet higher....Glacial Lake Whittlesey, which deeply covered all of these lands, and Lake Warren which subsequently covered nearly the whole area, failed to leave deep stratified beds of sediment on the underlying clay till except around Chatham, between Blenheim and the Rondeau marshes, and in a few other smaller areas. Most of Lambton and Essex Counties, therefore, are essentially till plains smoothed by shallow deposits of lacustrine clay which settled in the depressions while the knolls were being lowered by wave action.

Chapman & Putnam 1986

The single most important environmental feature necessary for extended human occupation is potable water. As such, proximity to water is regarded as a useful index for the determination of potential for the presence of archaeological resources. The St. Clair river, a 65.2 km river flowing into Lake St. Clair from Lake Huron, is located west of the study area, while the soils within the study area are exclusively Brookston clay (Figure 6).

These environmental characteristics would have provided an ideal environment for both temporary and permanent settlement throughout the pre-and post-contact periods. The water sources would have served as important pre- and post-contact transportation routes as well as sources of potable water and riverine resources. During the 19th and 20th centuries, rapid deforestation resulted in significant land clearance and over time, the once diverse forest life

and wide range of tree species and natural resources would have also been depleted as agricultural and modern residential and commercial development continued. Over the course of the 19th century, the study area would have been made up of agricultural land just outside of the rapidly expanding municipality and port of call of Mooretown along historically surveyed road allowances. As a result of continuing urban development, this portion of southern Ontario is almost completely deforested today.

1.3.2 Known Archaeological Sites

AECOM conducted a data search of the ASDB to determine if any registered archaeological sites are located within the study area as well as within 1 km of the current study area boundaries. This search resulted in the identification of no registered archaeological sites.

Information concerning specific site locations is protected by provincial policy and is not fully subject to the *Freedom of Information and Protection of Privacy Act (FIPPA)*. The release of such information in the past has led to looting or various forms of illegally conducted site destruction. Confidentiality extends to all media capable of conveying location, including maps, drawings, or textual descriptions of a site location. The MHSTCI will provide information concerning site location to the party or an agent of the party holding title to a property, or to a licensed archaeologist with relevant cultural resource management interests.

1.3.3 Existing Conditions

The study area consists of an agricultural field situated southwest of Petrolia Line and Tecumseh Road; the topography is generally flat with areas of gently rolling hills. An existing Enbridge station is located to the south of the current study area.

2. Field Methods

The Stage 2 field survey was conducted on May 11, 2021, under PIF P438-0248-2021, issued to Professional Archaeologist Samantha Markham, MES (P438). Joshua Keddy, MA (P484) acted as field supervisor and the fieldwork involved the physical survey of all land to be impacted by the proposed Enbridge A-1 observation well TC8 site as part of the Corunna and Ladysmith A-1 Observation Well Drilling Project the Township of St. Clair, Lambton County. Weather conditions during the field survey were ideal and at no time were conditions detrimental to the identification and recovery of archeological material. The weather during the Stage 2 field survey was described as partly sunny and windy with a high of 10°C. At the request of Enbridge Gas Inc., a representative of the Aamjiwnaang First Nation participated in the Stage 2 archaeological assessment alongside the AECOM archaeology team.

The portions of the study area subject to Stage 2 field survey were comprised of an agricultural field that had been ploughed and weathered prior to assessment; surface visibility was at least 80%. In accordance with *Standards and Guidelines for Consultant Archaeologists* (Section 2.1.2, Standards 1-9, Government of Ontario 2011) the ploughed agricultural field was subject to pedestrian survey at a 5 m interval.

Images 1-7 illustrate the methods and conditions for the Stage 2 field survey. As per *Standards and Guidelines for Consultant Archaeologists* (Section 7.8.6, Standard 1a, Ontario Government 2011), photograph locations and directions are provided on Figure 7 along with an illustration of the methods and results of the Stage 2 field survey.

3. Record of Finds

This Stage 2 archaeological assessment was conducted by employing the methods outlined in Section 2 of this report. Table 3 provides a listing of the documentary record generated by the Stage 2 fieldwork and indicates the location of each document type.

Table 3: Inventory of Documentary Record

Document Type	Quantity	Location	Additional Comments
Field Notes	~ 1 page	AECOM London Office	In original field folder and stored digitally in project file
Proponent Maps	1	AECOM London Office	Stored digitally in project file
Hand-Drawn Maps	0	AECOM London Office	Stored digitally in project file
Digital Photographs	7	AECOM London Office	Stored digitally in project file

The Stage 2 field survey did not result in the identification of any archaeological resources, sites, or material.

4. Analysis and Conclusions

The previous Stage 1 archaeological assessment conducted by AECOM (2020) which includes the Enbridge A-1 observation well TC8 study area determined that archaeological potential within the study area boundaries is high; however, the Stage 2 field survey did not result in the identification of any archaeological sites, or the recovery of archaeological material.

5. Recommendations

The previous Stage 1 archaeological assessment for the 2021/2022 Storage Enhancement Project conducted by AECOM (2020) which includes the Enbridge A-1 observation well TC8 study area determined that archaeological potential within the study area boundaries is high; however, the Stage 2 field survey did not result in the identification of any archaeological sites, or the recovery of archaeological material. As such, **no further archaeological assessment is required for the study area addressed in this report.**

Should additional land outside of the current study area be included as part of the proposed Corunna and Ladysmith A-1 Observation Well Drilling Project, the standard requirements for archaeological assessments to be conducted prior to land disturbance remain in place.

The MHSTCI is asked to accept this report into the Ontario Public Register of Archaeological Reports thereby concurring with the recommendations presented herein. As no further archaeological assessment is required, archaeological concerns for the Corunna and Ladysmith A-1 Observation Well Drilling Project – Enbridge A-1 Observation Well TC8, Part of Lot 19, Concession 10, Geographic Township of Moore, now the Township of St. Clair, Lambton County, Ontario have been fully addressed.

Please note that this archaeological assessment report has been written to meet the requirements of the MHSTCI's Standards and Guidelines for Consultant Archaeologists (Ontario Government 2011); however properties that are subject to archaeological assessment are not considered cleared for ground disturbance activities until the associated report has been reviewed and accepted by the MHSTCI. In order to maintain compliance with the MHSTCI and the *Ontario Heritage Act* (1990), no ground disturbing activities are to occur until the proponent and approval authority receive a formal letter from the MHSTCI stating that the recommendations provided herein are compliant and that the report has been accepted into the MHSTCI register of archaeological reports.

6. Advice on Compliance with Legislation

This report is submitted to the Ontario Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection, and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Heritage, Sport, Tourism and Culture Industries, a letter will be issued by the Ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act*.

Archaeological sites recommended for further archaeological fieldwork or protection remain subject to section 48 (1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological license.

The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 (when proclaimed in force in 2012) require that any person discovering human remains must notify the police or coroner and the Registrar of Burial Sites, War Graves, Abandoned Cemeteries, and Cemetery Closures.

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8. Images



Photo 1 - Pedestrian survey at 5 m interval, facing north



Photo 2 – Surface visibility, facing down



Photo 3 - Surface visibility, facing down



Photo 4 - Pedestrian survey at 5 m interval, facing south



Photo 5 - Surface visibility, facing down



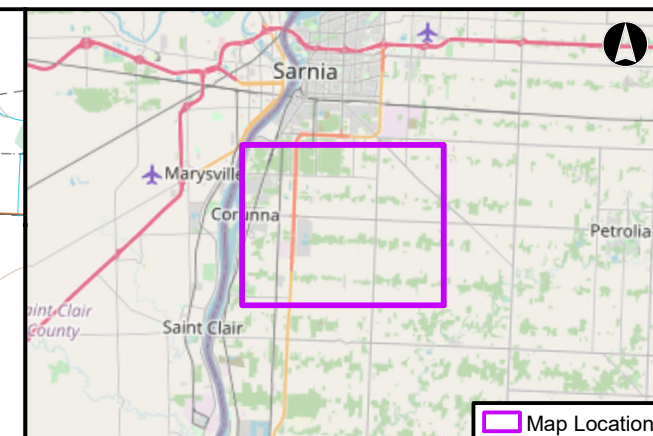
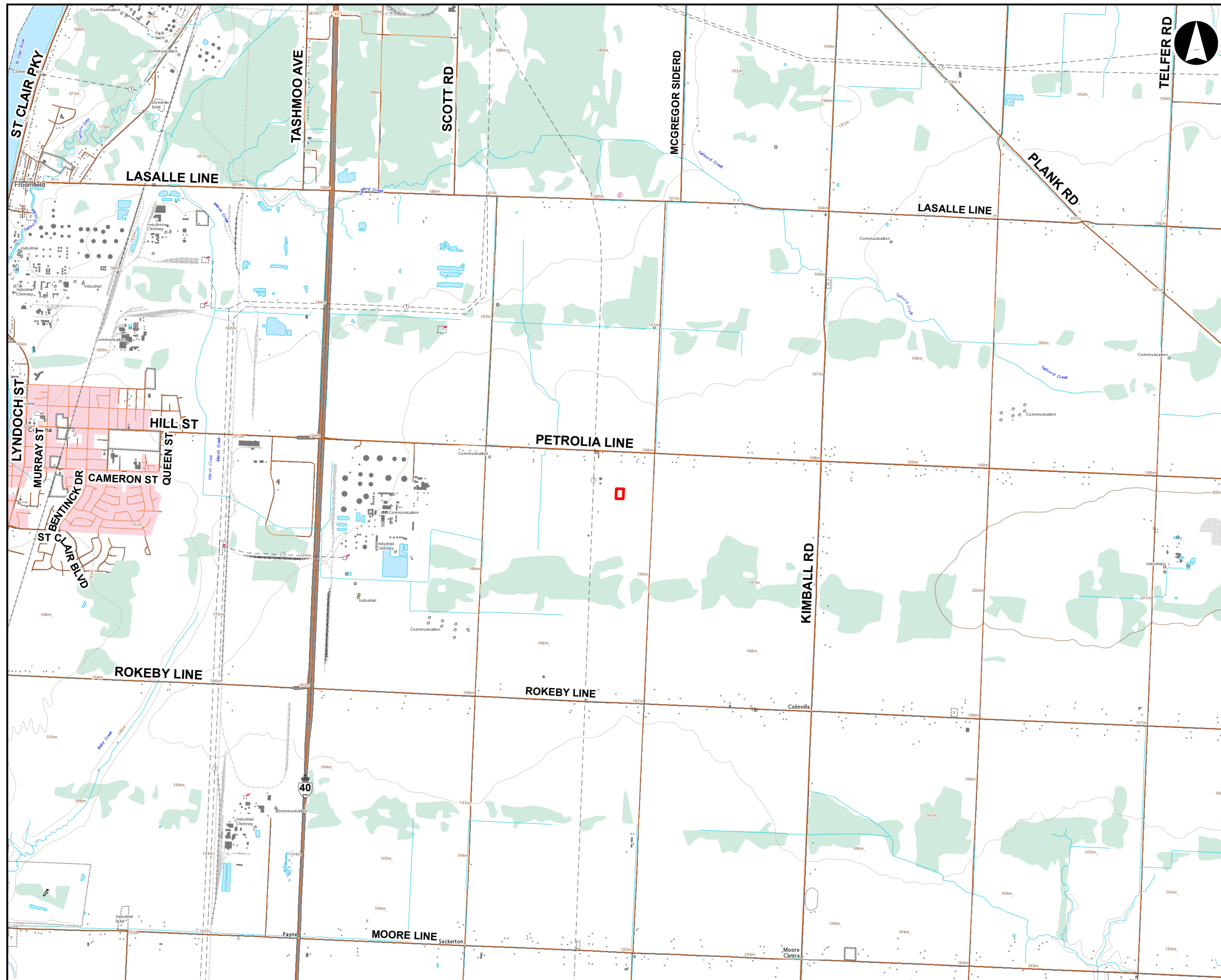
Photo 6 - Surface visibility, facing down




Photo 7 - Pedestrian survey at 5 m interval, facing north

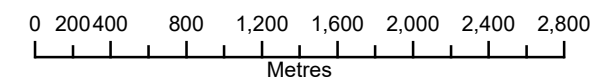
9. Figures

All figures pertaining to the Stage 2 archaeological assessment for the proposed Corunna and Ladysmith A-1 Observation Well Drilling Project – Enbridge A-1 Observation Well TC8 study area in Lambton County, Ontario are provided on the following pages.



 Map Location

Legend

 Study Area

Stage 2 Archaeological Assessment
Corunna and Ladysmith A-1 Observation Well
Drilling Project – Enbridge A-1 Observation Well
TC8, Municipality of St. Clair, Lambton County, ON

Location of the Study Area

Jun, 2021

1:40,000

Datum: NAD 1983 UTM Zone 17N
Source: MNRF, <http://wms.ess-ws.nrcan.gc.ca/wms/toporama/en>

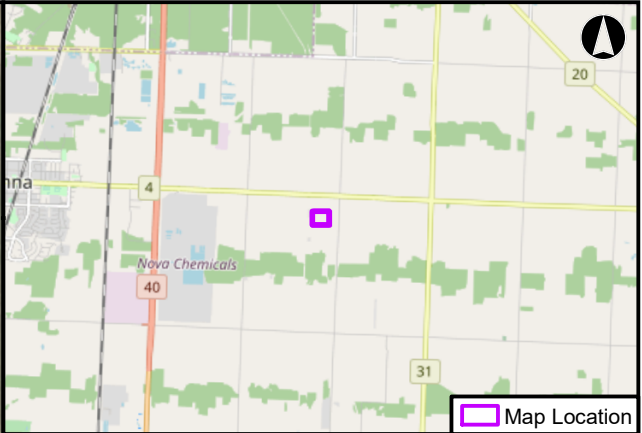
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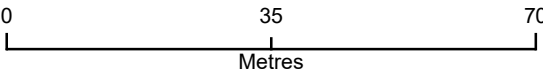
Figure 1

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Legend


 Study Area



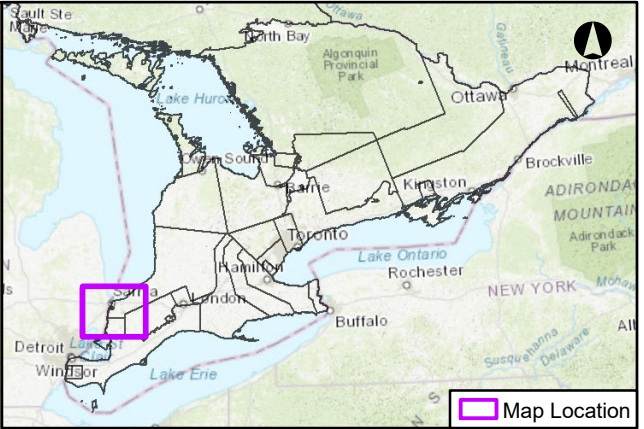
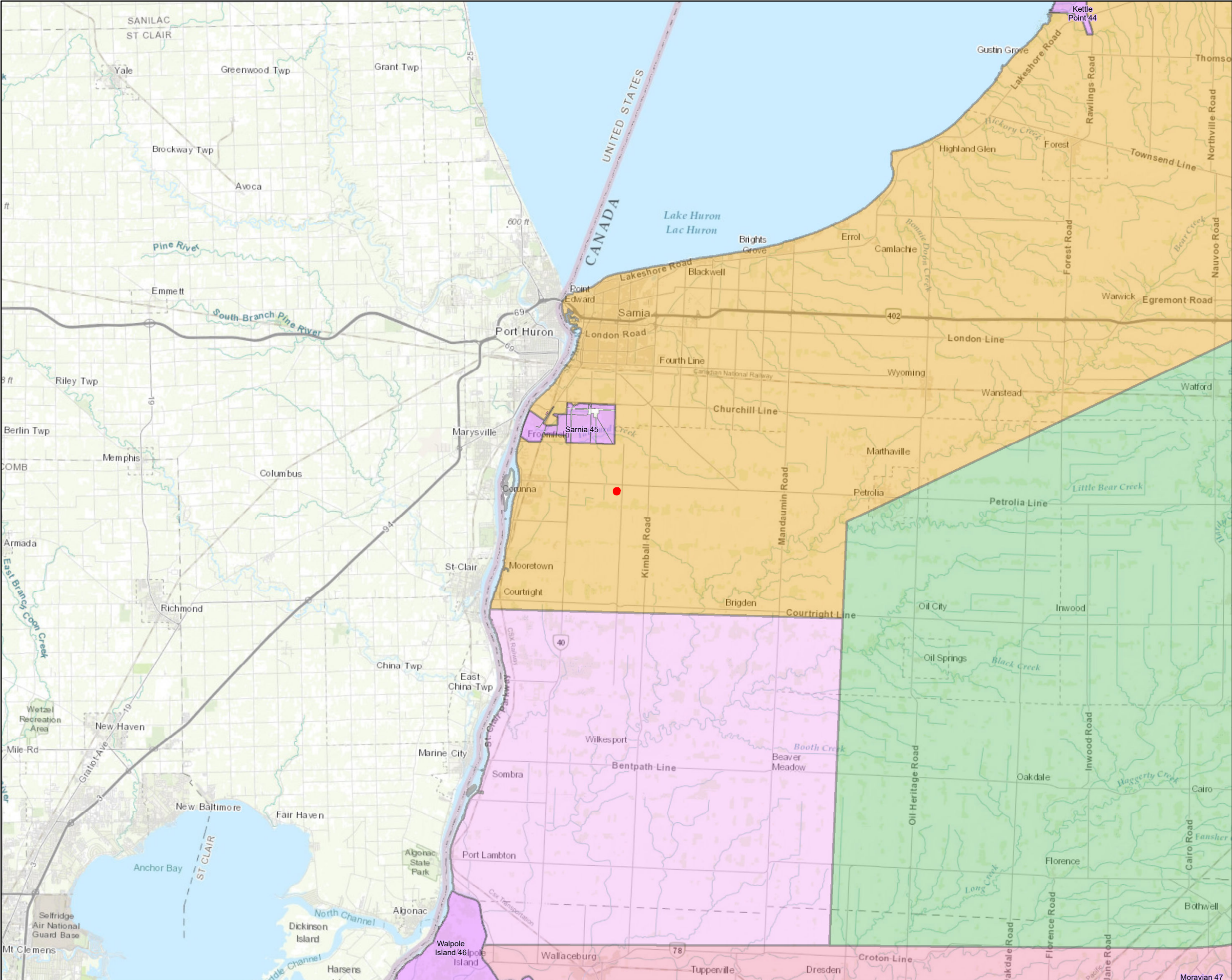
Stage 2 Archaeological Assessment
Corunna and Ladysmith A-1 Observation Well
Drilling Project – Enbridge A-1 Observation Well
TC8, Municipality of St. Clair, Lambton County, ON

Study Area in Detail

Jun, 2021	1:1,000 <small>* when printed 11"x17"</small>	Datum: NAD 1983 UTM Zone 17N Source: MNRF
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P#: 60633149		Figure 2

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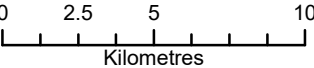


Legend

- Study Area
- First Nations Reserve Land

Treaty

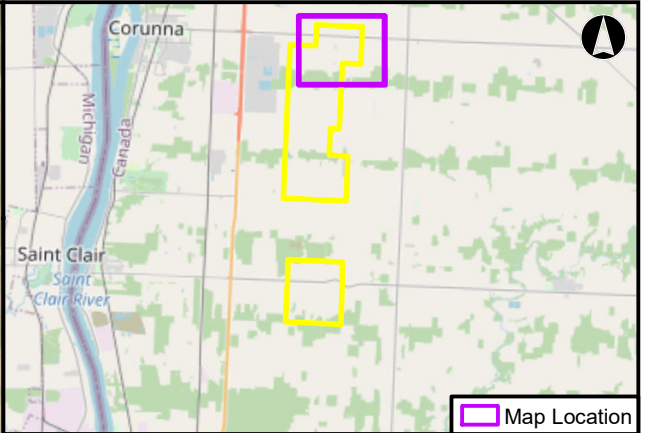
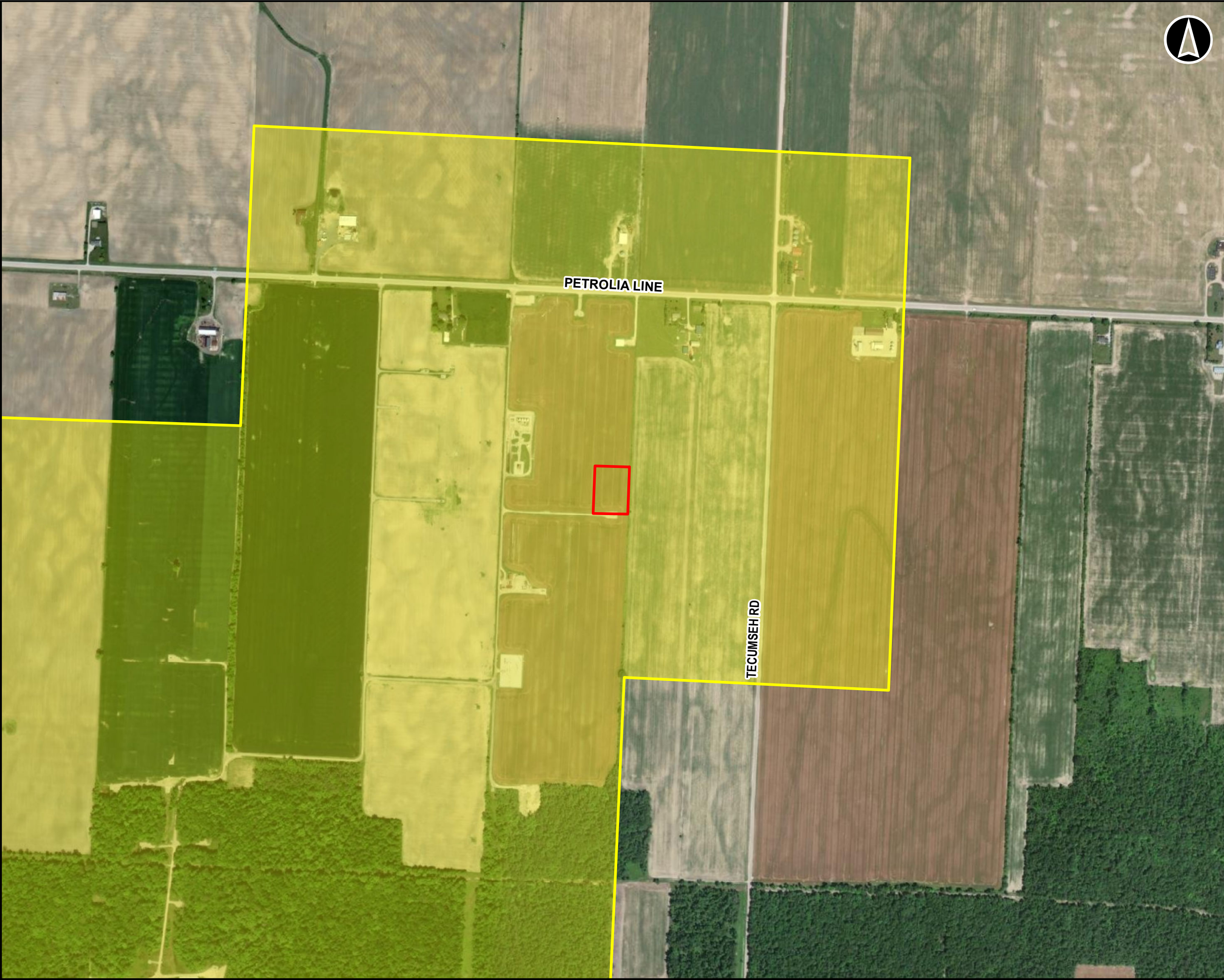
- Huron Tract Purchase, Treaty 29, August 13, 1833
- Long Woods Purchase, Treaty 21, March 9, 1819
- McKee Purchase, Treaty 2, May 19, 1790
- Sombra Township Purchase, Treaty 7, September 7, 1796



Stage 2 Archaeological Assessment
Corunna and Ladysmith A-1 Observation Well
Drilling Project – Enbridge A-1 Observation Well
TC8, Municipality of St. Clair, Lambton County, ON

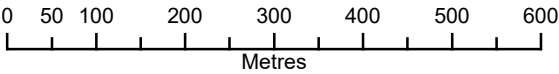
Ontario Treaties Map

June 2021	1:250,000	Datum: NAD83 UTM17 Source: www.ontario.ca/page-map-ontario-treaties-and-reserves#17
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		Figure 3
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Legend

- Stage 1 Study Area
- Stage 2 Study Area
- Stage 2 Archaeological Assessment Required



Stage 2 Archaeological Assessment
Corunna and Ladysmith A-1 Observation Well
Drilling Project – Enbridge A-1 Observation Well
TC8, Municipality of St. Clair, Lambton County, ON

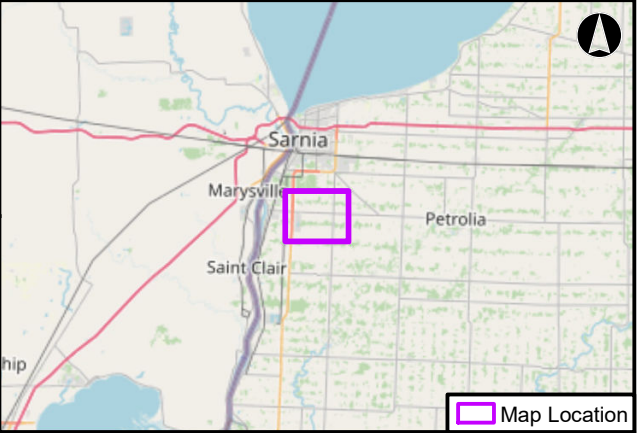
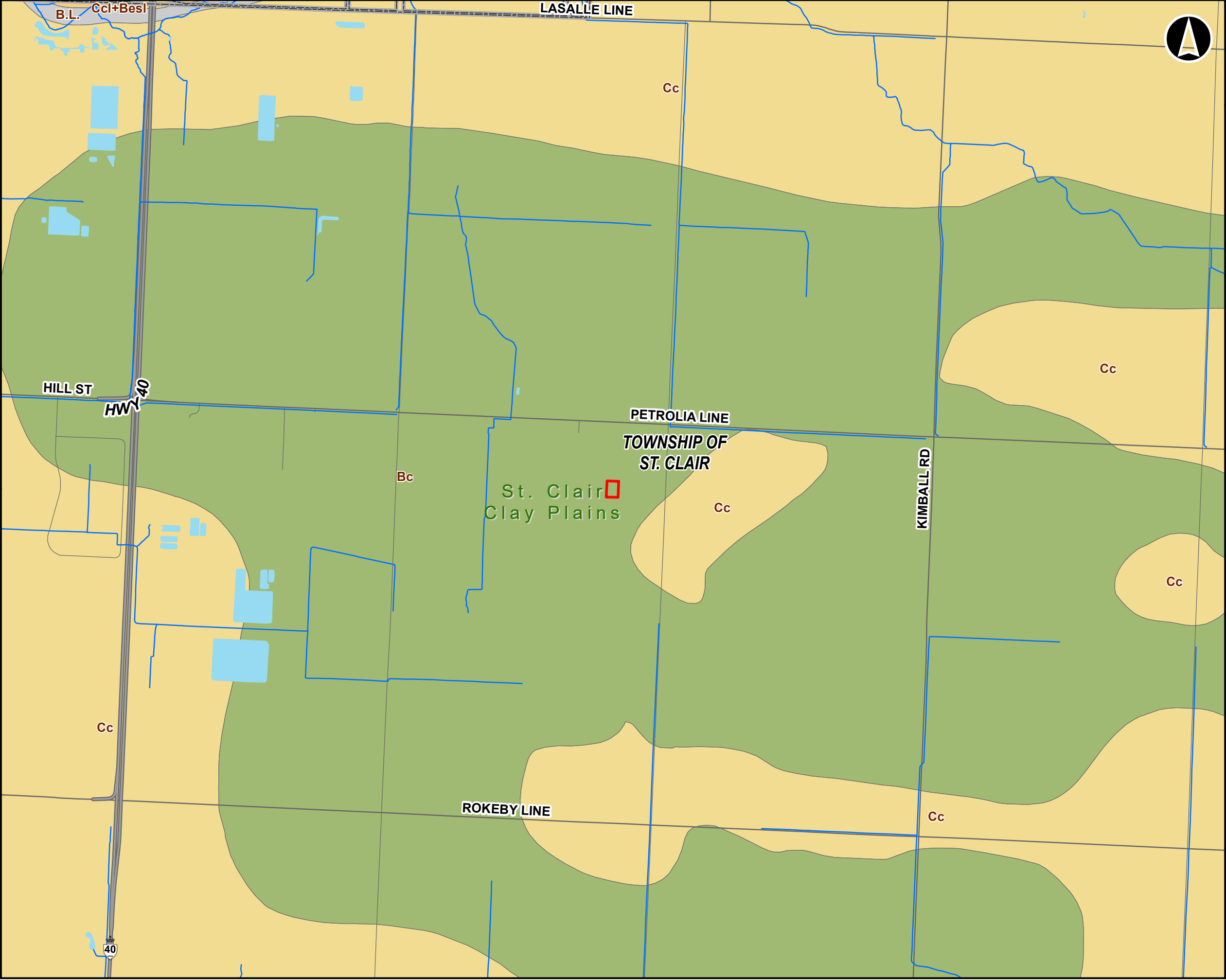
Previous Archaeological Assessments

Jun, 2021	1:8,500	Datum: NAD 1983 UTM Zone 17N Source: MNRF
P#: 60633149		* when printed 11"x17"

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Figure 5

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Legend

Study

Municipal Boundary

Physiographic Region

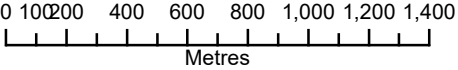
Soils

B.L. - Unclassified

Bc - Brookston, Clay

Cc - Clyde, Clay

Ccl+Besl - Caistor, Clay Loam



Stage 2 Archaeological Assessment
Corunna and Ladysmith A-1 Observation Well
Drilling Project – Enbridge A-1 Observation Well
TC8, Municipality of St. Clair, Lambton County, ON

Soil Drainage and Agricultural Suitability

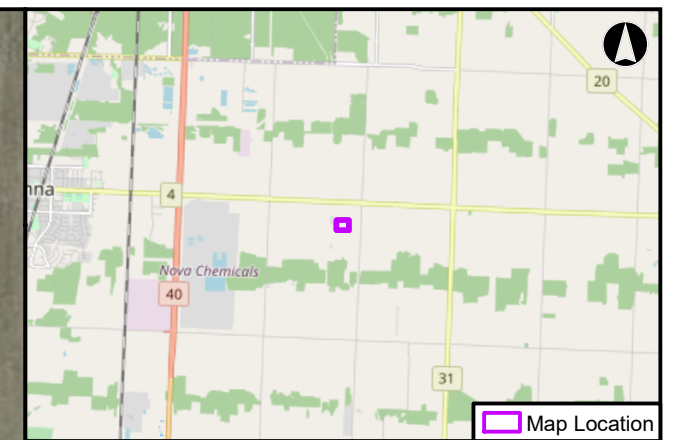
Jun, 2021	1:25,000 <small>* when printed 11"x17"</small>	Datum: NAD 1983 UTM Zone 17N Source: MNR, Ontario Soil Report Lambton County 1957
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P#: 60633149

AECOM

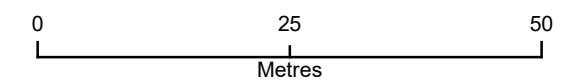
Figure 6

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Legend

- ③ Photo Location and Direction
- Study Area
- Pedestrian Survey at 5m Intervals



Stage 2 Archaeological Assessment
Corunna and Ladysmith A-1 Observation Well
Drilling Project – Enbridge A-1 Observation Well
TC8, Municipality of St. Clair, Lambton County, ON

Results of the Stage 2 Field Survey

Jun, 2021	1:750	Datum: NAD 1983 UTM Zone 17N Source: MNRF
P#: 60633149	* when printed 11"x17"	Figure 7
		

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As a fully integrated firm, we connect knowledge and experience across our global network of experts to help clients solve their most complex challenges.

From high-performance buildings and infrastructure, to resilient communities and environments, to stable and secure nations, our work is transformative, differentiated and vital. A Fortune 500 firm, AECOM companies had revenue of approximately US\$19 billion during the 12 months ended June 30, 2015.

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Enbridge Gas Inc.

Stage 2 Archaeological Assessment 2021/2022 Storage Enhancement Project Parts of Lot 20, Concession 5, and Lot 19, Concession 4, Geographic Township of Moore, Now Township of St. Clair, Lambton County, Ontario

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PIF Number: P438-0237-2020

February 3, 2021
Original Report

Project Number: 60633149

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Revision History

Revision #	Date	Revised By:	Revision Description

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The attached Report (the "Report") has been prepared by AECOM Canada Ltd. ("AECOM") for the benefit of the Client ("Client") in accordance with the agreement between AECOM and Client, including the scope of work detailed therein (the "Agreement").

The information, data, recommendations and conclusions contained in the Report (collectively, the "Information"):

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- represents AECOM's professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to AECOM which has not been independently verified;
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Ontario Department Manager
Impact Assessment and Permitting (IAP)

Executive Summary

AECOM Canada Ltd. (AECOM) was retained by Enbridge Gas Inc. to conduct a Stage 2 archaeological assessment for the proposed 2021/2022 Storage Enhancement Project in Lambton County, Ontario, in advance of the proposed development of a natural gas pipeline, as well as accompanying storage enhancement works. Two study areas were assessed in this study. One study area consists an area approximately 2 hectares (ha) in size and is located on part of Lot 20, Concession 5 in the Geographic Township of Moore, now Township of St. Clair, Lambton County, Ontario. The other is approximately 1.2 ha in size and is located on part of Lot 19, Concession 4 in the Geographic Township of Moore, now Township of St. Clair, Lambton County, Ontario.

This Stage 2 archaeological assessment was triggered by the requirements of the Ontario Energy Board's (OEB) *Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario* and conducted in accordance with Chapter 4, subsection 4.3.4 prior to implementation of the project (Ontario Energy Board 2016). This project is also subject to the *Ontario Heritage Act* (Government of Ontario 1990) and the *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011).

AECOM's Stage 1 archaeological background study of the 2021/2022 Storage Enhancement Project has determined that the potential for the recovery of archaeological resources is high, given the proximity of the study area to previously identified Euro-Canadian archaeological sites, proximity to the St. Clair river, and areas of early Euro-Canadian settlement and early transportation routes. Areas where archaeological potential has been removed include areas that have been subject to extensive land alterations that have significantly compromised the recovery of archaeological materials such as constructed roadways. All potentially undisturbed areas must be subject to Stage 2 field survey.

The Stage 2 archaeological assessment for the proposed 2021/2022 Storage Enhancement Project in Lambton County, Ontario, in advance of the proposed development of a natural gas pipeline resulted in the identification of one archaeological location, a 19th to 20th century Euro-Canadian artifact scatter. Location 1 (AeHo-150) is a concentrated scatter of over 158 pieces of 19th century Euro-Canadian cultural material, within an area measuring approximately 45 m east-west by 95 m north-south. Diagnostic items recovered during the Stage 2 archaeological assessment are indicative of a period of occupation spanning from the later 19th century into the 20th century. Given the presence of at least 20 diagnostic artifacts that date to a period of use before 1900, Location 1 fulfills the criteria for further Stage 3 archaeological investigation as per Section 2.2, Standard 1c of the *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). Location 1 has been registered with the Ontario MHSTCI as Location 1 (AeHo-150).

The Stage 2 archaeological assessment for the proposed 2021/2022 Storage Enhancement Project in Lambton County, Ontario, in advance of the projected development of a natural gas pipeline resulted in the identification of one archaeological site. Archaeological site Location 1 (AeHo-150) fulfills the criteria for further Stage 3 archaeological investigation, as per Section 2.2, Standards 1b and 1c of the *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). **As such, further Stage 3 site-specific archaeological assessment is recommended for Location 1 (AeHo-150).**

The Stage 3 archaeological assessment for Location 1 (AeHo-150) must include the hand excavation test unit methodology, as outlined in Section 3.2 and Table 3.1 of the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011), to further test the nature and density of each site. The Stage 3 site specific assessment for this site will include the following methods:

- Location 1 (AeHo-150) was identified during pedestrian survey within an open agricultural field, so a controlled surface pick-up (CSP) must be conducted prior to test unit excavation. If ground surface visibility has

decreased since the time of the Stage 2 survey and the Stage 3 CSP, the subject area must be re-ploughed and weathered;

- Hand excavation will consist of the controlled excavation of 1 m square test units over the concentration of the artifact scatter to determine the presence of buried artifacts, structures, stratigraphy and cultural features (Section 3, *Standards and Guidelines for Consultant Archaeologists*, Ontario Government 2011);
- Location 1 (AeHo-150) has been identified as a site where it is not yet evident that the level of cultural heritage value or interest may result in a recommendation to proceed to Stage 4 mitigation. As such, test unit placement should begin at 5 m intervals across the extent of each site, and additional test units amounting to 20% of the grid unit total should be placed in areas of interest within the site extents such as areas of higher artifact concentrations and/or adjacent to high yielding units;
- Test units should be excavated to a depth of 5 cm into the subsoil and, as per Section 3.2.2., Standard 7 of the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011), the entire contents of each unit must be screened through mesh with an aperture of no greater than 6 mm; and,
- If test unit excavation uncovers a cultural feature, do not excavate into feature fill. Instead, record the exposed plan of the feature and place geotextile fabric over the unit floor and backfill the unit.

Apart from the required site-specific Stage 3 of Location 1 (AeHo-150), all other parcels of land included in this Stage 2 archaeological assessment report did not result in the identification of any archaeological sites or materials. Therefore, they are considered clear of further archaeological concerns.

Should additional land outside of the current study area be included as part of the proposed 2021/2022 Storage Enhancement Project, the standard requirements for archaeological assessments to be conducted prior to land disturbance remain in place. The Stage 2 archaeological assessment must be conducted by a licensed archaeologist and must follow the requirements set out in the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011), including:

- The standard test pit survey method at 5 m intervals is to be conducted in all areas that will be impacted by the project where ploughing is not feasible (e.g. woodlots, overgrown areas, manicured lawns, small sections of agricultural land); and
- Pedestrian survey at 5 m intervals where ploughing is possible (e.g. agricultural fields). This assessment will occur when agricultural fields have been recently ploughed, weathered by rain, and exhibit at least 80% surface visibility.
- Poorly drained areas, areas of steep slope, and areas of confirmed previous disturbance (e.g. building footprints, roadways, areas with identifiable underground infrastructure) are to be mapped and photo-documented but are not recommended for Stage 2 survey as they possess low to no archaeological potential.

The MHSTCI is asked to accept this report into the Ontario Public Register of Archaeological Reports thereby concurring with the recommendations presented herein. As further archaeological assessment is required for Location 1 (AeHo-150), archaeological concerns for Location 1 (AeHo-150) of the 2021/2022 Storage Enhancement Project in Lambton County, Ontario, have not been fully addressed.

Please note that this archaeological assessment report has been written to meet the requirements of the MHSTCI's *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011); however properties that are subject to archaeological assessment are not considered cleared for ground disturbance activities until the associated report has been reviewed and accepted by the MHSTCI. In order to maintain compliance with the MHSTCI and the

Ontario Heritage Act (1990), no ground disturbing activities are to occur until the proponent and approval authority receive a formal letter from the MHSTCI stating that the recommendations provided herein are compliant and that the report has been accepted into the MHSTCI register of archaeological reports.

Project Personnel

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Licensed Archaeologist	Samantha Markham, MA (P438)
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Senior Review	Adria Grant, MA, CAHP
GIS Analyst	Ben Clark, BAA

Acknowledgements

Proponent Contact	Evan Tomek, BES, Enbridge Gas Inc.
Approval Authority	Zora Crnojacki, Ontario Energy Board

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1. Project Context

1.1 Development Context

AECOM Canada Ltd. (AECOM) was retained by Enbridge Gas Inc. to conduct a Stage 2 archaeological assessment for the proposed 2021/2022 Storage Enhancement Project in Lambton County, Ontario, in advance of the proposed development of a natural gas pipeline, as well as accompanying storage enhancement works. Two study areas were assessed in this study. One study area consists an area approximately 2 hectares (ha) in size and is located on part of Lot 20, Concession 5 in the Geographic Township of Moore, now Township of St. Clair, Lambton County, Ontario. The other is approximately 1.2 ha in size and is located on part of Lot 19, Concession 4 in the Geographic Township of Moore, now Township of St. Clair, Lambton County, Ontario.

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All archaeological consulting activities were conducted under PIF number PIF# P438-0237-2020 issued to Professional Archaeologist Samantha Markham in accordance with the Ministry of Heritage, Sport, Tourism and Culture Industries' (MHSTCI) *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011). Permission to enter the property to conduct fieldwork, including the collection of artifacts when present, was provided by Enbridge Gas Inc. on behalf of the current landowner.

1.1.1 Objectives

The objective of the Stage 2 archaeological assessment is to provide an overview of archaeological resources on the property, make a determination as to whether any of the resources might be artifacts or archaeological sites with cultural heritage value or interest requiring further assessment, and to recommend appropriate Stage 3 assessment strategies for any archaeological sites identified.

1.2 Historical Context

Years of archaeological research and assessments in southern Ontario have resulted in a well-developed understanding of the historic use of land in Lambton County from the earliest First Nation people to the more recent

Euro-Canadian settlers and farmers. Table 1 provides a breakdown of the cultural and temporal history of past occupations in Lambton County.

Table 1: Cultural Chronology for Lambton County

Archaeological Period	Time Period	Characteristics
Early Paleo	9000-8400 BC	<ul style="list-style-type: none"> Fluted Points Arctic tundra and spruce parkland, caribou hunters
Late Paleo	8400-8000 BC	<ul style="list-style-type: none"> Holcombe, Hi-Lo and Lanceolate Points Slight reduction in territory size
Early Archaic	8000-6000 BC	<ul style="list-style-type: none"> Notched and Bifurcate base Points Growing populations
Middle Archaic	6000-2500 BC	<ul style="list-style-type: none"> Stemmed and Brewerton Points, Laurentian Development Increasing regionalization
Late Archaic	2000-1800 BC	<ul style="list-style-type: none"> Narrow Point Environment similar to present
	1800-1500 BC	<ul style="list-style-type: none"> Broad Point Large lithic tools
	1500-1100 BC	<ul style="list-style-type: none"> Small Point Introduction of bow
Terminal Archaic	1100-950 BC	<ul style="list-style-type: none"> Hind Points, Glacial Kame Complex Earliest true cemeteries
Early Woodland	950-400 BC	<ul style="list-style-type: none"> Meadowood Points Introduction of pottery
Middle Woodland	400 BC – AD 500	<ul style="list-style-type: none"> Dentate/Pseudo-scallop Ceramics Increased sedentism
	AD 550-900	<ul style="list-style-type: none"> Princess Point Introduction of corn horticulture
Late Woodland	AD 900-1300	<ul style="list-style-type: none"> Agricultural villages
	AD 1300-1400	<ul style="list-style-type: none"> Increased longhouse sizes
	AD 1400-1650	<ul style="list-style-type: none"> Warring nations and displacement
Contact Period	AD 1600-1875	<ul style="list-style-type: none"> Early written records and treaties
Historic	AD 1749-present	<ul style="list-style-type: none"> European settlement (French and English)

Notes: Taken from Ellis and Ferris (1990)

The following sections provide a detailed summary of the archaeological cultures that have settled in the vicinity of the study area. As Chapman and Putnam (1984) illustrate, the modern physiography of southern Ontario is largely a product of events of the last major glacial stage and the landscape is a complex mosaic of features and deposits produced during the last series of glacial retreats and advances prior to the withdrawal of the continental glaciers from the area. Southwestern Ontario was finally ice free by 12,500 years ago. With continuing ice retreat and lake regressions the land area of southern Ontario progressively increased while barriers to the influx of plants, animals, and people steadily diminished (Karrow and Warner 1990). The land within Lambton County has been extensively utilized by pre-contact First Nation people who began occupying southwestern Ontario as the glaciers receded from the land, as early as 11,000 BC.

1.2.2 Pre-Contact First Nation Settlement

The Paleo Period

In this area the first human settlement can be traced back to 11,000 BC; these earliest well-documented groups are referred to as Paleo which literally means old or ancient. During the Paleo period people were non-agriculturalists who depended on hunting and gathering of wild food, they moved their encampments on a regular basis to be in the locations where these resources naturally became available, and the size of the groups occupying any particular location would vary depending on the nature and size of the available food resources (Ellis and Deller 1990). The picture that has emerged for the early and late Paleo is of groups at low population densities who were residentially mobile and made use of large territories during annual cycles of resource exploitation.

The Archaic Period

The next major cultural period following the Paleo is termed the Archaic, which is broken temporally into the Early, Middle, and Late Archaic periods. There is much debate on how the term Archaic is employed; general practice bases the designation off assemblage content as there are marked differences in artifact suites from the preceding Paleo and subsequent Woodland periods. As Ellis *et al.* (1990) note, from an artifact and site characteristic perspective the Archaic is simply used to refer to non-Paleo manifestations that pre-date the introduction of ceramics. Ellis *et al.* (1990) stress that Archaic groups can be distinguished from earlier groups based on site characteristics and artifact content.

Early Archaic sites have been reported throughout much of southwestern Ontario and extend as far north as the Lake Huron Basin region and as far east as Rice Lake (Ellis *et al.* 1986). A lack of excavated assemblages from southern Ontario has limited understandings and inferences regarding the nature of stone tool kits in the Early Archaic and tool forms other than points are poorly known in Ontario; however, at least three major temporal horizons can be recognized and can be distinguished based on projectile point form (Ellis *et al.* 1990). These horizons are referred to as Side-Notched (ca. 8,000-7,700 BC), Corner-Notched (ca. 7,700-6,900 BC), and Bifurcated (ca. 6,900-6,000 BC) (Ellis *et al.* 1990). Additional details on each of these horizons and the temporal changes to tool types can be found in Ellis *et al.* (1990).

The Middle Archaic period (6,000-2,500 BC), like the Early Archaic, is relatively unknown in southern Ontario. Ellis *et al.* (1990) suggest that artifact traits that have come to be considered as characteristic of the Archaic period, first appear in the Middle Archaic. These traits include fully ground and polished stone tools, specific tool types including banner stones and net-sinkers, and the use of local and/or non-chert type materials for lithic tool manufacture (Ellis *et al.* 1990).

The Late Archaic begins around approximately 2,000 BC and ends with the appearance of ceramics and the Meadowood Phase at roughly 950 BC. Much more is known about this period than the Early and Middle Archaic and several Late Archaic sites are known. Sites appear to be more common than earlier periods, suggesting some degree of population increase. True cemeteries appear and have allowed for the analysis of band size, biological relationships, social organization, and health. Narrow and Small point traditions appear as well as tool recycling wherein points were modified into drills, knives, end scrapers, and other tools (Ellis *et al.* 1990). Other tools including serrated flakes used for sawing or shredding, spokeshaves, and retouched flakes manufactured into perforators, graters, micro-perforators, or piercers. Tools on coarse-grained rocks such as sandstone and quartz become common and include hammerstones, net-sinkers, anvils, and cobble spalls. Depending on preservation, several Late Archaic sites include bone and/or antler artifacts which likely represent fishing toolkits and ornamentation. These artifacts include bone harpoons, barbs or hooks, notched projectile points, and awls. Bone ornaments recovered have included tubular bone beads and drilled mammal canine pendants (Ellis *et al.* 1990).

Throughout the Early to Late Archaic periods the natural environment warmed, and vegetation changed from closed conifer-dominated vegetation cover, to the mixed coniferous and deciduous forest in the north and deciduous vegetation in the south we see in Ontario today (Ellis *et al.* 1990). During the Archaic period there are indications of increasing populations and decreasing size of territories exploited during annual rounds; fewer moves of residential camps throughout the year and longer occupations at seasonal campsites; continuous use of certain locations on a seasonal basis over many years; increasing attention to ritual associated with the deceased; and, long range exchange and trade systems for the purpose of obtaining valued and geographically localized resources (Ellis *et al.* 1990).

The Woodland Period

The Early Woodland period is distinguished from the Late Archaic period primarily by the addition of ceramic technology, which provides a useful demarcation point for archaeologists but is expected to have made less difference in the lives of the Early Woodland peoples. The settlement and subsistence patterns of Early Woodland people shows much continuity with the earlier Archaic with seasonal camps occupied to exploit specific natural resources (Spence *et al.* 1990). During the Middle Woodland well-defined territories containing several key environmental zones were exploited over the yearly subsistence cycle. Large sites with structures and substantial middens appear in the Middle Woodland associated with spring macro-band occupations focussed on utilizing fish resources and created by consistent returns to the same site (Spence *et al.* 1990). Groups would come together into large macro-bands during the spring-summer at lakeshore or marshland areas to take advantage of spawning fish; in the fall inland sand plains and river valleys were occupied for deer and nut harvesting and groups split into small micro-bands for winter survival (Spence *et al.* 1990). This is a departure from earlier Woodland times when macro-band aggregation is thought to have taken place in the winter (Ellis *et al.* 1988; Granger 1978).

The period between the Middle and Late Woodland periods was both technically and socially transitional for the ethnically diverse populations of Southern Ontario and these developments laid the basis for the emergence of settled villages and agriculturally based lifestyles (Fox 1990). A distinct cultural occupation emerged during the late Woodland Period in southern Ontario in the modern counties of Kent, Essex and Lambton as well as portions of west Middlesex and west Elgin. This emerging cultural manifestation may be generally classified as Western Basin Tradition, which was observed also in south-eastern Michigan and north-western Ohio. The inhabitants of these communities are considered distinct from Iroquoian groups to the east and Mississippian to the south. Instead, they represent prehistoric Central Algonquians.

Until recently little attention was paid to Western Basin Late Woodland occupations in southern Ontario, although several sites have been the focus of systematic excavation over the past 30 years, including Walpole Island First Nation in the late 1980's. Based on these investigations, the Late Woodland Western Basin Tradition of Southern Ontario may be broken down into four sub-phases based on evolving ceramic traditions and innovations in settlement-subsistence strategies. The Riviere au Vase Phase (AD 600 - 800/900) grew seamlessly out of the Middle Woodland tradition, with the most visible advancements observed in ceramic production and decoration. Lithic production was also a well-established industry during this early phase of the Late Woodland Period. Typical point forms are corner notched, or, among less well-made examples, side notched and triangular Levanna-like points appear in the final stages of the Riviere au Vase Phase. Subsistence strategies were maintained from the Middle Woodland Period, with the addition of seasonal harvesting as well as hunting and gathering activities. The general picture suggests that small hunting and gathering groups occupied south-western Ontario in the early Late Woodland period, exploiting seasonally abundant plant and animal resources. Settlement-subsistence practices over the coldest months are not known.

The following Younger Phase (AD 800 or 900 – 1200) witnessed a shift from seasonally mobile bands moving in an annual cycle to permanent or semi-permanent villages founded inland from major waterways and lakefronts. Subsistence strategies still comprised regional resource exploitation supplemented by agriculture. During warmer months, the Younger Phase communities focused their activities along lakeshores and major drainages. During

colder months, they moved inland to gather nuts and hunt deer and settled in small family winter camps. No formal villages existed at this time.

The Springwells Phase (1200-1400) maintained the trends established during the earlier Late Woodland Period phases. The general practice of exploitation was maintained, although warmer weather settlements began to develop into more established villages with formalised living areas and evidence of longhouses and palisades. These new communities centred around small lineage-based groups. By the end of this phase, large settlements with earth worked enclosures emerged. The shift toward more permanent communities may be partnered with the introduction of maize horticulture into general subsistence activities.

The distinction between the material culture of the Younger and Springwells Phases is blurred, particularly regarding ceramic styles. Vessels from both periods are well made and highly decorated. The Springwells phase maintains heterogeneity between decorative styles and is characterised by a diffusion of ceramic types throughout the Western Basin Tradition region. Lithic tools are sparse, well used, and of local, poor quality chert. Point styles follow the traditions established during the previous Riviere au Vase Phase, and generally comprise a Levanna-like triangular form becoming increasingly narrower.

The last phase, the Wolfe Phase (AD 1400-1550), is poorly represented in the archaeological record because of a general drop in the number of sites. The general trends suggest fewer, larger, fortified settlements supported by seasonal camps. Fewer sites may also indicate a continued western shift into Michigan with an eastern limit marked by sites along Lake Huron and the St. Clair River. Generally, however, a lack of data limits the understanding of the communities currently, including their relationship with the expanding Iroquoian groups and their overall material culture.

1.2.3 Post-Contact Period Settlement

The post-contact Indigenous occupation of southern Ontario was heavily influenced by the dispersal of Iroquoian speaking peoples, including the Six Nations of the Iroquois – Mohawk, Cayuga, Oneida, Seneca, Onondaga, and Tuscarora. This was followed by the return of Algonkian speaking groups from northern Ontario, including the Michi Saagig, who had temporarily retreated to their wintering grounds in the mid-1600s to avoid warfare and disease as a result of colonial settlement. Algonkian speaking Ojibwe (Chippewa), Odawa (Ottawa), and Pottawatomi, known as the Three Fires Confederacy, remained in their traditional territory that covered a vast area of southern Ontario as well as eastern Michigan.

As European settlers encroached on their territory the nature of First Nation population distribution, settlement size and material culture changed. Despite these changes it is possible to correlate historically recorded villages with archaeological manifestations and the similarity of those sites to more ancient sites reveal an antiquity to documented cultural expressions that confirms a long historical continuity to systems of Indigenous ideology and thought (Ferris 2009).

It is important to note that, when discussing the historical documentation of the movement of Indigenous people, what has been documented by early European explorers and settlers represents only a very small snapshot in time. Documentation of where Indigenous groups were residing during European exploration and settlement is restricted to only a very short period and does not reflect previous and subsequent movements of these groups. This brief history does not reflect the full picture of the pre- or post-contact period occupation of Indigenous groups or cultures. As such, relying on historic documentation regarding Indigenous occupation and movement across the landscape can lead to misinterpretation. For example, noting the movement of Indigenous groups into an area may incorrectly suggest to the reader that these groups had not occupied the area previously; however, this is not the case. It is clear from Indigenous oral histories and the archaeological record that pre-contact Indigenous populations

were extremely mobile and not tied to any one specific area. Over the vast period of time prior to the arrival of Europeans, Indigenous groups, language families, and cultures were fluid across the landscape.

The study area also falls within the part of Ontario that was purchased by the Crown as part of Treaty No. 27 ½ on April 25th, 1825 (Figure 3). Morris (1943) describes Treaty No. 27 ½ as follows:

...an agreement made at Amherstburg in the Western District of the Province of Upper Canada on the 26th of April, 1825, between James Givens, Esquire, Superintendent of Indian Affairs, on behalf of His Majesty King George the Fourth and the Chiefs and Principal Men of the part of the Chippewa Nation of Indians, inhabiting and claiming the tract of land....Wawanosh Township in the County of Huron was named after Way-way-nosh the principal Chief of the Band making this Treaty.

Morris 1943: 26-27

Treaty Number 27½ was subsequently confirmed on July 10th, 1827 as Treaty Number 29 with only a minor change in the legal description of the boundaries of the land surrender (Morris 1943:27). The Chippewa Nation inhabiting and claiming this land was composed of 440 individuals, who would be entitled to equally share the yearly sum of 1,100 pounds. While it is difficult to delineate treaty boundaries on modern maps, Figure 3 provides an illustration of treaties and purchases with the approximate location of the current study area shown.

1.2.4 Euro-Canadian Settlement

The Sarnia-Lambton Region and Lambton County

Euro-Canadian immigrants to the Sarnia-Lambton region began to settle the area as early as 1796, when French settlers first arrived and settled along the banks of the St. Clair river (Elford 1982). However, a significant wave of settlers would not begin to arrive until at least the 1830s. A subsequent wave followed in the 1850s during the potato famine in Ireland, resulting in a large population boom; by 1891, the population had risen to 58,810 individuals (Elford 1982). The principle crops grown in Sarnia-Lambton included wheat and peas, and farmers also supplemented their income by selling forestry products (City of Sarnia 2016). The early growth of Sarnia was stimulated by the wealth of stands of timber and the discovery of oil in the late 1850s. Lambton County became independent in 1853, following the Municipal Act of 1849 and the initial completion of surveying in 1835. It takes its name from Governor General John George Lambton, first Earl of Durham, who authored *The Report on the Affairs of British North America* (1839), often referred to as the Durham Report; this text investigated two armed uprisings known as the Rebellions of 1837-1838, and would later have a profound influence on the development of the *British North America Act, 1840* (Elford 1982), which established the Province of Canada in 1841.

In 1858, James M. Williams developed the world's first commercial oil well, which started an oil boom in the area. With the arrival of the Great Western Railway in 1858 and the Grand Trunk Railway in 1859, the shipping industry expanded and the rail lines were later linked to the United States by the opening of a rail tunnel under the St. Clair River in 1889. Later, ferry service to the U.S. was formed, bringing in prospectors from all over North America (City of Sarnia 2016).

Township of Moore

The Township of Moore takes its name from Sir John Moore, a general of the British Army killed at the 1829 Battle of Corunna (Elford 1982). The first Euro-Canadian settlements in this township were established along the St. Clair river, with surveyor Roswell Mount completing his work by 1829. A portion of land was ceded from the Aamjiwnaang First Nation in 1827 as part of Treaty 29, and a reserve was formed along the southern boundary of the Township of St. Clair (Plain 2017). In order to continue settlement expansion and agricultural activity, significant swamp drainage

and forest clearing in the township needed to be undertaken, which would lead to a \$20,000 debt incurred by 1881 (Phelps 1973). Agriculture would remain an important industry for the township, and the land around the study area is still for the most part utilized for agricultural purposes.

Land Use and Settlement of the Study Area

The 1880 *Illustrated Historical Atlas of the County of Lambton* (H. Belden & Co.) was reviewed to determine the presence of 19th century settlement features within the study area as the presence of historic features elevates the potential for the recovery of 19th century archaeological resources. The study area is historically located on part of Lot 20, Concession 5 and part of Lot 19, Concession 4 in the Geographic Township of Moore, Lambton County. No landowners are listed on the 1880 map on either parcel and no structures are illustrated. The St. Clair Division of Canada Southern Railway is visible crossing between the two parcels along modern day Courtright Line. The small hamlet of Kimball is visible on the map to the east of the study area along modern day Kimball Road.

It should be noted that not all features of interest, particularly farmhouses and smaller homesteads, were mapped systematically as this would have been beyond the intended scope of the Ontario historical atlas series. In addition, given that atlases were funded by subscription, preference with regard to the level of detail included was given to subscribers. As such, the absence of structures or other features on historic atlas maps does not preclude the presence of historic features at the time the area was surveyed.

1.2.5 Reports with Relevant Background Information

To inform the current Stage 2 archaeological assessment and further establish the archaeological context of the study area, a search of the ASDB was conducted by AECOM to determine if any previous archaeological work has been completed within the current study area or within 50 m of the study area boundaries. The search resulted in the identification of five archaeological reports within 50 m of the study area, which are shown in Table 3, below.

Table 2: Archaeological Reports with Relevant Background Information

Year	Title	Author	PIF Number
1992	<i>Archaeological Assessment Stage 1: Background Study Tecumseh Gas Storage Ltd Proposed Ladysmith Project Moore Township County of Lambton</i>	A.R.A.	92-023-8
1992	<i>Archaeological Assessment Tecumseh Gas Storage Ltd Proposed Ladysmith Project</i>	A.R.A.	92-023-2
1999	<i>The 1999 Stage I-2 A. A. of the Proposed Enbridge Consumers Gas Ladysmith Connection Project, Lambton County, Ontario</i>	D.R. Poulton & Associates (D.P.A.)	1999-031-019
2019	<i>Stage 1-2 Archaeological Assessment: Ladysmith designated Storage Area (DSA) Well TL9H Lot 20, Concession 5, Geographic Township of Moore, now Township of St. Clair, Lambton County, Ontario</i>	Stantec	P256-0558-2018
2020	<i>Stage 1 Archaeological Assessment 2021/2022 Storage Enhancement Project Part of Lots 19-21, Concessions 4-5, and Lots 18-22, Concessions 7-11, Geographic Township of Moore, Now Township of St. Clair, Lambton County, Ontario</i>	AECOM	P438-0224-2020

In the 1990's three archaeological assessments were performed on areas adjacent to the current study area. In 1992, ARA completed a Stage 1 archaeological assessment and determined that a Stage 2 assessment was required. Their subsequent Stage 2 identified four previously unknown archaeological sites, Tecumseh A (AeHo-19), Tecumseh B, Tecumseh C (AeHo-20), and Tecumseh D. Tecumseh B and D were dense concentrations of 20th century material and were not recommended for further work. Tecumseh A and C are located approximately 600 meters west of our current study area and are addressed in Table 4 below. In 1999, Dana Poulton completed a Stage 1-2 assessment for the proposed Enbridge Consumers Gas Ladysmith Connection Project. This assessment was focused on an area adjacent to the study area being reported on in this document but did not identify any archaeological resources.

In 2019, Stantec Consulting Ltd was retained by Enbridge Gas Inc. (Enbridge) to complete a Stage 1-2 archaeological assessment on two proposed work sites in the township of St. Clair, Lambton County, Ontario. One of these, an approximately 1 ha area is located on part of Lot 20, Concession 5, Geographic Township of Moore, now township of St. Clair, Lambton County, Ontario, and is directly adjacent to the study area being reported on in this document. Their Stage 1 assessment determined that the study area retained potential for the identification of archaeological resources, and they performed a Stage 2 archaeological assessment on Dec 13, 2018. This Stage 2 archaeological assessment did not result in the identification or recovery of any archaeological materials,

In 2020, AECOM Canada Ltd was retained by Enbridge Gas Inc to conduct a Stage 1 archaeological assessment of an approximately 1100 ha area located in the Geographic Township of Moore, Lambton County, Ontario. The area which was subject to this Stage 1 archaeological assessment includes the study areas being reported on in this document. The assessment concluded that there was a high potential for the recovery of both First Nation and Euro-Canadian archaeological resources within this study area, and recommended St 2 archaeological assessment for any potentially undisturbed areas within the scope of that report. Based on the recommendation of this report, AECOM Canada Ltd undertook the Stage 2 archaeological assessment which is the subject of this report.

To the best of our knowledge, there are no other reports concerning archaeological work conducted within or in close proximity (i.e. within 50 m) of the study area; however, it should be noted that the MHSTCI does not maintain a database of all properties that have had past archaeological investigations and searches of the MHSTCI's public register do not always result in a complete listing of all archaeological work conducted in a given area. In consequence, in some cases the only way a consulting archaeologist will know that a past assessment has been conducted in a given area is if they have personal knowledge of it, or if the assessment resulted in the discovery and registration of one or more archaeological sites.

Archaeological Management Plans

There does not yet appear to be Archaeological Master Plans for Lambton County. This may be because most of the county is situated in predominantly rural settings with limited development that could be informed by a master plan study. A review of the Lambton County Inventory of Heritage Resources was completed to determine the presence of any heritage properties or historically significant sites within or near the study area. The results of this search identified no listed properties, heritage plaques, or historic places within and/or near the study area boundaries.

1.3 Archaeological Context

1.3.1 Natural Environment

The study area is situated within the St. Clair Clay Plain (Chapman & Putnam 1986:146-147).

Adjoining Lake St. Clair in Essex and Kent County Counties and the St. Clair River in Lambton County are extensive clay plains covering 2,270 square miles. The region is one of little relief, lying between 575 and 700 feet a.s.l., except for the moraine at Ridgeway and Blenheim which rises 50 to 500 feet higher....Glacial Lake Whittlesey, which deeply covered all of these lands, and Lake Warren which subsequently covered nearly the whole area, failed to leave deep stratified beds of sediment on the underlying clay till except around Chatham, between Blenheim and the Rondeau marshes, and in a few other smaller areas. Most of Lambton and Essex Counties, therefore, are essentially till plains smoothed by shallow deposits of lacustrine clay which settled in the depressions while the knolls were being lowered by wave action.

Chapman & Putnam 1986:147

The single most important environmental feature necessary for extended human occupation is potable water. As such, proximity to water is regarded as a useful index for the determination of potential for the presence of archaeological resources. The St. Clair river, a 65.2 km river flowing into Lake St. Clair from Lake Huron, is located adjacent to the study area, approximately 8.5 km west.

These environmental characteristics would have provided an ideal environment for both temporary and permanent settlement throughout the pre-and post-contact periods. This water source would have served as important pre- and post-contact transportation routes as well as sources of potable water and riverine resources.

1.3.2 Known Archaeological Sites

AECOM conducted a data search of the ASDB on to determine if any registered archaeological sites are located within the study area as well as within 1 km of the current study area boundaries. This search resulted in the identification of 2 registered archaeological sites. Table 2 provides details on the registered archaeological sites within 1 km of the current study area.

Table 3: Registered Archaeological Sites within 1 km of the Study Area

Borden #	Site Name	Cultural Affiliation	Site Type	Development Status	Proximity to the Study Area
AeHo-19	Tecumseh A	Euro-Canadian	homestead	No record	Approx. 600 m
AeHo-20	Tecumseh C	Euro-Canadian	homestead	No record	Approx. 600 m

Information concerning specific site locations is protected by provincial policy and is not fully subject to the *Freedom of Information and Protection of Privacy Act (FIPPA)*. The release of such information in the past has led to looting or various forms of illegally conducted site destruction. Confidentiality extends to all media capable of conveying location, including maps, drawings, or textual descriptions of a site location. The MHSTCI will provide information concerning site location to the party or an agent of the party holding title to a property, or to a licensed archaeologist with relevant cultural resource management interests.

1.3.3 Existing Conditions

The study area consists of an agricultural field north of Courtright Line and an agricultural field south of Courtright Line. There is some existing Enbridge Gas Inc. infrastructure directly north and east of the northern study area, and

a line of steel hydro towers north of the southern study area. The topography is generally flat with areas of gently rolling hills. During the pre-contact and early contact periods, this area would have been an ideal location for settlement as it is located adjacent to the St. Clair river, which offered rich, cultivable soils and a mixture of deciduous trees interspersed with open areas. During the early 19th century, Euro-Canadian settlers began to clear the forests for agricultural purposes. Over the course of the 19th century, the study area would have been made up of agricultural land just outside of the rapidly expanding municipality and port of call of Mooretown along historically surveyed road allowances.

2. Field Methods

The Stage 2 field survey was conducted on November 30, 2020, and January 13, 2021 under PIF# P438-0237-2020. Joshua Keddy acted as the field supervisor, and the fieldwork involved the physical survey of all land to be impacted by the proposed 2021/2022 Storage Enhancement Project in Lambton County, Ontario. Weather conditions during the field investigation were ideal and at no time were conditions detrimental to the identification and recovery of archeological material. The weather during the Stage 2 field survey on November 30th was approximately 2°C, with some light rain/wet snow falling, though it did not accumulate. The weather during the Stage 2 field survey on January 13th was sunny and approximately 5°C.

The area assessed on November 30th, 2020 (Lot 20, Concession 5) was within an agricultural field, approximately 85% of the study area was ploughed and weathered, and approximately 15% was confirmed to have been previously disturbed. Areas of previous disturbance include an area covered by a thick pad of gravel which had what appears to be gas infrastructure in the center of it. This area was not subject to Stage 2 archaeological and was photo-documented only. The area assessed on January 13th, 2021 (Lot 19, Concession 4) was also within an agricultural field and 100% of the study area was ploughed and weathered.

The portion of both study areas that were within agricultural fields had recently been ploughed and weathered prior to assessment and surface visibility was at least 80%. In accordance with the *Standards and Guidelines for Consultant Archaeologists* (Section 2.1.2, Standards 1-9, Government of Ontario 2011) the ploughed agricultural fields were subject to pedestrian survey at a 5 m interval. When archaeological resources were found, survey intervals were decreased to a 1 m interval over a minimum of a 20 m radius around the find. Pedestrian survey continued at a 1 m interval until the full extent of the surface scatter was defined.

Images 1-11 illustrate the methods and conditions for the Stage 2 field investigation. As per the *Standards and Guidelines for Consultant Archaeologists* (Section 7.8.6, Standard 1a, Ontario Government 2011), photograph locations and directions are provided on Figure 5 along with an illustration of the methods and results of the Stage 2 field investigation.

At the request of Enbridge, representatives from Chippewas of Kettle and Stoney Point and the Haudenosaunee Development Institute (HDI) participated in the Stage 2 archaeological assessment alongside the AECOM archaeology team on November 30, 2020, and a representative from Tri-Tribal Monitoring Services on behalf of Aamjiwnaang First Nation participated in the Stage 2 archaeological assessment alongside the AECOM archaeology team on January 13, 2021.

3. Record of Finds

This Stage 2 archaeological assessment was conducted by employing the methods outlined in Section 2 of this report. Table 4 provides a listing of the documentary record generated by the Stage 2 fieldwork and indicates the location of each document type. Any maps that show actual archaeological locations and all UTM coordinates recorded during the assessment are provided in the supplementary documentation to this report.

Table 4: Inventory of Documentary Record

Document Type	Quantity	Location	Additional Comments
Field Notes	1	AECOM London Office	In original field folder and stored digitally in project file
Proponent Maps	1	AECOM London Office	Stored digitally in project file
Digital Photographs	12	AECOM London Office	Stored digitally in project file

AECOM's Stage 1 archaeological assessment (2020) concluded that the potential for the recovery of archaeological materials was high. The Stage 2 field investigation of the study area on resulted in the identification of one archaeological site, Location 1.

The following section provides a summary of the archaeological material recovered from Location 1, and the complete artifact catalogues, including decorative attributes and inferred functions, can be found in Appendix A. Brief descriptions of specific artifact types and associated dates of production can be found below. More detailed artifact descriptions and date ranges are provided in the AECOM Artifact Glossary provided in Appendix B.

3.1 Location 1

Location 1 consists of a concentrated scatter of 19th century cultural material, measuring approximately 45 m east-west by 95 m north-south. A total of 158 pieces of cultural material were observed in the field, of which 133 were collected for laboratory processing and analysis. All 19th century ceramics were collected, as were all pieces of colored glass. A 30% sample of clear glass and window glass was collected, and a 25% sample of observed brick was collected.

The artifacts most recovered were domestic items including ceramic fragments (Plates 1, 3 and 5), and bottle glass (Plate 2). The remaining material included structural items, faunal remains, and personal items (Plates 4 and 6). Table 5 provides a summary of the cultural material collected from Location 1 and the complete catalogue can be found in Appendix A.

Table 5: Location 1 Summary of Cultural Material

Material Type	Quantity	%
Ceramics	80	60.2
Domestic Glass	43	32.2
Structural	3	2.3
Personal	3	2.3
Faunal	3	2.3
Other	1	0.7
Total	133	100

Ceramic fragments are the most recovered artifact type from Location 1, representing 60.2% (n=80) of the artifact collection. The recovered ceramic ware types include ironstone, whiteware, utilitarian wares like coarse earthenware and stoneware, and Rockinghamware. A breakdown of ceramic ware types is provided in Table 6.

Table 6: Location 1 Recovered Ceramic Ware Types

Ware Type	Quantity	%
Ironstone	53	66.25
Whiteware	18	22.5
Utilitarian ware	8	10
Rockinghamware	1	1.25
Total	80	100

The predominant ceramic ware type recovered from Location 1 is ironstone, representing 66.25% of the recovered ceramics. All the ironstone sherds represent tableware. A total of 32 of the sherds of ironstone are undecorated, while 18 of the ironstone sherds are moulded, with 9 being too fragmentary to determine what moulded motif was used, three showing a leaf or floral moulded design, three showing a moulded rim in an undulating pattern, two are painted blue with fluting moulding on interior, and one shows a moulded wheat motif (1865-1900). The final three pieces of ironstone are transfer printed. One is decorated with a blue, Asian influenced scenic motif and has a highly vitrified glaze. The other two are more standard 19th century transfer print; both are rim sherds; one has an unknown green pattern while the other has a brown geometric/floral pattern. Whiteware is the second most common ceramic type recovered from this site. Of the collection of whiteware, 10 pieces are undecorated. On the remaining eight whiteware fragments, decorative types include transfer printed (n=6) (1835-present), and moulded (n=2). The transfer printed whiteware includes blue floral and geometric patterns, with one sherd bearing the remnants of a maker's mark in the exterior: "...R...", over a plant sprig. The next most common type is utilitarian ware (10%), including coarse yellow earthenware and stoneware. These wares range in date from the early-late 19th century and continue into the 20th century. The final pieces of ceramic in this collection is a single sherd of Rockingham (ca. 1855-1890).

Domestic glass was the second most common material type represented at Location 1 (32.2%). A total of 28 of these pieces of glass are undetermined glass, 11 are bottle glass fragments, and four are shards of glass dishes. The typical types of glassware recovered from historic 19th century sites usually consist of dark bottle glass used to store liquors, or aqua coloured bottles used for storing and distributing medication. Other types of coloured glass also appear throughout the 19th and 20th centuries, including amber, cobalt, white, and light greens (Kendrick 1971). Glass colours present include olive (pre-1860), aqua (pre-1880), sun-coloured amethyst (ca. 1880-1920), light green (ca. 19th century), amber (1890-present), cobalt and light blue (mid 19th century), milk glass, and clear (1880-

present). Two of the bottle glass shards retain some embossed lettering: one exhibits "...ER...COIN..." and the other "AGUE...CONQUE...".

Of the structural material from Location 1, one fragment of non-diagnostic brick was recovered along with one piece of window glass (mid-late 19th century) and two cut nails (1800-1850).

The two personal artifacts from Location 1 include an aluminum scoop printed with the words "ALWAYS PACK S-M-A TIGHTLY IN CUP", and the face from a pocket watch. The aluminium scoop was manufactured by Simulated Milk Adapted (SMA), developed in 1919 (National Museum of American History). The pocket watch face is made of cuprous metal, with painted dial and numerals. The words "NEW HAVEN" are painted between the central aperture, and the 12 position. The New Haven Watch Company manufactured watches under that name from 1883-1887 (Pocket Watch Database).

A total of three pieces of faunal material were recovered, including two cortical fragments of mammal bone, and one mammal long bone fragment. The final two artifacts from this site are a small fragment of non-ferrous, non-cuprous miscellaneous metal, and a ferrous metal handle.

Site Function

The assemblage of cultural material recovered from Location 1 consists largely of domestic household items, with the most frequently recovered material being tableware and domestic glass. Only a minimal amount of structural material was present (n=13) and two personal items were recovered. The analysis of the diagnostic material supports a primary date of occupation between starting in the mid to late 19th century and progressing into the 20th century.

4. Analysis and Conclusions

The Stage 2 archaeological assessment for the proposed 2021/2022 Storage Enhancement Project in Lambton County, Ontario, in advance of the proposed development of a natural gas pipeline resulted in the identification of one archaeological location, a 19th to 20th century Euro-Canadian artifact scatter.

Location 1 (AeHo-150) is a concentrated scatter of over 158 pieces of 19th century Euro-Canadian cultural material, within an area measuring approximately 45 m east-west by 95 m north-south. Diagnostic items recovered during the Stage 2 archaeological assessment are indicative of a period of occupation spanning from the later 19th century into the 20th century.

Given the presence of at least 20 diagnostic artifacts that date to a period of use before 1900, Location 1 fulfills the criteria for further Stage 3 archaeological investigation as per Section 2.2, Standard 1c of the *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). Location 1 has been registered with the Ontario MHSTCI as Location 1 (AeHo-150).

4.1 Preliminary Determination for Stage 4 Mitigation of Development Impacts

A preliminary determination as to whether or not the archaeological locations that retain cultural heritage or interest, that were identified during this Stage 2 archaeological assessment will require Stage 4 mitigation, is discussed below. This determination is required under the *Standards and Guidelines for Consultant Archaeologists* Section 7.8.3, Standard 2c (Ontario Government 2011).

Location 1 (AeHo-150) has been identified as a small area of 19th to early 20th century refuse with at least 20 pieces of material dating to before 1900. Given the small amount of material recovered during the Stage 2 archaeological assessment, a primary date of occupation dating to the mid-late 19th century. It is not yet evident that the level of cultural heritage value or interest may result in a recommendation to proceed to Stage 4 mitigation.

5. Recommendations

The Stage 2 archaeological assessment for the proposed 2021/2022 Storage Enhancement Project in Lambton County, Ontario, in advance of the projected development of a natural gas pipeline resulted in the identification of one archaeological site. Archaeological site Location 1 (AeHo-150) fulfills the criteria for further Stage 3 archaeological investigation, as per Section 2.2, Standards 1b and 1c of the *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). **As such, further Stage 3 site-specific archaeological assessment is recommended for Location 1 (AeHo-150).**

The Stage 3 archaeological assessment for Location 1 (AeHo-150) must include the hand excavation test unit methodology, as outlined in Section 3.2 and Table 3.1 of the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011), to further test the nature and density of each site. The Stage 3 site specific assessment for this site will include the following methods:

- Location 1 (AeHo-150) was identified during pedestrian survey within an open agricultural field, so a controlled surface pick-up (CSP) must be conducted prior to test unit excavation. If ground surface visibility has decreased since the time of the Stage 2 survey and the Stage 3 CSP, the subject area must be re-ploughed and weathered;
- Hand excavation will consist of the controlled excavation of 1 m square test units over the concentration of the artifact scatter to determine the presence of buried artifacts, structures, stratigraphy and cultural features (Section 3, *Standards and Guidelines for Consultant Archaeologists*, Ontario Government 2011);
- Location 1 (AeHo-150) has been identified as a site where it is not yet evident that the level of cultural heritage value or interest may result in a recommendation to proceed to Stage 4 mitigation. As such, test unit placement should begin at 5 m intervals across the extent of each site, and additional test units amounting to 20% of the grid unit total should be placed in areas of interest within the site extents such as areas of higher artifact concentrations and/or adjacent to high yielding units;
- Test units should be excavated to a depth of 5 cm into the subsoil and, as per Section 3.2.2., Standard 7 of the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011), the entire contents of each unit must be screened through mesh with an aperture of no greater than 6 mm; and,
- If test unit excavation uncovers a cultural feature, do not excavate into feature fill. Instead, record the exposed plan of the feature and place geotextile fabric over the unit floor and backfill the unit.

Apart from the required site-specific Stage 3 of Location 1 (AeHo-150), all other parcels of land included in this Stage 2 archaeological assessment report did not result in the identification of any archaeological sites or materials. Therefore, they are considered clear of further archaeological concerns.

Should additional land outside of the current study area be included as part of the proposed 2021/2022 Storage Enhancement Project, the standard requirements for archaeological assessments to be conducted prior to land disturbance remain in place. The Stage 2 archaeological assessment must be conducted by a licensed archaeologist and must follow the requirements set out in the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011), including:

- The standard test pit survey method at 5 m intervals is to be conducted in all areas that will be impacted by the project where ploughing is not feasible (e.g. woodlots, overgrown areas, manicured lawns, small sections of agricultural land); and
- Pedestrian survey at 5 m intervals where ploughing is possible (e.g. agricultural fields). This assessment will occur when agricultural fields have been recently ploughed, weathered by rain, and exhibit at least 80% surface visibility.
- Poorly drained areas, areas of steep slope, and areas of confirmed previous disturbance (e.g. building footprints, roadways, areas with identifiable underground infrastructure) are to be mapped and photo-documented but are not recommended for Stage 2 survey as they possess low to no archaeological potential.

The MHSTCI is asked to accept this report into the Ontario Public Register of Archaeological Reports thereby concurring with the recommendations presented herein. As further archaeological assessment is required for Location 1 (AeHo-150), archaeological concerns for the portion of the 2021/2022 Storage Enhancement Project assessed in this report in Lambton County, Ontario, have not been fully addressed.

Please note that this archaeological assessment report has been written to meet the requirements of the MHSTCI's *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011); however properties that are subject to archaeological assessment are not considered cleared for ground disturbance activities until the associated report has been reviewed and accepted by the MHSTCI. In order to maintain compliance with the MHSTCI and the *Ontario Heritage Act* (1990), no ground disturbing activities are to occur until the proponent and approval authority receive a formal letter from the MHSTCI stating that the recommendations provided herein are compliant and that the report has been accepted into the MHSTCI register of archaeological reports.

6. Advice on Compliance with Legislation

This report is submitted to the Ontario Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Heritage, Sport, Tourism and Culture Industries, a letter will be issued by the Ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act*.

Archaeological sites recommended for further archaeological fieldwork or protection remain subject to section 48 (1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological license.

The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 (when proclaimed in force in 2012) require that any person discovering human remains must notify the police or coroner and the Registrar of Burial Sites, War Graves, Abandoned Cemeteries, and Cemetery Closures.

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8. Images

8.1 Field Survey



Photo 1 - Pedestrian Survey at 5 m interval, facing east. Photo taken on November 30, 2020



Photo 2 - Pedestrian Survey at 5 m interval, facing southwest. Photo taken on November 30, 2020



Photo 3 - Surface Visibility. Photo taken on November 30, 2020

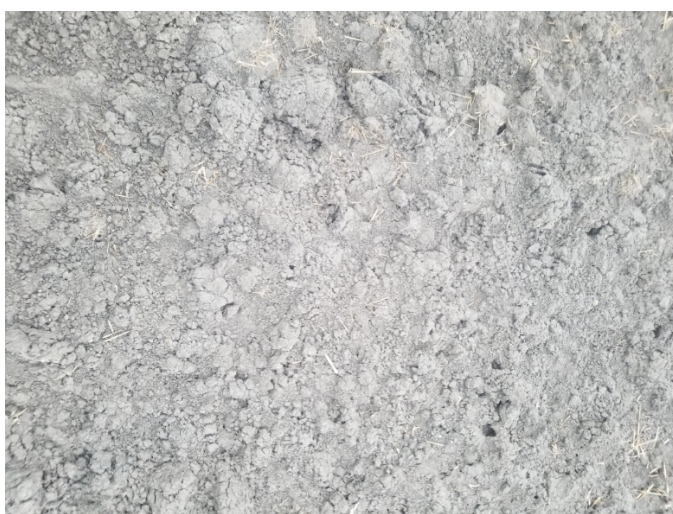


Photo 4 - Surface visibility. Photo taken on November 30, 2020



Photo 5 - Overview of Gravel pad on east edge of property, with gas-related infrastructure visible in left edge of photo, facing south. Photo taken on November 30, 2020



Photo 6 - Surface visibility, pedestrian survey at 5 m interval, and gravel pad (visible in right background of photo), facing east. Photo taken on November 30, 2020



Photo 7 - Pedestrian survey at 5 m intervals, facing south. Photo taken on Jan 13, 2021



Photo 8 - Pedestrian survey at 5 m intervals facing north. Photo taken on Jan 13, 2021



Photo 9 – Surface visibility, facing down. Photo taken on Jan 13, 2021

Photo 10 – Surface visibility, facing down. Photo taken on Jan 13, 2021



Photo 11 – Intensifying at Location 1, 1 m interval. Photo taken on Jan 13, 2021

8.2 Artifact Plates



Plate 1: Representative sample of whiteware from AeHo-150 including blue floral transfer print and geometric patterns and a single sherd of Rockingham.



Plate 2: Representative sample of bottle glass from AeHo-150 including include olive, aqua, sun-coloured amethyst, light green, amber, cobalt and light blue, milk glass, and clear.



Plate 3: Representative sample of ironstone including brown and blue transfer print and blue painted ware.



Plate 4: A cuprous metal watch face categorized as a personal item from AeHo-150.



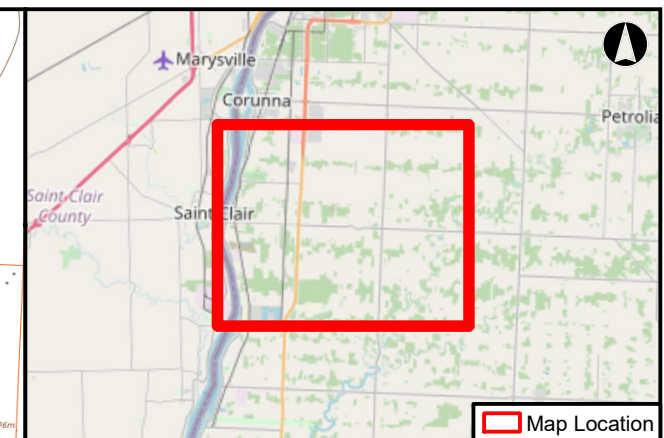
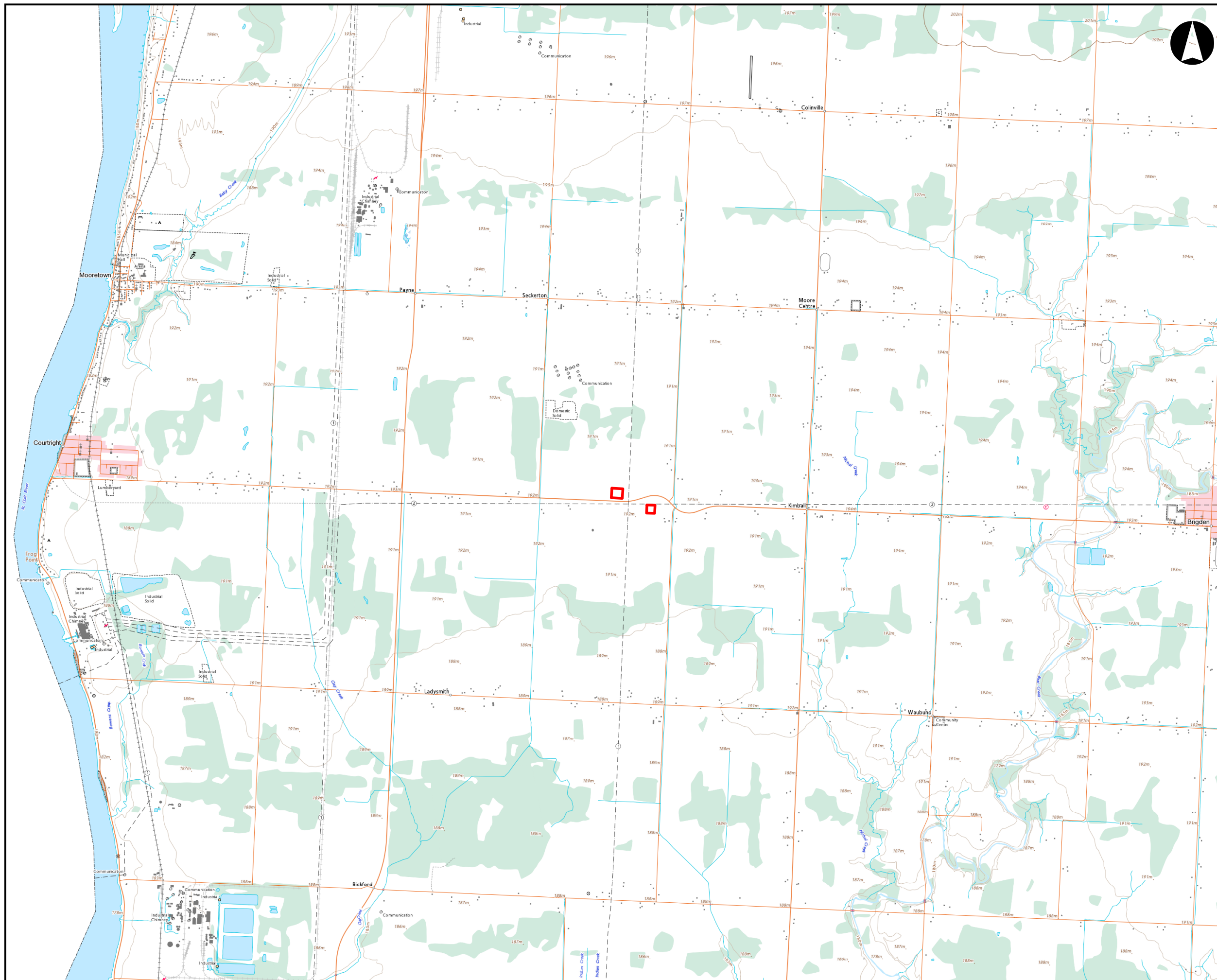
Plate 5: Representative sample of utilitarian ware from AeHo-150, including coarse yellow earthenware and stoneware.



Plate 6: An aluminum scoop printed with the words "ALWAYS PACK S-M-A TIGHTLY IN CUP" categorized as a personal item from AeHo-150.

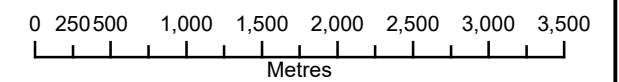
9. Figures

All figures pertaining to the Stage 2 archaeological assessment for the proposed 2021/2022 Storage Enhancement Project in Lambton County, Ontario are provided on the following pages. Any maps providing the location of the site are not subject to the *Freedom of Information and Protection of Privacy Act* as the disclosure of this information has led to looting in the past. Any information that pinpoints the location of the archaeological site, maps, and GPS coordinates are provided in the supplementary documentation of this report.



Legend

 Study Area



Stage 2 Archaeological Assessment
2021/2022 Storage Enhancement Project
Municipality of St. Clair, Lambton County, Ontario

Location of the Study Area

Jan, 2021

1:50,000

Datum: NAD 1983 UTM Zone 17N
Source: MNRF, http://wms.ess-ws.nrcan.gc.ca/wms/toporama_en

P#: 60633149

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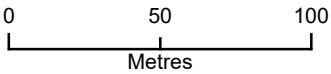
Figure 1

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Legend

 Study Area



Stage 2 Archaeological Assessment
2021/2022 Storage Enhancement Project
Municipality of St. Clair, Lambton County, Ontario

Study Area in Detail

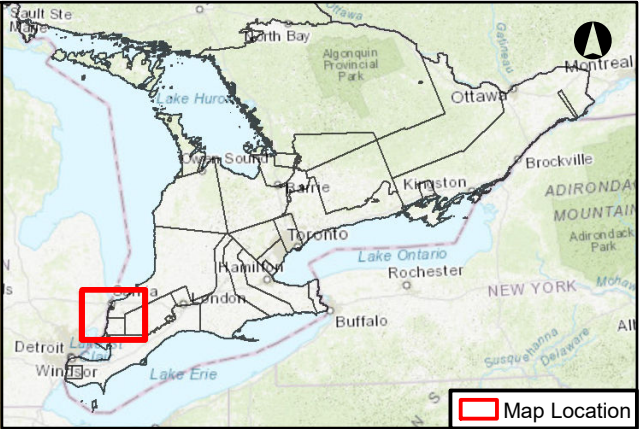
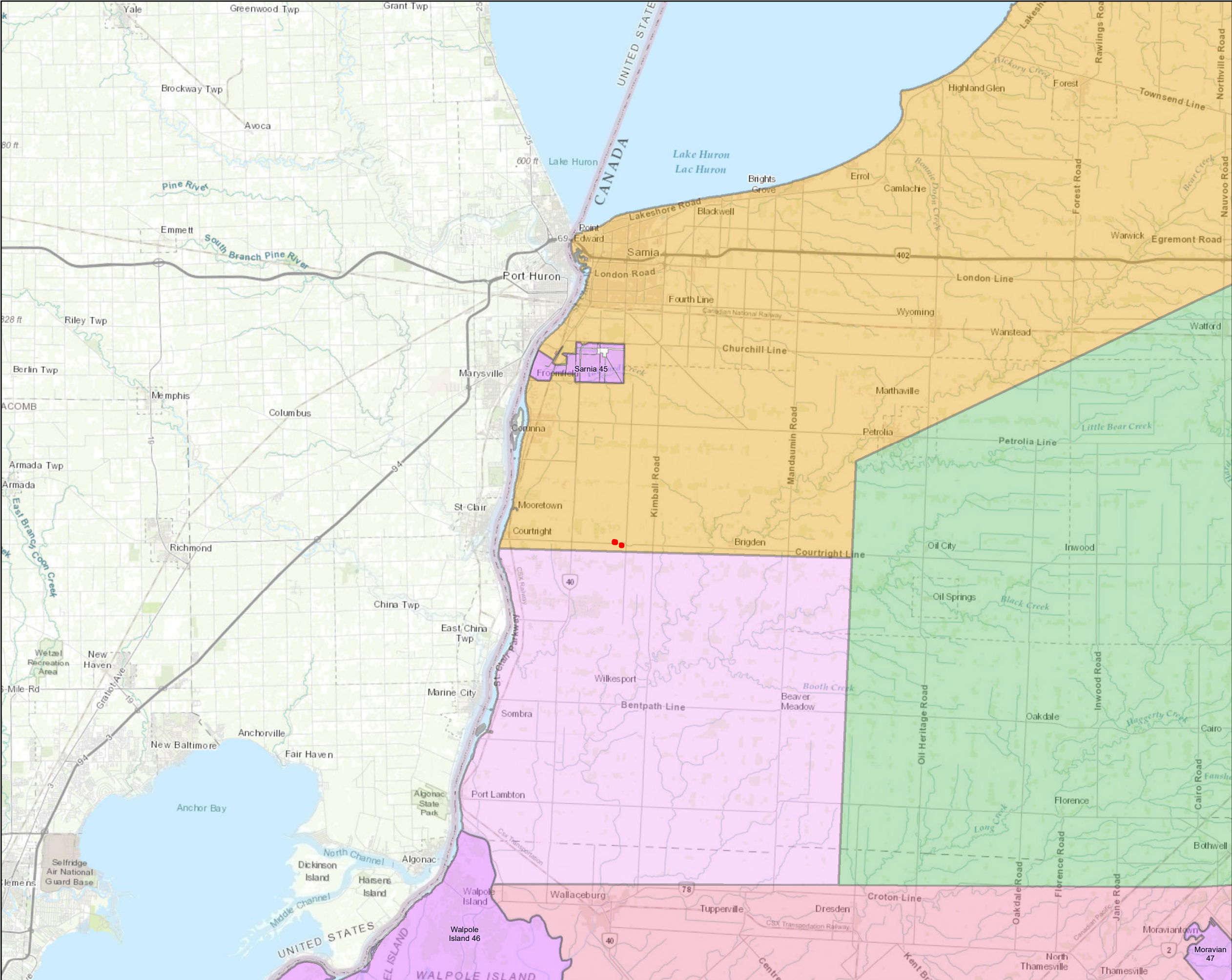
Jan, 2021	1:2,500 <small>* when printed 11"x17"</small>	Datum: NAD 1983 UTM Zone 17N Source: MNRF
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Figure 2

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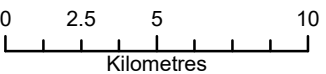


Legend

- Study
- First Nations Reserve Land

Treaty

- Huron Tract Purchase, Treaty 29, August 13, 1833
- Long Woods Purchase, Treaty 21, March 9, 1819
- McKee Purchase, Treaty 2, May 19, 1790
- Sombra Township Purchase, Treaty 7, September 7, 1796



Stage 2 Archaeological Assessment
Sarnia 2021/2022 Storage Enhancement Project
Municipality of St. Clair, Lambton County, Ontario

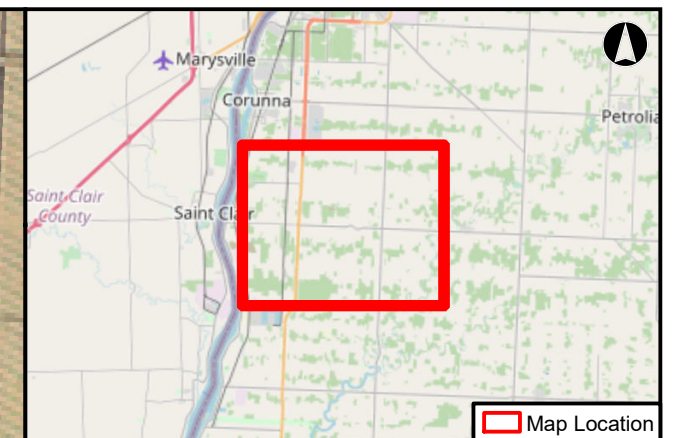
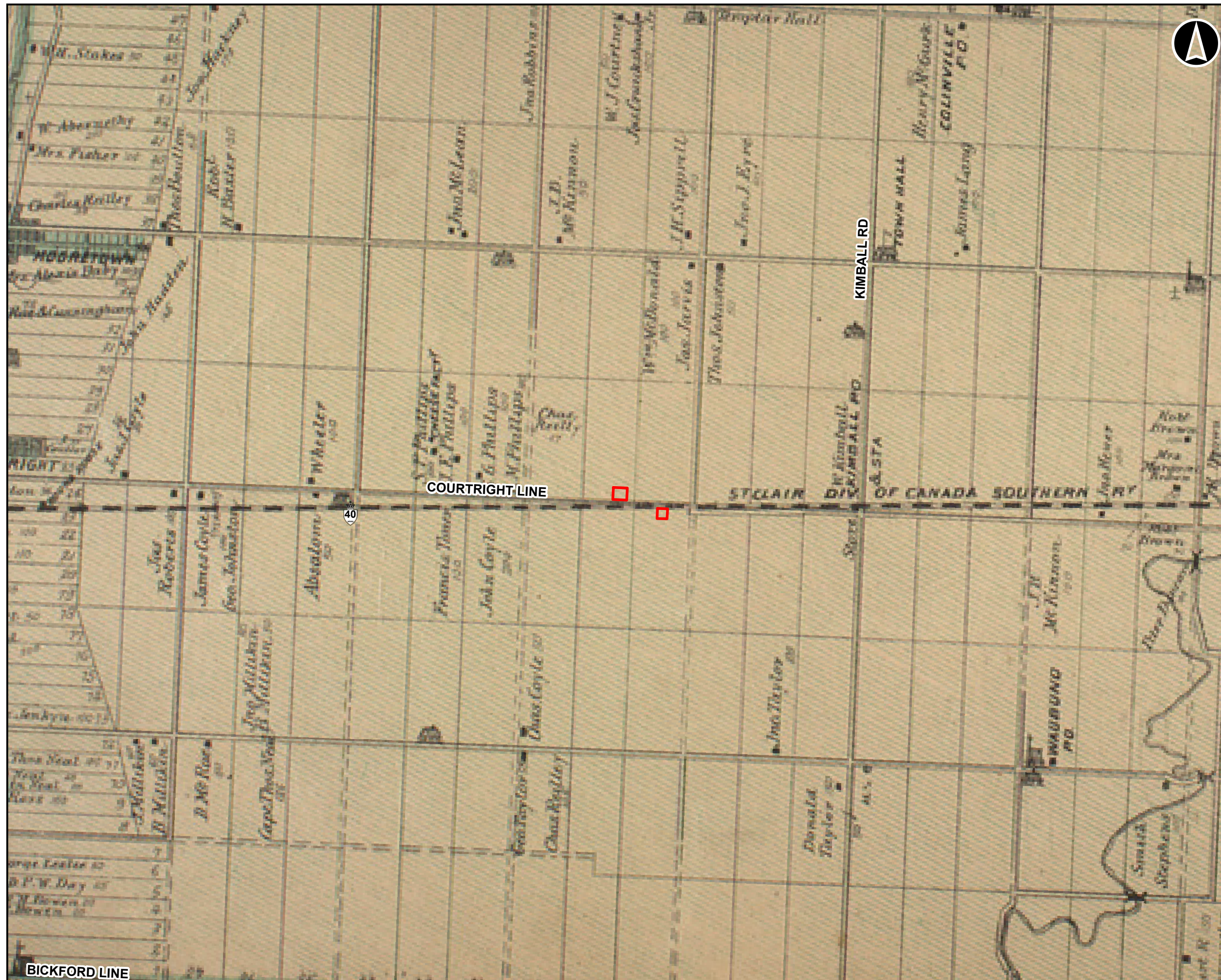
Ontario Treaties Map

January 2021	1:250,000	Datum: NAD83 UTM17 Source: www.ontario.ca/page/map-ontario-treaties-and-reserves#17
P#: 60548456	V#:	

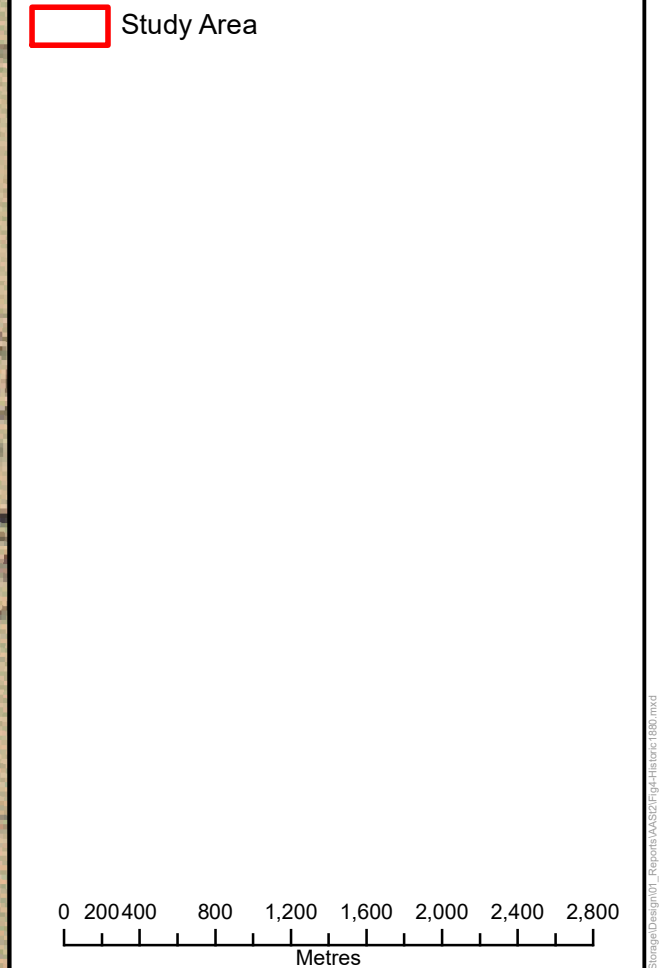


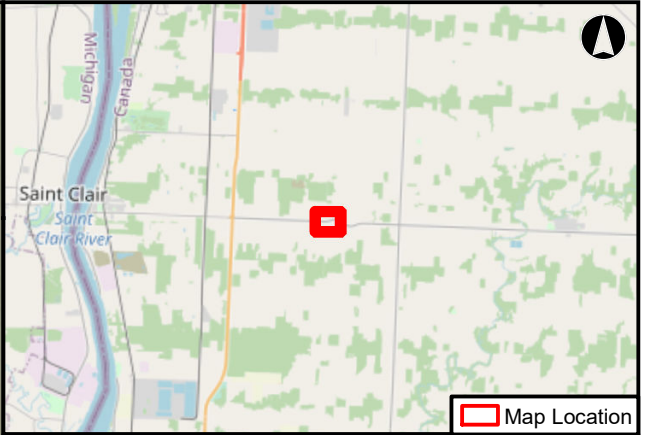
Figure 3

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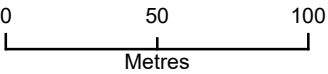
Legend





Legend

- Study Area
- Previously Assessed (Stantec 2019)



Stage 2 Archaeological Assessment
2021/2022 Storage Enhancement Project
Municipality of St. Clair, Lambton County, Ontario

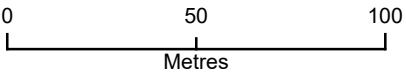
Previous Archaeological Assessments

Jan, 2021	1:2,500 <small>* when printed 11"x17"</small>	Datum: NAD 1983 UTM Zone 17N Source: MNRF
P#: 60633149		Figure 5
AECOM		

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- Legend**
- ③ Photo Location and Direction
 - Study Area
 - Pedestrian Survey at 5m Intervals
 - Visually Confirmed Disturbance
 - Cleared of Arch Concerns (Stantec 2019)



Stage 2 Archaeological Assessment
2021/2022 Storage Enhancement Project
Municipality of St. Clair, Lambton County, Ontario

Results of the Stage 2 Field Survey

Jan, 2021	1:2,000	Datum: NAD 1983 UTM Zone 17N Source: MNRF
P#: 60633149	* when printed 11"x17"	

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Figure 6

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Appendix A

Location 1 (AeHo-150) Artifact Catalogue

Stage 1-2 Archaeological Assessment

Appendix A: Location 1 (AeHo-150) Artifact Catalogue

Cat. #	Subunit or Context	Artifact	Quantity	Comments
1	St 2 1-1	nail, cut	1	
2	St 2 1-2	glass, undetermined	1	Purple, body shard, melted
3	St 2 1-3	glass, bottle	1	Olive, neck shard
4	St 2 1-4	ironstone	1	tableware, undecorated, rim sherd
5	St 2 1-5	ironstone	1	tableware, undecorated, rim sherd
6	St 2 1-6	stoneware	1	Utilitarian, neck/shoulder sherd, white/grey fabric, buff glaze on exterior, clear glaze on interior
7	St 2 1-7	stoneware, salt-glazed	1	Utilitarian, unknown portion black glaze on interior & exterior
8	St 2 1-8	ironstone, moulded	1	Tableware, rimsherd, undulating rim, highly vitrified glaze
9	St 2 1-9	ironstone, moulded	1	Tableware, rimsherd, undulating rim, gold band on interior of rim
10	St 2 1-10	ironstone	1	Tableware, rimsherd
11	St 2 1-10	glass, dish	1	Milkglass, rimshard, fluted on interior and exterior
12	St 2 1-10	metal, miscellaneous	1	unknown metal, possibly a portion of a lid
13	St 2 1-11	ironstone	1	Tableware, unknown portion
14	St 2 1-13	whiteware	1	Tableware, rimsher
15	St 2 1-13	glass, undetermined	1	Cobalt, body shard
16	St 2 1-14	ironstone	1	Tableware, unknown portion
17	St 2 1-15	ironstone, transfer printed	1	Tableware, Rimsherd, green unknown motif
18	St 2 1-16	utensil	1	Aluminium scoop, impressed with "ALWAYS PACK S-M-A TIGHTLY IN CUP"
19	St 2 1-17	glass, undetermined	2	Aqua, body shards, 1 is melted
20	St 2 1-18	whiteware	1	Tableware, base sherd
21	St 2 1-18	glass, undetermined	1	Clear, body shard
22	St 2 1-19	ironstone	1	Tableware, unknown portion, undecorated
23	St 2 1-20	ironstone	1	Tableware, unknown portion, undecorated
24	St 2 1-21	glass, dish	1	Milkglass, base shard
25	St 2 1-23	glass, undetermined	1	Cobalt, body shard
26	St 2 1-23	ironstone	1	Tableware, unknown portion, undecorated
27	St 2 1-24	ironstone, moulded	1	Tableware, unknown portion, unknown motif
28	St 2 1-25	glass, bottle	1	Clear, base shard, embossed DCS on base
29	St 2 1-26	ironstone, moulded	1	Tableware, undulating rim, rimsherd
30	St 2 1-26	glass, window	1	>1.6mm
31	St 2 1-27	ironstone, moulded	1	Tableware, rimsherd, floral/leaf motif
32	St 2 1-29	ironstone	1	Tableware, undecorated, base sherd
33	St 2 1-30	glass, undetermined	1	Aqua, body shards
34	St 2 1-31	ironstone, moulded	1	Tableware, rimsherd, floral/leaf motif
35	St 2 1-32	glass, undetermined	1	7-up green, body shard
36	St 2 1-33	whiteware	1	Tableware, unknown portion, undecorated
37	St 2 1-33	whiteware, moulded	1	Tableware, rimsherd, unknown motif
38	St 2 1-33	glass, undetermined	1	Clear, base shard, stippled, embossed with "9 6543"
39	St 2 1-34	stoneware	1	Utilitarian, white fabric, clear glaze
40	St 2 1-34	ironstone	1	Tableware, rimsherd, undecorated
41	St 2 1-35	glass, undetermined	1	Clear, body shard
42	St 2 1-36	glass, undetermined	1	Clear, body shard
43	St 2 1-37	glass, bottle	1	Bleat, lip/neck shard, crown cap
44	St 2 1-38	ironstone	1	Tableware, base sherd, undecorated
45	St 2 1-40	ironstone, moulded	1	Tableware, rimsherd, unknown motif
46	St 2 1-41	ironstone	1	Tableware, unknown portion, undecorated
47	St 2 1-42	whiteware	1	Tableware, unknown portion, undecorated
48	St 2 1-43	glass, undetermined	1	Clear, body shard
49	St 2 1-44	stoneware, salt-glazed	1	Utilitarian, unknown portion, white fabric, clear glaze on interior and exterior
50	St 2 1-45	ironstone	1	Tableware, unknown portion, undecorated
51	St 2 1-46	glass, undetermined	1	Light blue, body shard partially melted
52	St 2 1-47	glass, undetermined	1	Cobalt, neck shard, threaded
53	St 2 1-48	whiteware, transfer printed	1	Tableware, rimsherd, blue unknown motif
54	St 2 1-48	ironstone, transfer printed	1	Tableware, rim sherd, blue scenic motif (Japanese influence). Highly vitrified glaze
55	St. 2 1-49	glass, undetermined	1	Clear, body shard
56	St. 2 1-49	ironstone	1	Tableware, base sherd, undecorated
57	St. 2 1-51	glass, bottle	1	Clear, neck shard
58	St. 2 1-51	ironstone, moulded	1	Tableware, rimsherd, blue with fluted moulding
59	St. 2 1-52	glass, undetermined	2	Milkglass, base shard; 7-up green, body shard
60	St. 2 1-54	glass, dish	1	Milkglass, base shard
61	St. 2 1-55	ironstone, moulded	1	Tableware, rimsherd, blue with fluted moulding

62	St. 2 1-56	ironstone	1	Tableware, unknown portion, undecorated
63	St. 2 1-57	glass, undetermined	1	Clear, body shard
64	St. 2 1-58	ironstone	1	Tableware, unknown portion, undecorated
65	St. 2 1-59	glass, undetermined	1	Clear, body shard
66	St. 2 1-60	ironstone, moulded	2	Tableware, unknown portion, unknown moulding motif (1), tableware, rimsherd, blue, too fragmentary to determine portion but likely same as cat#59/62
67	St. 2 1-61	ironstone	1	Tableware, unknown portion, undecorated
68	St. 2 1-62	ironstone	1	Tableware, unknown portion, undecorated
69	St. 2 1-62	glass, undetermined	1	Light Blue, body shard
70	St. 2 1-63	ironstone	1	Tableware, unknown portion, undecorated
71	St. 2 1-64	glass, undetermined	1	Milkglass, body shard
72	St. 2 1-65	clock part	1	cuprous, clock face, minute markings around edge visible, as are works "NEW HAVEN". Based on size, likely part of a pocketwatch
73	St. 2 1-65	glass, undetermined	1	Clear, body shard
74	St. 2 1-66	glass, bottle	1	Milkglass, neck/shoulder sherd. Appears to be part of a small jar
75	St. 2 1-67	ironstone, moulded	1	Tableware, unknown portion, unknown moulded motif
76	St. 2 1-68	glass, undetermined	1	7-up green, body shard
77	St. 2 1-68	whiteware	1	Tableware, unknown portion, brown floral motif
78	St. 2 1-69	glass, bottle	1	Purple, neck shard, threaded
79	St. 2 1-70	ironstone	1	Tableware, unknown portion, undecorated
80	St. 2 1-71	ironstone, moulded	1	Tableware, rim/base sherd, wheat motif
81	St. 2 1-72	ironstone	1	Tableware, unknown portion, undecorated
82	St. 2 1-73	rockinghamware,	1	Tableware, unknown portion
83	St. 2 1-74	whiteware, transfer printed	1	Tableware, rim sherd, blue geometric motif on the interior, portion of a makers mark on exterior "...R..." over a plant sprig
84	St. 2 1-75	ironstone, moulded	1	Tableware, unknown portion, unknown moulded motif
85	St. 2 1-76	ironstone	1	Tableware, rimsherd, undecorated
86	St. 2 1-77	ironstone, moulded	1	Tableware, rimsherd, unknown motif
87	St. 2 1-78	earthenware, yellow	1	Utilitarian, unknown portion, clear glaze on exterior, brown glaze on interior
88	St. 2 1-79	ironstone	1	Tableware, rimsherd, undecorated
89	St. 2 1-80	ironstone	1	Tableware, rimsherd, undecorated
90	St. 2 1-81	ironstone	1	Tableware, rim sherd, undecorated, part of a lid
91	St. 2 1-82	ironstone, moulded	1	Tableware, rimsherd, floral moulded pattern
92	St. 2 1-83	glass, undetermined	1	Olive, body shard
93	St. 2 1-84	ironstone	1	Tableware, rimsherd, undecorated
94	St. 2 1-84	stoneware, salt-glazed	1	Utilitarian, unknown portion, grey on exterior w/ blue paint, dark grey on interior. Exterior decoration looks like a Welding and Belding
95	St. 2 1-85	metal, handle	1	Oval cross section, ring on end
96	St. 2 1-86	ironstone	1	Tableware, unknown portion, undecorated
97	St. 2 1-87	faunal remains	1	Cortical fragment, medium-large mammal
98	St. 2 1-87	glass, bottle	1	Aqua, Body Shard, embossed "AGUE...CONQUE..."
99	St. 2 1-88	whiteware	1	tableware, unknown portion, undecorated
100	St. 2 1-89	whiteware, moulded	1	Tableware, unknown portion, unknown moulded motif
101	St. 2 1-90	ironstone	1	Tableware, unknown portion, undecorated
102	St. 2 1-91	glass, bottle	1	Aqua, shard of a lid from a ring top jar
103	St. 2 1-91	whiteware	1	Tableware, unknown portion, interior painted solid teal
104	St. 2 1-92	stoneware	1	Utilitarian, unknown portion, clear glaze on exterior, brown glaze on interior
105	St. 2 1-94	glass, undetermined	1	Clear, bodyshard
106	St. 2 1-94	ironstone, transfer printed	1	Tableware, rimsherd, brown geometric/floral motif
107	St. 2 1-95	glass, bottle	1	Clear, body shard, embossed "...ER COIN..."
108	St. 2 1-96	whiteware, transfer printed	3	Tableware, rimsherd, blue floral motif
109	St. 2 1-97	whiteware	1	Tableware, base sherd, undecorated
110	St. 2 1-98	whiteware, transfer printed	1	Tableware, unknown portion, blue floral motif
111	St. 2 1-99	faunal remains	1	longbone fragment, medium-large mammal
112	St. 2 1-99	brick	1	Fragment, red
113	St. 2 1-100	stoneware, salt-glazed	1	Utilitarian, unknown portion, clear glaze on exterior, brown glaze on interior
114	St. 2 1-101	whiteware	1	Tableware, unknown portion, undecorated
115	St. 2 1-102	glass, bottle	1	Aqua, base shard
116	St. 2 1-103	ironstone	1	Tableware, unknown portion, undecorated
117	St. 2 1-104	faunal remains	1	Cortical fragment, large mammal
118	St. 2 1-106	ironstone	1	Tableware, base sherd, undecorated
119	St. 2 1-107	ironstone, moulded	1	Tableware, rimsherd, unknown motif
120	St. 2 1-108	ironstone, moulded	1	Tableware, unknown portion, unknown motif
121	St. 2 1-109	glass, undetermined	1	Aqua, body shard
122	St. 2 1-110	ironstone	1	Tableware, unknown portion, undecorated
123	St. 2 1-111	glass, dish	1	Purple, moulded floral motif

124	St. 2 1-113	ironstone	1	Tableware, unknown portion, undecorated
125	St. 2 1-114	whiteware	1	Tableware, rimsherd, undulating rim, undecorated
126	St. 2 1-116	glass, undetermined	1	Purple, body shard
127	St. 2 1-117	glass, bottle	1	Milkglass, rim/neck shard, threaded. Looks like part of a small jar
128	St. 2 1-118	glass, undetermined	1	Green, body shard

Appendix B

Historic Euro-Canadian Glossary of Terms/Definitions

1. Ceramics

1.1 Ware Types

Creamware: Creamware has a soft, cream colored body and was first developed sometime after 1750 by English potters, notably Josiah Wedgwood who by 1767 was producing a form called "Queen's ware" (Hume 1972:219) with a yellow lead glaze (in crevices it appears yellow or green). The glaze applied to creamware often appears rippled or wavy on the underside of ceramic pieces. Creamware was very common tableware in the last half of the 18th century and it was produced in a wide variety of forms, which often had moulded border decorations (Kenyon 1980). The creamware found in early 19th century Ontario is usually quite plain with edge treatments being the most common decorative type. Kenyon (1980) suggests that most Ontario creamware consists of undecorated dinnerware and that this type of ware had declined in popularity by 1830.

Ironstone (aka Bone China): Ironstone generally has a much harder, thicker body than ordinary white earthenwares. The glaze is often tinted slightly blue, but unlike earlier pearlware the glaze is smooth. Ironstone was introduced in the 1840s, and was the most popular type of tableware ceramic in Ontario during the 1870's to 1880s. It began as an earthenware influenced by oriental porcelains in the early 19th century and later served as an alternative to cheap china from Europe. Ironstone is rarely decorated with colour and often has moulded designs instead. The plain, unmolded forms were commonly available through the entire span of ironstone production and therefore are not very useful time markers and only a median date of 1870 can be inferred. Where it is decorated in colour, tea leaf patterns in green and dark blue began in the 1850s.

Pearlware: Pearlware has a slightly rippled glaze, which is bluish in colour as a result of the addition of cobalt. Pearlware was most often decorated with edged designs, transfer-printing or painting, with blue being the dominant colour used for decoration. Pearlware is almost never undecorated and pieces of plain pearlware recovered from archaeological sites are most often undecorated fragments of decorated pieces. Prior to 1830, painted floral designs were either all blue in colour or featured a palette of colours including brown, yellow, and green. Pearlware decreased in popularity after 1840 (Kenyon 1985).

Porcelain: Porcelain is a type of earthenware fired at such a high temperature that the clay has begun to vitrify. High grade porcelain is translucent and lower grade porcelain, while completely vitrified and thin, is much less translucent and nearly opaque. Due to its high cost, porcelain is extremely rare on 19th century sites in Ontario; however, by the late 19th to early 20th century it became relatively common as production techniques were developed in Europe which greatly reduced costs (Hughes 1961).

Red and Yellow Earthenware (Utilitarian): Red earthenware vessels were manufactured throughout the late 18th and 19th centuries and were the most common utilitarian ware in the first half of the 19th century, eventually being replaced by more durable stoneware vessels (Adams 1994:99). These types of utilitarian ware took a variety of forms including bowls and chamber pots, pitchers, flower pots, butter jars/crocks, and preserve jars. The use of red and yellow earthenware slowly declined throughout the 19th century and these ceramics are uncommon after 1880 when more durable stoneware became readily available (Miller 1987).

Redware: a thin-bodied earthenware covered on both the interior and exterior by a dark reddish-brown, dark brown, or black glaze. Commonly used in the early 19th century for tea pots and mugs (Adams 1994).

Rockingham Ware: Refer to "Yellowware" below.

Semi-Porcelain: Semi-porcelain is a vitreous, hard-glazed white earthenware resembling bone china. This hard earthenware was produced to emulate imported porcelains, but is not completely vitrified and lacks true translucency. In 1850, semi-porcelains became popular and soon dominated the marketplace over finer porcelains (Hughes 1961).

Stoneware (Utilitarian): Stoneware is characterized by a hard paste that is most commonly grey to light-brown, but in some instances can appear red. It is fired at a much higher temperature than other utilitarian wares, making it less porous. Vessel exteriors are often salt-glazed, giving the surface a dimpled effect. Stoneware tended to be used for large vessels such as harvest bottles, butter pots, storage crocks, and pinched-neck pitchers (Nöel Hume 1969). If the vessels were used to store liquids, the interior was given a thick dark-brown glaze coating. Stoneware vessels were introduced in Ontario in 1849 and became more durable and refined over time (Adams 1994).

Undetermined Ceramics

Unfortunately, some recovered ceramics from 19th century archaeological sites cannot be catalogued into a specific ceramic-ware classification. This is because these pieces have been altered by exposure to heat or no glaze or decorative features are present to allow for identification. In order to avoid altering the separate ceramic totals, percentages, and ultimately the temporal data for an archaeological site, damaged pieces are classified as undetermined ceramics. These pieces are considered non-diagnostic.

Whiteware (General): Whiteware is a variety of white earthenware with a near colorless glaze that replaced earlier near-white ceramics such as pearlware and creamware by the early 1830s and remained popular until the present day. Early whiteware tends to have a porous paste, with more vitrified, harder ceramics becoming increasingly common later in the 19th century (Kenyon 1985). There are a number of different methods used in decorating whiteware that changed over time and are useful for archaeologists in dating sites. The most common decorative techniques found in 19th century Ontario are painted, transfer-printed, edged, banded, sponged, moulded, and stamped. The proportion of these types will vary from site to site depending not only on the age of the site, but also according to the taste and wealth of the occupants.

Yellowware: Yellow-bodied ceramics became popular in the 1840s with typical forms being large bowls and jugs. These vessels most often have a clear glaze and are commonly decorated with bands of slip that are primarily blue, black, brown, and/or white in colour. Black, brown, and white slip decoration, when occurring together, is referred to as mocha treatment and is commonly seen on large drinking vessels and jugs. Mocha designs were popular from ca. 1840 to as late as 1900. Sometimes the glaze is a mottled brown, in which case the ceramic is termed “Rockingham” (Adams 1994).

1.2 Decorative Forms

Edged: Tablewares were often decorated with moulded rim motifs that were painted green or blue, and occasionally red (Miller 1991). Edged wares were one of the most common decorative types used on tablewares between 1790 and 1860 as they were the least expensive of the tablewares at that time (Miller 1987). By the 1840s, green edged wares became rare while blue remained popular until the 1860s. The edge rim and decorative motifs changed over time and are a useful indicator of age. Scalloped, or shell, edged rims occurred prior to 1840 and straight rims became more common after 1840. Straight rims remained popular until the 1870s (Adams 1994).

Flow Transfer Printed: This decorative type was created by the use of chemicals such as ammonium or lime during the glaze firing process. Flow wares are characterized by the appearance of painted and printed colours that “flow” or continue beyond the borders of the original pattern. Flow transfer-printed designs were first introduced in Ontario in the mid-1840s and were commonly produced through to the 1870s; however, flow transfer continued

to be produced into the 20th century. The most common colour used was blue, but vessels were also sometimes decorated in purple, brown, black, and green. Motifs generally included chinoiserie and floral designs.

Moulded (Ironstone): Ironstone is the most common ceramic type to feature raised moulded designs. From the 1840's through the 1880's, hexagonal and octagonal body forms were popular and embossed motifs of plant elements became increasingly popular after 1860 (Stelle 2001). The subjects selected for the designs were extremely varied and included such things as leaves, sprays of corn, wheat, oats, or hops, various fruits, and flowers (Stelle 2001). Beginning in the 1860s the "wheat" design became the most popular ironstone pattern produced (Kenyon 1985).

Painted: Painted wares were popular from as early as the 18th century through to the 1870s. Painted wares produced before 1830 typically feature broad paint stroke designs that were painted mostly in blue, but also polychrome colours featuring blue, brown, yellow, and green (Miller 1980). By the 1830s, a new palette of colours became popular including black, bright green, red, and pink. The prices for painted whitewares fell after 1830 as production costs were reduced through the simplification of painted designs. Simple, small floral patterns known as sprig patterns became common from 1830 through to the 1870s (Miller 1980, Stelle 2001).

Slipped/Banded: Banding is considered the fundamental decoration on factory-made slipware. Both popular and long-lived, banding appeared in conjunction with most other types of slip-decoration either as a wide band that formed a background or as narrow lines bracketing a main decoration (Sussman 1997). Over time, colour choices changed from bright, earthy tones common in the early 19th century to duller colours including blues and greys. Grey, blue, and black banding colours are more typical of wares produced in the 1850s and thereafter (Miller 1980).

Sponged: Sponged whiteware ceramics were a form of inexpensive tableware in which a sponge was used to apply an underglaze pigment (Miller 1987). All-over sponging, or the spatter technique, were popular by the 1830s and remained popular until the 1870s when cut and open sponge designs became more common (Adams et al. 1994).

Stamped: Stamped decorations are a variation on the sponged method. Stamping involves cutting a sponge into a desired design including simple floral and geometric patterns. The stamps were then dipped in pigment and pressed onto the ceramic to produce the decoration. This technique was used between 1845 to 1930 (Adams et al. 1994).

Transfer Printed: Transfer printed wares became popular quite early in the 19th century and involved the transfer of an intricate pattern from a sheet of treated paper to the underglaze surface of the clay. The technique involved in the transfer printing process underwent a change in the first twenty years of the nineteenth century (Gurujal 1988:14). In general, transfer printing involved engraving a copper plate with the desired design, the design with pigment was then printed on paper and the paper was used to transfer the pattern to the ceramic (Stelle 2001). The early technology involved the use of rather thick paper that produced designs with heavy lines but after 1803 and the introduction of tissue paper, graduated shadings and fine lines were made possible (Stelle 2001). Before 1830, almost all transfer printed wares were dark blue. After 1830, colors such as light blue, black, brown, green, purple, and red became more common. Transfer printed whiteware ceramics were less densely decorated than the earlier pearlware types, with more of the white background showing through the designs.

2. Firearm Material

Shot Shells: In the 1850s, before major advances in the ammunition industry, cartridges were generally assembled at home. By the 1860s, shotgun ammunition had become similar to what is available today. At this time, companies

such as Draper & Co. began to manufacture shells with finely machined brass heads and bodies/cases; however, these were more expensive to produce than shells with paper bodies. The mass production of shot shells began in the early 1870s.

3. Glass

3.1 General

Bottle Glass (General): The typical types of glassware recovered from historic 19th century sites usually consists of dark bottle glass used to store liquors, or aqua coloured bottles used for storing and distributing medication. Other types of coloured glass also appear throughout the 19th and 20th centuries, including amber, cobalt, white, and light greens.

Bottle Glass Manufacture (General): Further identification and dating of glass bottles from Euro-Canadian archaeological sites is often difficult as bottles are usually highly fragmented. If the lip area and/or base are intact, some dating clues may be found upon examination.

3.2 Glass Colours

Amber and Yellow Glass: Various shades of amber glass bottles were common from the late 19th through to the mid-20th centuries and darkened in shade as bottle making techniques were refined. Yellower amber coloured glass was a common glass colour from as early as 1860, declining in popularity after 1890. Darker ambers dominated after 1890 and continued to be manufactured well into the mid-20th century (Kendrick 1971).

Aqua Glass: Aqua coloured glass, often referred to as “green glass”, was manufactured up until the 1880s (Kendrick 1971).

Blue/Cobalt Glass: Various shades of blue bottle glass are usually coloured with the addition of cobalt oxide (Tooley 1953). Because of the wide application of the colours used for various products throughout the 19th and 20th centuries, blue coloured glass has limited diagnostic utility unless manufacturer marks or embossing indicating the product contained in the bottle are present.

Clear Glass: The use of clear bottle glass was mainly used for preserving food items in the canning process and this type of glassware typically dates from the 1880s up to the present day (Kendrick 1971). The manufacture of clear bottle glass typically dates from the 1880s up to the present day and was mainly used for preserving food items in the canning process (Kendrick 1971).

Green Glass: There are probably more shades of green to be found in bottle colours than any other colour with each different shade formed by a multitude of different colouring agents and impurities. Of particular note is the “7-Up” coloured bottles, which is an intensely brilliant green associated with the famous soft-drink bottle. This very bright shade of green is almost exclusively a 20th century feature (Toulouse 1971).

Olive Glass: Olive coloured glass was manufactured using iron slag to give it that darker appearance sought after to help protect the bottle's contents from sunlight. These olive coloured bottles take on a very dark olive green opaque, almost black appearance. Dark olive bottles were manufactured up until the 1860s (Kendrick 1971).

Sun-Coloured Amethyst: Dating reliability of clear glass can be narrowed down for bottles manufactured with manganese dioxide, which was used to "colourize" glass. Decolourized glass begins as colourless glass, but as a result of the addition of manganese during the manufacturing process, upon exposure to sunlight/UV light, it will turn a light violet or amethyst colour which is then referred to as "sun coloured amethyst glass" (Kendrick 1971). This glass is typically dated to between 1880 and 1920 (Kendrick 1971).

White Glass: White glass, which is thick and opaque, was manufactured after 1870 and often used for makeup and cream jars throughout the mid-20th century.

3.3 Glass Manufacturing Methods

Blown Glass: Blown glass often has an inconsistent shape and air bubble imperfections are visible. Bottle bases should be examined for the presence or absence of a pontil mark or "scar" where the bottle was attached to a rod during early blown manufacture.

Snap-Case: By about 1850, a method of bottle manufacture known as "snap case" was developed which was still a blown method, but left no pontil mark. By 1870, this method became universal, so after this date, pontil scars are no longer seen. Snap case bottles mostly had the bottle top added by hand and, therefore, the seam does not extend over the lip (Adams 1994).

Machine-Made: By the beginning of the 20th century, automatic bottle making machines were developed which produce a vertical mould seam that extends over the bottle lip and is ideal for dating purposes.

4. Personal Material

Agate Buttons: Agate buttons became popular in Upper Canada beginning in the late 1840's. Agate buttons which are often confused with white glass buttons are distinguishable due to the dimpled appearance present on the back of the button which is a result of the moulding process (Adams et al. 1994). The "agate" was in fact a type of pressed ceramic powder made using the so-called "Prosser" process patented in 1840.

Brass Buttons: Brass buttons were popular until the 1850s when they were replaced by glass and iron stamped buttons. Brass was a desired material for buttons given that brass is ductile and can be stamped, gilded, plated, or engraved easily. Large brass buttons were popular in the early 19th century. Prior to 1830, gilded brass buttons were almost exclusively worn on men's clothing. Gilded brass buttons have been surface plated and are stamped with "GILT", "ORANGE", "COLOUR" (White 2005).

Bone Buttons: Bone Buttons, often simply turned discs with 4 holes, were commonly used in the 19th century for underclothing. Typically 1 to 2 cm in diameter, bone buttons often retain the wood-like grain of the bone and so are sometimes misidentified as wood. By the last quarter of the 19th century bone buttons began to be replaced by those made of "vegetable ivory", a substance obtained from the shell of a large tropical nut (Adams et al. 1994).

Glass Buttons: Glass buttons common in the 19th century include white glass and coloured glass in black, blue, green, or pink. White glass buttons are moulded from a white opal glass and were primarily four-holed with pie-crust, saw tooth, or beaded designs. Coloured glass came in a variety of styles, some of which had brass eye and self-fasteners. Glass buttons predominate the last half of the 19th century when the manufacture of bone buttons decreased (Kenyon 1980).

Hair Combs: The most common type of comb found on 19th century sites are double-edged fine tooth combs. They are usually made of bone, horn, or ivory. After 1860, these comb materials were mostly replaced by vulcanite. In the 1890s, a variety of materials were introduced including aluminum, celluloid, and hard rubber. The method of manufacture generally involves cutting the desired material into rectangular pieces which were dampened and heated until they became soft. Once they are pressed and flat, tooth cutting was accomplished by a small circular saw (Kenyon 1980).

Metal Buttons: Large brass buttons with shanks were often used on coats. While such coat buttons were often gilded, this is usually missing on archaeological specimens. In the first quarter of the 19th century metal coat buttons were usually flat with a metal eye soldered back. Often words like “best gilt” or some other profession of quality are impressed on the back. By the 1820s other types of metal coat button were becoming more popular, including the “Florentine”, composed of several layers of metal covered with fabric. Another metal button type is a disc, usually with four holes, used for suspenders and undergarments similar to the bone buttons (Adams et al. 1994).

Mouth Harp (Jew’s Harp): The mouth harp, also known as a “Jew’s Harp” is an ancient musical instrument that had appeared in Europe by the 12th century AD. It is a plucked idiophone, which means that it is an instrument capable of only producing one note. The harmonics of the note can be modified by alternating the resonance patterns created by changes to the shaping of the mouth and tongue (Kenyon 1980). Mouth harps are found on 19th century sites in Ontario from as early as 1825.

Shell Buttons: Shell or “pearl” buttons, fashioned from discs of fresh-water or sometimes even exotic tropical shells, were often used as shirt buttons, especially before the development of the much less expensive “agate” button in the 1840s (Adams et al 1994).

White Clay Smoking Pipes: Clay pipes were very popular throughout the 19th century, with a decline in use by 1880 when they were replaced by cigarettes (Adams 1994:93). Most white clay pipes found in Upper Canada were manufactured either in Quebec or Scotland. Glasgow was one of the chief production centres for clay pipes in the 17th and 18th centuries. The manufacture of Glasgow clay pipes includes the firm of William White from 1805-1955, the firm of A. Coghill from 1826-1899, and the firm of William Murray from 1833-1861 (Walker 1970). Occasionally, examples from English, Dutch, French, and American makers are also recovered. Sometimes the maker’s name and/or city of manufacture were impressed on one side of the pipe stem, a practice which did not become popular until the 1840s (Adams 1994:93).

Marbles: Marbles generally found on 19th century sites in Ontario include clay, stone, porcelain, and glass. Clay, stone, and porcelain marbles were manufactured from as early as the 18th century and into the 20th century, with clay marbles having the longest period of manufacture up to the 1940s. Glass marbles were introduced in the mid-19th century with spiral designs popular from 1840 until the 1910s. Swirl and cat’s eye marble designs were not manufactured until the 20th century (Kenyon, 1985).

5. Structural Material and Metal

Brick: Brick is a basic construction material that varies in colour, shape, and size as a result of considerable local variation in brick-making practice. Generally early 19th century bricks are thin, flat and rectangular, and by the mid-19th century they are thicker and may have impressed rectangular or oval “frogs” (rough edges from being badly impressed). By the end of the 19th century, the brick-making industry became highly mechanized and brick shapes, sizes, and colours became uniform (Adams et al 1994).

Cut Nails: Cut nails were mechanically cut from a flat sheet of iron, thus the nail is of even thickness when viewed from the side, not tapered like the earlier hand-made nails (Adams et al 1994). Cut nails were invented in 1790 and were in common use from 1830 until the 1890s (Adams et al 1994).

Metal (Miscellaneous and Hardware): Miscellaneous metal and metal hardware are typically one of the largest artifact categories represented on 19th century Euro-Canadian sites. The miscellaneous metal and hardware category includes scraps of metal, including sheet metal and wire, but their intended use is unclear. Recovered metal hardware can sometimes be assigned a function, but often represent hardware items that cannot be identified due to their fragmentary nature.

Nails (General): Since the basic way in which nails are made has changed over time, they are useful indicators of the time period of site occupation. Three types of nails are commonly recovered from archaeological sites in Ontario: wrought nails, cut nails, and wire drawn nails.

Screws: Although screws were patented in the U.S. in 1875, they were not patented in Canada until much later. Screws were not developed commercially in Canada until the early 20th century as the design was difficult to manufacture. Peter Robertson was a Canadian inventor who began successfully producing screws in his factory in Milton, Ontario beginning in 1908. Robertson would later patent his design as the Robertson screw in 1909 (Lamb 1998).

Window Glass: While not true for every sherd, a sample of window glass dating to the first half of the 19th century should have an average thickness of 1.1 to 1.6 mm compared to about 1.7 to 2.0 mm from the last half of the century (Adams 1994).

Wire Drawn Nails: Wire nails are essentially the modern style nail with a round cross section and round head; developed in the 1850s, they did not begin to displace the cut nail until the 1890s (Adams et al 1994).

Wrought Nails: Wrought nails were the most common nail type used before 1830 and continued in use after this date; they are hand made with faceted heads and all sides tapering to a point (Adams et al 1994).

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Apr 29, 2021

Samantha Markham (P438)
AECOM
410 - 250 York London ON N6A 6K2

**RE: Review and Entry into the Ontario Public Register of Archaeological Reports:
Archaeological Assessment Report Entitled, "Stage 1 Archaeological Assessment
2021/2022 Storage Enhancement Project, Part of Lots 19-21, Concessions 4-5, and
Lots 18-22, Concessions 7-11, Geographic Township of Moore, Now Township of
St. Clair, Lambton County, Ontario", Dated Apr 16, 2021, Filed with MHSTCI
Toronto Office on Apr 23, 2021, MHSTCI Project Information Form Number P438-
0224-2020, MHSTCI File Number 0012902**

Dear Ms. Markham:

This office has reviewed the above-mentioned report, which has been submitted to this ministry as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18.¹ This review has been carried out in order to determine whether the licensed professional consultant archaeologist has met the terms and conditions of their licence, that the licensee assessed the property and documented archaeological resources using a process that accords with the 2011 *Standards and Guidelines for Consultant Archaeologists* set by the ministry, and that the archaeological fieldwork and report recommendations are consistent with the conservation, protection and preservation of the cultural heritage of Ontario.

The report documents the assessment of the study area as depicted in Figure 2 of the Supplementary Documentation and Figure 1 and Figure 6-1 through 6-4 of the above titled report and recommends the following:

AECOM's Stage 1 background study for the 2021/2022 Storage Enhancement Project area has determined that the potential for the recovery of both First Nation and Euro-Canadian archaeological resources within the current study area is high. Based on these findings, Stage 2 archaeological assessment is recommended for all areas identified to have archaeological potential in Figure 6 within the study area limits.

The Stage 2 archaeological assessment must be conducted by a licensed archaeologist and must follow the requirements set out in the *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011), including:

- The standard test pit survey method at 5 m intervals is to be conducted in all areas that will be impacted

by the project where ploughing is not feasible (e.g. woodlots, overgrown areas, manicured lawns, small sections of agricultural land) and

- Pedestrian survey at 5 m intervals where ploughing is possible (e.g. agricultural fields). This assessment will occur when agricultural fields have been recently ploughed, weathered by rain, and exhibit at least 80% surface visibility.
- Poorly drained areas, areas of steep slope, and areas of confirmed previous disturbance (e.g. building footprints, roadways, areas with identifiable underground infrastructure) identified during the Stage 2 assessment are to be mapped and photo-documented but are not recommended for Stage 2 survey as they possess low to no archaeological potential (Section 2.1, Standard 2a and 2b).

Should additional land outside of the current study area boundaries be included as part of the 2021/2022 Storage Enhancement Project, the standard requirements for archaeological assessments to be conducted prior to land disturbance remain in place.

It is pertinent to note that the 2021/2022 Storage Enhancement Project study area evaluated in this report includes additional land that may not be impacted by the project. A large area was assessed as part of this Stage 1 archaeological assessment in order to accommodate areas of possible infrastructure improvements. Once the area of project impacts has been determined, only the land that will be impacted by this project will require Stage 2 archaeological assessment.

There are three registered archaeological sites located within the current study area limits, AfHo-49, AeHo-19 and AeHo-20. Once the land to be impacted by infrastructure improvements has been identified, should proposed construction activities impact any of the archaeological sites, further archaeological assessment must be completed prior to ground disturbing activities.

Archaeological site AfHo-49 was determined to retain cultural heritage value or interest and requires Stage 3 archaeological assessment following the requirements set out in Section 3.2 and Table 3.1 the Standards and Guidelines for Consultant Archaeologists (Ontario Government 2011) (Stantec 2012).

While 19th century archaeological sites AeHo-19 and AeHo-20 were identified in 1992 by ARA, the field methods were sufficient to fulfill the requirements set out in the Standards and Guidelines for Consultant Archaeologists (Ontario Government 2011). Therefore, further Stage 3 archaeological assessment is required for AeHo-19 and AeHo-20 following the requirements set out in Section 3.2 and Table 3.1 the Standards and Guidelines for Consultant Archaeologists (Ontario Government 2011). Given the age of the archaeological reports, it is possible the sites will not be easily relocated. If archaeological sites AeHo-19 and AeHo-20 cannot be successfully relocated, it is recommended that a Stage 2 archaeological assessment be conducted again for the area (see Figure 2 of the Supplementary Documentation) following the requirements set out in Section 2 of the Standards and Guidelines for Consultant Archaeologists (Ontario Government 2011).

Based on the information contained in the report, the ministry is satisfied that the fieldwork and reporting for the archaeological assessment are consistent with the ministry's 2011 *Standards and Guidelines for Consultant Archaeologists* and the terms and conditions for archaeological licences. This report has been entered into the Ontario Public Register of Archaeological Reports. Please note that the ministry makes no representation or warranty as to the completeness, accuracy or quality of reports in the register.

Should you require any further information regarding this matter, please feel free to contact me.

Sincerely,

Wai Hadlari
Archaeology Review Officer

cc. Archaeology Licensing Officer
Evan Tomek, Enbridge Gas Inc.
Zora Zrnojacki, Ontario Energy Board

¹*In no way will the ministry be liable for any harm, damages, costs, expenses, losses, claims or actions that may result: (a) if the Report(s) or its recommendations are discovered to be inaccurate, incomplete, misleading or fraudulent; or (b) from the issuance of this letter. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or the Report(s) is otherwise found to be inaccurate, incomplete, misleading or fraudulent.*

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Jun 30, 2021

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AECOM
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RE: Entry into the Ontario Public Register of Archaeological Reports: Archaeological Assessment Report Entitled, "Stage 2 Archaeological Assessment, Corunna and Ladysmith A-1 Observation Well Drilling Project – Enbridge A-1 Observation Well TC8, Part of Lot 19, Concession 10, Geographic Township of Moore, Now the Township of St. Clair, Lambton County, Ontario", Dated Jun 28, 2021, Filed with MHSTCI Toronto Office on N/A, MHSTCI Project Information Form Number P438-0248-2021, MHSTCI File Number 0012902

Dear Ms. Markham:

The above-mentioned report, which has been submitted to this ministry as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18, has been entered into the Ontario Public Register of Archaeological Reports without technical review.¹

Please note that the ministry makes no representation or warranty as to the completeness, accuracy or quality of reports in the register.

Should you require further information, please do not hesitate to send your inquiry to Archaeology@Ontario.ca

cc. Archaeology Licensing Officer
Evan Tomek, Enbridge Gas Inc.
Zora Zrnojacki, Ontario Energy Board

¹In no way will the ministry be liable for any harm, damages, costs, expenses, losses, claims or actions that may result: (a) if the Report(s) or its recommendations are discovered to be inaccurate, incomplete, misleading or fraudulent; or (b) from the issuance of this letter. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or the Report(s) is otherwise found to be inaccurate, incomplete, misleading or fraudulent.

**Ministry of Heritage, Sport, Tourism, and
Culture Industries**

Archaeology Program Unit
Programs and Services Branch
Heritage, Tourism and Culture Division
401 Bay Street, Suite 1700
Toronto ON M7A 0A7
Tel.: (437) 339-9145
Email: Wai.Hadlari@ontario.ca

**Ministère des Industries du patrimoine, du sport, du
tourisme et de la culture**

Unité des programme d'archéologie
Direction des programmes et des services
Division du patrimoine, du tourisme et de la culture
401, rue Bay, bureau 1700
Toronto ON M7A 0A7
Tél. : (437) 339-9145
Email: Wai.Hadlari@ontario.ca



May 7, 2021

Samantha Markham (P438)
AECOM
410 - 250 York London ON N6A 6K2

**RE: Review and Entry into the Ontario Public Register of Archaeological Reports:
Archaeological Assessment Report Entitled, "Enbridge Gas Inc. Stage 2
Archaeological Assessment 2021/2022 Storage Enhancement Project Parts of Lot
20, Concession 5, and Lot 19, Concession 4, Geographic Township of Moore, Now
Township of St. Clair, Lambton County, Ontario ", Dated May 7, 2021, Filed with
MHSTCI Toronto Office on May 7, 2021, MHSTCI Project Information Form Number
P438-0237-2020, MHSTCI File Number 0012902**

Dear Ms. Markham:

This office has reviewed the above-mentioned report, which has been submitted to this ministry as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18.¹ This review has been carried out in order to determine whether the licensed professional consultant archaeologist has met the terms and conditions of their licence, that the licensee assessed the property and documented archaeological resources using a process that accords with the 2011 *Standards and Guidelines for Consultant Archaeologists* set by the ministry, and that the archaeological fieldwork and report recommendations are consistent with the conservation, protection and preservation of the cultural heritage of Ontario.

The report documents the assessment of the study area as depicted in Figures 2 and 3 of the Supplementary Documentation and Figures 1 and 7 of the above titled report and recommends the following:

The Stage 2 archaeological assessment for the proposed 2021/2022 Storage Enhancement Project in Lambton County, Ontario, was conducted on two separate parcels of land, TL8 south of Courtright Line, and TL9 north of Courtright Line in advance of the development of a natural gas pipeline. The Stage 2 archaeological assessment of TL8 south of Courtright Line resulted in the identification of one archaeological site, and the Stage 2 archaeological assessment of TL9 north of Courtright Line determined there were no archaeological resources on this parcel. Archaeological site Location 1 (AeHo-150) fulfills the criteria for further Stage 3 archaeological investigation, as per Section 2.2, Standards 1b and 1c of the *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). As such, further Stage 3 site-specific archaeological assessment is recommended for Location 1 (AeHo-150) on TL8 south of Courtright Line.

The Stage 3 archaeological assessment for Location 1 (AeHo-150) must include the hand excavation test unit methodology, as outlined in Section 3.2 and Table 3.1 of the Standards and Guidelines for Consultant Archaeologists (Ontario Government 2011), to further test the nature and density of each site. The Stage 3 site specific assessment for this site will include the following methods:

Location 1 (AeHo-150) was identified during pedestrian survey within an open agricultural field, so a controlled surface pick-up (CSP) must be conducted prior to test unit excavation. If ground surface visibility has decreased since the time of the Stage 2 survey and the Stage 3 CSP, the subject area must be re-ploughed and weathered;

Hand excavation will consist of the controlled excavation of 1 m square test units over the concentration of the artifact scatter to determine the presence of buried artifacts, structures, stratigraphy and cultural features (Section 3, Standards and Guidelines for Consultant Archaeologists, Ontario Government 2011);

Location 1 (AeHo-150) has been identified as a site where it is not yet evident that the level of cultural heritage value or interest may result in a recommendation to proceed to Stage 4 mitigation. As such, test unit placement should begin at 5 m intervals across the extent of each site, and additional test units amounting to 20% of the grid unit total should be placed in areas of interest within the site extents such as areas of higher artifact concentrations and/or adjacent to high yielding units;

Test units should be excavated to a depth of 5 cm into the subsoil and, as per Section 3.2.2., Standard 7 of the Standards and Guidelines for Consultant Archaeologists (Ontario Government 2011), the entire contents of each unit must be screened through mesh with an aperture of no greater than 6 mm; and,

If test unit excavation uncovers a cultural feature, do not excavate into feature fill. Instead, record the exposed plan of the feature and place geotextile fabric over the unit floor and backfill the unit.

Apart from TL8 south of Courtright Line where site-specific Stage 3 of Location 1 (AeHo-150) is required, as per Section 7.8.4, Standard 3, no further archaeological assessment of TL9 north of Courtright Line is required (Figure 7)”

Should additional land outside of the current study area be included as part of the proposed 2021/2022 Storage Enhancement Project, the standard requirements for archaeological assessments to be conducted prior to land disturbance remain in place (Figure 5 and Figure 6). The Stage 2 archaeological assessment must be conducted by a licensed archaeologist and must follow the requirements set out in the Standards and Guidelines for Consultant Archaeologists (Ontario Government 2011), including:

The standard test pit survey method at 5 m intervals is to be conducted in all areas that will be impacted by the project where ploughing is not feasible (e.g. woodlots, overgrown areas, manicured lawns, small sections of agricultural land); and

Pedestrian survey at 5 m intervals where ploughing is possible (e.g. agricultural fields). This assessment will occur when agricultural fields have been recently ploughed, weathered by rain, and exhibit at least 80% surface visibility.

Poorly drained areas, areas of steep slope, and areas of confirmed previous disturbance (e.g. building footprints, roadways, areas with identifiable underground infrastructure) are to be mapped and photo-documented but are not recommended for Stage 2 survey as they possess low to no archaeological potential.

Based on the information contained in the report, the ministry is satisfied that the fieldwork and reporting for the archaeological assessment are consistent with the ministry's 2011 *Standards and Guidelines for Consultant Archaeologists* and the terms and conditions for archaeological licences. This report has been entered into the Ontario Public Register of Archaeological Reports. Please note that the ministry makes no

representation or warranty as to the completeness, accuracy or quality of reports in the register.

Should you require any further information regarding this matter, please feel free to contact me.

Sincerely,

Wai Hadlari
Archaeology Review Officer

cc. Archaeology Licensing Officer
Evan Tomek, Enbridge Gas Inc.
Zora Zrnojacki, Ontario Energy Board

¹ *In no way will the ministry be liable for any harm, damages, costs, expenses, losses, claims or actions that may result: (a) if the Report(s) or its recommendations are discovered to be inaccurate, incomplete, misleading or fraudulent; or (b) from the issuance of this letter. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or the Report(s) is otherwise found to be inaccurate, incomplete, misleading or fraudulent.*

60659305 – Corunna and Ladysmith A-1 Observation Well Drilling Project
Prepared by AECOM

Summary of OPCC Comments Following Submission on June 17, 2021

Contact Name	Method and Date of Communication	Summary of Comments/Questions	Response
Government Agencies			
Steve Arnold Mayor, St. Clair Township Councillor, County of Lambton	Email of June 17, 2021	Major Arnold mentioned that he could not access the ER via email and requested it be resent.	AECOM provided a digital copy of the ER via email on June 17.
Roman Dorfman Real Estate Services Supervisor, Facilities and Real Estate Services Hydro One Networks Inc. (HONI)	Email of June 18, 2021	HONI requested confirmation that the wells identified in the ER were the same ones where Enbridge is seeking an access road easement from HONI.	Enbridge confirmed on June 22 that it is the same Project currently under review.
Dan Delaquis A/Manager Indigenous Energy Policy Ministry of Energy, Northern Development and Mines (ENDM)	Email of June 23, 2021	ENDM requested confirmation that the Project was one which Enbridge had already consulted ENDM. If so, the Ministry confirmed that the Letter of Opinion is not required for the Project so a formal delegation was not provided.	AECOM confirmed on June 25 that it was the same project.

60659305 – Corunna and Ladysmith A-1 Observation Well Drilling Project
Prepared by AECOM

Attachments – Copies of Agency Comments

van der Woerd, Mark

From: van der Woerd, Mark
Sent: June-17-21 12:19 PM
To: Steve Arnold
Cc: Evan Tomek; Washburn, Kristan
Subject: RE: [EXTERNAL] Re: Enbridge Gas Corunna & Ladysmith Observation Well Drilling Project - Environmental Report
Attachments: RPT_2021-06-09_Enbridge Well Drilling Project_Final ER.pdf

Hi Steve,

Thanks for letting me know and apologies for any confusion! I have attached it again to this email. If you don't receive it, please let me know.

Thanks,
Mark

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

From: Steve Arnold <steve.arnold1@outlook.com>
Sent: June-17-21 12:09 PM
To: van der Woerd, Mark <Mark.VanderWoerd@aecom.com>
Subject: [EXTERNAL] Re: Enbridge Gas Corunna & Ladysmith Observation Well Drilling Project - Environmental Report

Hi Mark, I received no attachment to this email, when you get a chance please forward it on 🙏

Thank you,
Steve Arnold
Mayor
St Clair Twp
Councillor
County of Lambton
519-381-7440



On Jun 17, 2021, at 12:03 PM, van der Woerd, Mark <Mark.VanderWoerd@aecom.com> wrote:

Caution: This email originated from outside of the organization.
Do not click links or open attachments unless you recognize the sender and know the content is safe.

Mimecast Attachment Protection was unable to create safe copies of your attachments.

Good morning,

Enbridge Gas Inc. (Enbridge Gas) is proposing the installation of two new observation wells in the Township of St. Clair in Lambton County. The Corunna (TC8) and Ladysmith (TL8) A-1 Observation Well Drilling Project (the Project) involves work at the Corunna Designated Storage Area (DSA) and Ladysmith DSA to allow Enbridge Gas to monitor the gas content and pressure in the underground storage area. The Project will assist with the continued safe and reliable delivery of natural gas to existing and future customers.

Enbridge Gas is committed to protecting the environment throughout the life of the Project. Enbridge Gas has retained AECOM to prepare an Environmental Report (ER) which identifies and evaluates the potential impacts the Project could have on environmental features within the Project Study Areas for TC8 and TL8. The report also outlines plans for how potentially negative impacts to the environment can be mitigated. A copy of the ER is attached to this email.

The work to prepare the well pads is anticipated to begin in summer 2021. By way of this email, Enbridge Gas is commencing the 42 day review period per the Ontario Energy Board Environmental Guidelines. Should you have any questions or would like to discuss the project in more detail, please do not hesitate to let us know.

Kind regards,
Mark

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



please don't print this e-mail unless you really need to.

van der Woerd, Mark

From: Alicia Pagaduan <Alicja.Pagaduan@enbridge.com>
Sent: June-19-21 7:52 PM
To: Roman.Dorfman@HydroOne.com
Cc: van der Woerd, Mark
Subject: [EXTERNAL] RE: Enbridge Gas Corunna & Ladysmith Observation Well Drilling Project - Environmental Report

Hi Roman,

I'll review this this week and get back to you. So far I've only been involved in the TL8 which is the access laneway I submitted to you.

I haven't seen anything for the TC8 yet or Ladysmith. This was originally Chantelle's projects so it's also in transition to me among other things she's been working on.

Thanks,

Alicja Pagaduan, CPA, CMA, MBA

Advisor Permitting

ENBRIDGE GAS INC.

TEL: 519-436-4600 ext 5002951 | CELL: 519-350-1838 | Alicja.Pagaduan@enbridge.com
50 Keil Dr. N, Chatham, ON N7M 5M1

Integrity. Safety. Respect.

From: Roman.Dorfman@HydroOne.com <Roman.Dorfman@HydroOne.com>
Sent: Friday, June 18, 2021 7:46 AM
To: Alicia Pagaduan <Alicja.Pagaduan@enbridge.com>
Cc: Mark.VanderWoerd@aeom.com
Subject: [External] FW: Enbridge Gas Corunna & Ladysmith Observation Well Drilling Project - Environmental Report

EXTERNAL: PLEASE PROCEED WITH CAUTION.

This e-mail has originated from outside of the organization. Do not respond, click on links or open attachments unless you recognize the sender or know the content is safe.

Alicja, can you please review the attached submission by EGI and advise what is needed from HONI as far as occupation agreements for the proposed "Observation Wells"

The attached report looks like the proposed location of the wells are in proximity to the access road easement being review by HONI

Let me know how I can assist

Thanks

Roman Dorfman

Real Estate Services Supervisor,
Facilities and Real Estate Services

Hydro One Networks Inc.

185 Clegg Road
Markham, ON | L6G 1B7

Tel: 905.946.6243
Cell: 416.433.8777
Fax: 905.946.6242
Email: roman.dorfman@hydroone.com

www.HydroOne.com

From: RE <RE@HydroOne.com>
Sent: Thursday, June 17, 2021 2:43 PM
To: DORFMAN Roman <Roman.Dorfman@HydroOne.com>
Subject: FW: Enbridge Gas Corunna & Ladysmith Observation Well Drilling Project - Environmental Report

FYI

From: REGULATORY AFFAIRS
Sent: Thursday, June 17, 2021 12:16 PM
To: RE
Subject: FW: Enbridge Gas Corunna & Ladysmith Observation Well Drilling Project - Environmental Report

Eryn MacKinnon

Sr. Regulatory Coordinator
Tel: (416) 345-4479
Cell: (416) 938-9113

From: van der Woerd, Mark <Mark.VanderWoerd@aecom.com>
Sent: Thursday, June 17, 2021 12:00 PM
Cc: Evan Tomek <Evan.Tomek@enbridge.com>; Washburn, Kristan <Kristan.Washburn@aecom.com>
Subject: Enbridge Gas Corunna & Ladysmith Observation Well Drilling Project - Environmental Report

*** Exercise caution. This is an EXTERNAL email. DO NOT open attachments or click links from unknown senders or unexpected email. ***

Good morning,

Enbridge Gas Inc. (Enbridge Gas) is proposing the installation of two new observation wells in the Township of St. Clair in Lambton County. The Corunna (TC8) and Ladysmith (TL8) A-1 Observation Well Drilling Project (the Project) involves work at the Corunna Designated Storage Area (DSA) and Ladysmith DSA to allow Enbridge Gas to monitor the gas content and pressure in the underground storage area. The Project will assist with the continued safe and reliable delivery of natural gas to existing and future customers.

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Kind regards,
Mark

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

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van der Woerd, Mark

From: Delaquis, Dan (ENDM) <Dan.Delaquis@ontario.ca>
Sent: June-25-21 11:04 AM
To: van der Woerd, Mark
Cc: Evan Tomek; Washburn, Kristan; Scott, Alyssa (ENDM); Ashe, Rosalind (ENDM); Johnston-Weiser, David (ENDM); Asha Patel; Catherine Pennington
Subject: [EXTERNAL] RE: Enbridge Gas Corunna & Ladysmith Observation Well Drilling Project - Environmental Report

Great – thanks, Mark. Have a great weekend yourself!

Dan

Dan Delaquis | A/Manager, Indigenous Energy Policy
Ministry of Energy, Northern Development and Mines

From: van der Woerd, Mark <Mark.VanderWoerd@aecom.com>
Sent: June 25, 2021 10:59 AM
To: Delaquis, Dan (ENDM) <Dan.Delaquis@ontario.ca>
Cc: Evan Tomek <Evan.Tomek@enbridge.com>; Washburn, Kristan <Kristan.Washburn@aecom.com>; Scott, Alyssa (ENDM) <Alyssa.Scott@ontario.ca>; Ashe, Rosalind (ENDM) <Rosalind.Ashe@ontario.ca>; Johnston-Weiser, David (ENDM) <David.Johnston-Weiser@ontario.ca>; Asha Patel <Asha.Patel@enbridge.com>; Catherine Pennington <Catherine.Pennington@enbridge.com>
Subject: RE: Enbridge Gas Corunna & Ladysmith Observation Well Drilling Project - Environmental Report

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

Hi Dan,

Thanks for your response. Confirming it is the same project.

Have a great weekend!
Mark

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

From: Delaquis, Dan (ENDM) <Dan.Delaquis@ontario.ca>
Sent: June-23-21 1:52 PM
To: van der Woerd, Mark <Mark.VanderWoerd@aecom.com>
Cc: Evan Tomek <Evan.Tomek@enbridge.com>; Washburn, Kristan <Kristan.Washburn@aecom.com>; Scott, Alyssa (ENDM) <Alyssa.Scott@ontario.ca>; Ashe, Rosalind (ENDM) <Rosalind.Ashe@ontario.ca>; Johnston-Weiser, David (ENDM) <David.Johnston-Weiser@ontario.ca>; Asha Patel <Asha.Patel@enbridge.com>; Catherine Pennington <Catherine.Pennington@enbridge.com>
Subject: [EXTERNAL] RE: Enbridge Gas Corunna & Ladysmith Observation Well Drilling Project - Environmental Report

Hi Mark,

Assuming that the project in the subject line is the one identified in the attached email, ENDM didn't provide a formal delegation for the project and therefore a Letter of Opinion is not required by Enbridge or the OEB in order to proceed with the LTC approval.

Happy to chat further if more information is needed.

Thanks,
Dan

Dan Delaquis | A/Manager, Indigenous Energy Policy
Ministry of Energy, Northern Development and Mines

From: van der Woerd, Mark <Mark.VanderWoerd@aecom.com>
Sent: June 17, 2021 12:22 PM
To: Delaquis, Dan (ENDM) <Dan.Delaquis@ontario.ca>
Cc: Evan Tomek <Evan.Tomek@enbridge.com>; Washburn, Kristan <Kristan.Washburn@aecom.com>
Subject: Enbridge Gas Corunna & Ladysmith Observation Well Drilling Project - Environmental Report

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

Good afternoon Dan,

I received an out of office notification from Jason McCullough. He noted that in his absence notifications/inquiries should be sent to you. Please see below and attached.

Please let us know if you have any questions.

Thanks!
Mark

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

From: van der Woerd, Mark
Sent: June-17-21 12:00 PM
Cc: Evan Tomek <Evan.Tomek@enbridge.com>; Washburn, Kristan <Kristan.Washburn@aecom.com>
Subject: Enbridge Gas Corunna & Ladysmith Observation Well Drilling Project - Environmental Report

Good morning,

Enbridge Gas Inc. (Enbridge Gas) is proposing the installation of two new observation wells in the Township of St. Clair in Lambton County. The Corunna (TC8) and Ladysmith (TL8) A-1 Observation Well Drilling Project (the Project) involves work at the Corunna Designated Storage Area (DSA) and Ladysmith DSA to allow Enbridge Gas to monitor the gas content and pressure in the underground storage area. The Project will assist with the continued safe and reliable delivery of natural gas to existing and future customers.

Enbridge Gas is committed to protecting the environment throughout the life of the Project. Enbridge Gas has retained AECOM to prepare an Environmental Report (ER) which identifies and evaluates the potential impacts the Project could have on environmental features within the Project Study Areas for TC8 and TL8. The report also outlines plans for how potentially negative impacts to the environment can be mitigated. A copy of the ER is attached to this email.

The work to prepare the well pads is anticipated to begin in summer 2021. By way of this email, Enbridge Gas is commencing the 42 day review period per the Ontario Energy Board Environmental Guidelines. Should you have any questions or would like to discuss the project in more detail, please do not hesitate to let us know.

Kind regards,

Mark

Mark van der Woerd

Senior Environmental Advisor, AECOM

mark.vanderwoerd@aecom.com

(289) 439-9803

LANDS MATTERS

Land Use – General

1. Land use requirements for the Project consist of the construction of gravel pads and access lanes, all located on privately owned lands. The Project ER set out at Exhibit F, Tab 1, Schedule 1, Attachment 1, Appendix A illustrates the features to be constructed for wells TC 8 and TL 8.
2. Attachment 1 to this Exhibit sets out the Affidavit of Title Search for those landowners in the Corunna and Ladysmith DSAs that are directly affected (construction activities occurring on their lands) by the Project work for wells TC 8 and TL 8 and landowners on the immediately adjacent properties. Enbridge Gas will provide notice of this Application to all landowners listed in Attachment 1.

Observation Well – TC 8

3. For well TC 8, Enbridge Gas must construct the following features:
 - A gravel pad temporary work space area of approximately 1,600 square metres with a silt fence around the perimeter in order to complete the drilling of the well. Once the drilling of well TC 8 is complete, the gravel pad will be reduced to approximately 30 square metres.
 - A 6 m wide x 70 m long permanent gravel lane will be constructed off of the existing gravel lane in order to allow access to the well site.

Observation Well – TL 8

4. For well TL 8, Enbridge Gas must construct the following features:
 - A gravel pad temporary work space area of approximately 4,800 square metres with a silt fence around the perimeter in order to complete the drilling

of the well. Once the drilling of well TL 8 is complete, the gravel pad will be reduced to approximately 30 square metres.

- A 6 m wide x 90 m long permanent gravel lane will be constructed off of an existing gravel road, owned by St. Clair Township which is being transferred to Enbridge Gas, located south of Courtright Line (Highway 80) in order to allow access to the well site.

Negotiations to Date

5. Enbridge Gas land agents have contacted the parties directly impacted by the Project. The impacted party for the drilling of observation well TC 8 is a tenant farmer. For the drilling of observation well TL 8, the impacted parties are a third party farmer, Township of St. Clair and Infrastructure Ontario.

Observation Well – TC 8

6. The proposed TC 8 observation well is within the Corunna DSA. Enbridge Gas owns the property on which the well will be drilled. These lands have been previously disturbed and are leased to a local farmer who has been notified of the Project.

Observation Well – TL 8

7. The proposed TL 8 observation well is within the Ladysmith DSA. Enbridge Gas has a Gas Storage Lease on the land on which the observation well will be drilled. Enbridge Gas has provided the third party farmer with a Letter of Acknowledgement. Negotiations with the third party farmer are ongoing, however, Enbridge Gas's legal right to drill based on the Gas Storage Lease negates any concerns from these ongoing negotiations.

8. Infrastructure Ontario has been notified of the Project and Enbridge Gas is obtaining an easement from Infrastructure Ontario for a permanent gravel lane to be constructed that intersects with the existing gravel road owned by St. Clair Township.
9. St. Clair Township has agreed to transfer ownership of the existing gravel road to Enbridge Gas and Enbridge Gas has signed the transfer agreement.

Risk Assessment of Land Use Requirements

10. Enbridge Gas will be building all-weather laneways and drill pads. Once the pads are in place, access to the well sites will not be an issue. As discussed above, TC 8 will be drilled on privately held agricultural lands owned by Enbridge Gas and TL 8 will be drilled on third party farm land that is under lease to Enbridge Gas. The lease agreement pertaining to TL 8 grants Enbridge Gas the right to drill and access the well. If the drilling does not occur in 2021, the pads will remain until 2022. Enbridge Gas will compensate both the third party farmer and the tenant farmer for use of the lands and any crop loss associated with the Project. Accordingly, the level of risk associated with land use requirements for the Project is considered to be low.

EB-2021-0079

ONTARIO ENERGY BOARD

IN THE MATTER OF the *Ontario Energy Board Act*,
1998, S.O. 1998, c. 15 (Schedule B);

AND IN THE MATTER OF an application by
Enbridge Gas Inc. for permission for the
Corunna and Ladysmith A-1 Observation Well
Drilling Project, within the Corunna and
Ladysmith Designated Storage Areas.

AFFIDAVIT OF SEARCH OF TITLE

**I, Ann L. Gray, of the City of Sarnia, Ontario, MAKE OATH AND SAY AS
FOLLOWS:**

1. I am a Free-Lance Title Searcher retained by Enbridge Gas Inc. (the "**Applicant**"), and as such have knowledge of the matters hereinafter deposed to.
2. On or about July 28, 2021, I conducted a search of title and obtained abstracts of title and other documents from the Land Registry Office for the Land Titles and the Land Registry Division of Lambton, in respect of the lands upon which the Applicant proposes to drill observation wells TC 8 and TL 8 in the Corunna and Ladysmith Designated Storage Areas and the lands immediately adjacent thereto (the "**Subject Lands**"). The said searches were conducted for the purpose of determining the status of land tenure ownership and other registered interests of encumbrancers (collectively, "**Interested Parties**") of the Subject Lands.

3. As a result of the said searches conducted and information provided by the Applicant, I determined the Interested Parties of the Subject Lands are those set in the list at Exhibit "A" hereto. This list of Interested Parties was compiled on the basis of the information provided to me by the Applicant, including a map of the area where to proposed wells will be drilled, and the searches of title undertaken therewith. Addresses for service for such Interested Parties were derived from the registered documents and from municipal directories, where applicable.

SWORN before me at Sarnia,

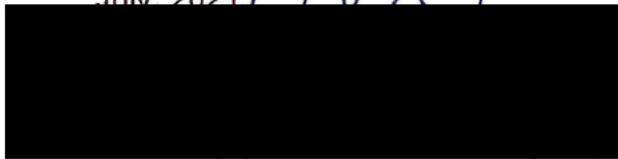
Ontario, this 29th day of

July, 2021

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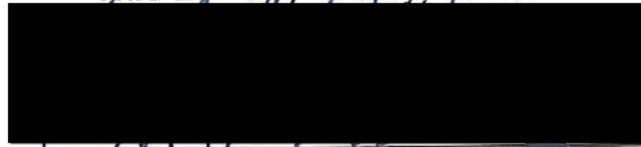


Ann L. Gray



A Commissioner for Taking
Affidavits

*This is **Exhibit "A"** to the Affidavit of
Ann L. Gray, sworn before me
This 29th day of July, 2021.*





A Commissioner, etc.



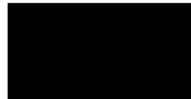
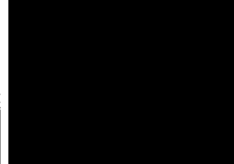
Corunna Designated Storage Area


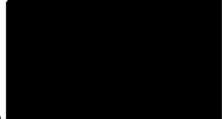


Observation Well Drilling Land Area



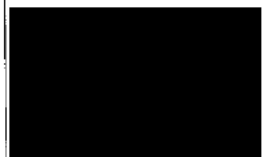
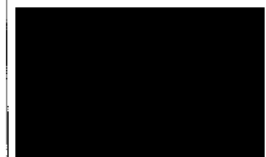
OWNER:	ADDRESS:	ENCUMBRANCE HOLDER:	ADDRESS:	ENCUMBRANCE:	PIN #	LEGAL DESCRIPTION:
Enbridge Gas Inc. (The Consumers' Gas Company Ltd.)	3501 Tecumseh Rd, Mooretown, ON NON 1M0	1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.) 2. 912176 Ontario Limited	1. 3501 Tecumseh Rd, Mooretown, ON NON 1M0 2. 3501 Tecumseh Rd, Mooretown, ON NON 1M0	1. (a) Lease 1. (b) Agreement 1. (c) OEB Order 1. (d) Easement 2. (a) Lease 2. (b) Easement 2. (c) Agreement	43295-0090	Part of Lot 19, Concession 10, Moore, St. Clair

Lands Adjacent to the Drilling Area

OWNER:	ADDRESS:	ENCUMBRANCE HOLDER:	ADDRESS:	ENCUMBRANCE:	PIN #	LEGAL DESCRIPTION:
		<p>1. Enbridge Gas Inc. (Union Gas Limited)</p> <p>2. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>3. The Hydro- Electric Power Commission of Ontario</p>	<p>1. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>2. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>3. (Ontario Hydro) 185 Clegg Road, P.O. Box 4300, Internal R32, Markham, ON L6G 1B7</p>	<p>1. (a) Agreement 1. (b) Easement</p> <p>2. (a) Lease 2. (b) Agreement 2. (c) Easement 2. (d) OEB Order</p> <p>3. Easement</p>	43295-0088	<p>Part of Lot 20, Concession 10, Moore, St. Clair</p> <p>SURFACE RIGHTS ONLY</p>

		<p>1. Enbridge Gas Inc. (Union Gas Limited)</p> <p>2. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>3. The Hydro-Electric Power Commission of Ontario</p>	<p>1. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>2. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>3. (Ontario Hydro) 185 Clegg Road, P.O. Box 4300, Internal R32, Markham, ON L6G 1B7</p>	<p>1. (a) Agreement 1. (b) Easement</p> <p>2. (a) Lease 2. (b) Agreement 2. (c) Easement 2. (d) OEB Order</p> <p>3. Easement</p>	<p>43295-0089</p>	<p>Part of Lot 20, Concession 10, Moore, St. Clair</p> <p>MINERAL RIGHTS ONLY</p>
		<p>1. Enbridge Gas Inc. (Union Gas Limited)</p> <p>2. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>3. The Hydro-Electric Power Commission of Ontario</p>	<p>1. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>2. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>3. (Ontario Hydro) 185 Clegg Road, P.O. Box 4300, Internal R32, Markham, ON L6G 1B7</p>	<p>1. (a) Agreement 1. (b) Easement</p> <p>2. (a) Lease 2. (b) Agreement 2. (c) Easement 2. (d) OEB Order</p> <p>3. Easement</p>	<p>43295-0089</p>	<p>Part of Lot 20, Concession 10, Moore, St. Clair</p> <p>MINERAL RIGHTS ONLY</p>

		<p>1. Enbridge Gas Inc. (Union Gas Limited)</p> <p>2. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>3. The Hydro-Electric Power Commission of Ontario</p>	<p>1. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>2. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>3. (Ontario Hydro) 185 Clegg Road, P.O. Box 4300, Internal R32, Markham, ON L6G 1B7</p>	<p>1. (a) Agreement 1. (b) Easement</p> <p>2. (a) Lease 2. (b) Agreement 2. (c) Easement 2. (d) OEB Order</p> <p>3. Easement</p>	<p>43295-0089</p>	<p>Part of Lot 20, Concession 10, Moore, St. Clair</p> <p>MINERAL RIGHTS ONLY</p>
		<p>1. Enbridge Gas Inc. (Union Gas Limited)</p> <p>2. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>3. The Hydro-Electric Power Commission of Ontario</p>	<p>1. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>2. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>3. (Ontario Hydro) 185 Clegg Road, P.O. Box 4300, Internal R32, Markham, ON L6G 1B7</p>	<p>1. (a) Agreement 1. (b) Easement</p> <p>2. (a) Lease 2. (b) Agreement 2. (c) Easement 2. (d) OEB Order</p> <p>3. Easement</p>	<p>43295-0089</p>	<p>Part of Lot 20, Concession 10, Moore, St. Clair</p> <p>MINERAL RIGHTS ONLY</p>

		<p>1. Enbridge Gas Inc. (Union Gas Limited)</p> <p>2. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>3. The Hydro-Electric Power Commission of Ontario</p>	<p>1. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>2. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>3. (Ontario Hydro) 185 Clegg Road, P.O. Box 4300, Internal R32, Markham, ON L6G 1B7</p>	<p>1. (a) Agreement 1. (b) Easement</p> <p>2. (a) Lease 2. (b) Agreement 2. (c) Easement 2. (d) OEB Order</p> <p>3. Easement</p>	<p>43295-0089</p>	<p>Part of Lot 20, Concession 10, Moore, St. Clair</p> <p>MINERAL RIGHTS ONLY</p>
		<p>1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>2. Bank of Montreal</p>	<p>1. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>2. 1362 Lambton Mall Road, Sarnia, ON N7S 5A1</p>	<p>1. (a) Lease 1. (b) Easement 1. (c) Agreement 1. (c) OEB Order</p> <p>2. Mortgage</p>	<p>43295-0091</p>	<p>Part of Lot 19, Concession 10, Moore, St. Clair</p>

		<p>1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>2. Nova Chemicals (Canada) Ltd. (Petrosar Limited)</p> <p>3. Plains Midstream Canada ULC (Dome NGL Pipeline Ltd.)</p> <p>4. Dome NGL Pipeline Ltd.</p> <p>5. Nova Chemicals (Canada) Ltd.</p> <p>6. Bank of Montreal</p>	<p>1. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>2. 1086 Modeland Rd, Bldg. 1040, Suite 201, Sarnia, ON N7S 6L2</p> <p>3. Manager of Lands, 1400-607 8th Ave SW, Calgary, AB T2P 0A7</p> <p>4. c/o Plains Midstream Canada ULC Manager of Lands, 1400-607 8th Ave SW, Calgary, AB T2P 0A7</p> <p>5. 785 Petrolia Line, Corunna, ON N0N 1G0</p> <p>6. 200 Ouellette Ave., Windsor, ON N9A 1A5</p>	<p>1. (a) Lease 1. (b) Easement 1. (c) Agreement</p> <p>2. Easement</p> <p>3. Easement</p> <p>4. Easement</p> <p>5. Easement</p> <p>6. Mortgage</p>	43295-0093	Part Lot 19, Concession 9, Moore, St. Clair
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		<p>1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>2. Nova Chemicals (Canada) Ltd. (Petrosar Limited)</p> <p>3. Plains Midstream Canada ULC (Dome NGL Pipeline Ltd.)</p> <p>4. Dome NGL Pipeline Ltd.</p> <p>5. Enbridge Gas Inc. (Union Gas Limited)</p> <p>6. The Toronto- Dominion Bank</p>	<p>1. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>2. 1086 Modeland Rd, Bldg. 1040, Suite 201, Sarnia, ON N7S 6L2</p> <p>3. Manager of Lands, 1400-607 8th Ave SW, Calgary, AB T2P 0A7</p> <p>4. c/o Plains Midstream Canada ULC Manager of Lands, 1400-607 8th Ave SW, Calgary, AB T2P 0A7</p> <p>5. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>6. 1210 London Road, Sarnia, ON N7S 1P4</p>	<p>1. (a) Lease 1. (b) Agreement 1. (c) OEB Order</p> <p>2. Easement</p> <p>3. Easement</p> <p>4. Easement</p> <p>5. (a) Easement 5. (b) Agreement</p> <p>6. Mortgage</p>	<p>43295-0094</p>	<p>Part Lot 19, Concession 9, Moore, St. Clair</p>
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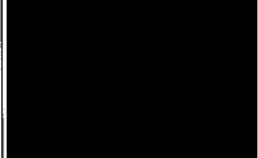
		<p>1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>2. Nova Chemicals (Canada) Ltd. (Petrosar Limited)</p> <p>3. Plains Midstream Canada ULC (Dome NGL Pipeline Ltd.)</p> <p>4. Dome NGL Pipeline Ltd.</p> <p>5. Enbridge Gas Inc. (Union Gas Limited)</p>	<p>1. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>2. 1086 Modeland Rd, Bldg. 1040, Suite 201, Sarnia, ON N7S 6L2</p> <p>3. Manager of Lands, 1400-607 8th Ave SW, Calgary, AB T2P 0A7</p> <p>4. c/o Plains Midstream Canada ULC Manager of Lands, 1400-607 8th Ave SW, Calgary, AB T2P 0A7</p> <p>5. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p>	<p>1. (a) Lease 1. (b) Agreement 1. (c) Easement 1. (d) OEB Order</p> <p>2. Easement</p> <p>3. Easement</p> <p>4. Easement</p> <p>5. (a) Easement 5. (b) Agreement</p>	<p>43295-0096</p>	<p>Part Lot 19, Concession 9, Moore, St. Clair</p>
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		<p>1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>2. Nova Chemicals (Canada) Ltd. (Petrosar Limited)</p> <p>3. Plains Midstream Canada ULC (Dome NGL Pipeline Ltd.)</p> <p>4. Dome NGL Pipeline Ltd.</p> <p>5. Enbridge Gas Inc. (Union Gas Limited)</p>	<p>1. 3501 Tecumseh Rd, Mooretown, ON NON 1M0</p> <p>2. 1086 Modeland Rd, Bldg. 1040, Suite 201, Sarnia, ON N7S 6L2</p> <p>3. Manager of Lands, 1400-607 8th Ave SW, Calgary, AB T2P 0A7</p> <p>4. c/o Plains Midstream Canada ULC Manager of Lands, 1400-607 8th Ave SW, Calgary, AB T2P 0A7</p> <p>5. 3501 Tecumseh Rd, Mooretown, ON NON 1M0</p>	<p>1. (a) Lease 1. (b) Agreement 1. (c) Easement 1. (d) OEB Order</p> <p>2. Easement</p> <p>3. Easement</p> <p>4. Easement</p> <p>5. (a) Easement 5. (b) Agreement</p>	<p>43295-0096</p>	<p>Part Lot 19, Concession 9, Moore, St. Clair</p>
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The Corporation of the County of Lambton	789 Broadway St., Wyoming, ON N0N 1T0				43289-0052 (Part)	Part of the Road Allowance between Concessions 10 & 11, and Part of Lots 19 & 20, Concession 10, Moore, (Petrolia Line) St. Clair
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Ladysmith Designated Storage Area

Observation Well Drilling Land Areas

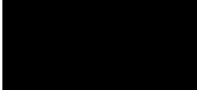
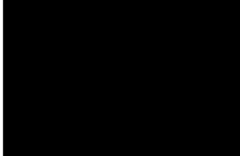
OWNER:	ADDRESS:	ENCUMBRANCE HOLDER:	ADDRESS:	ENCUMBRANCE:	PIN #	LEGAL DESCRIPTION:
		<p>1. The Hydro-Electric Power Commission of Ontario</p> <p>2. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>3. Esso Resources Canada Limited</p> <p>4. Imperial Oil Limited</p>	<p>1. (Ontario Hydro) 185 Clegg Rd., P.O.Box 4300, Internal R32, Markham, ON L6G 1B7</p> <p>2. 3501 Tecumseh Rd, Mooretown, ON NON 1M0</p> <p>3. 505 Quarry Park Blvd., Calgary, AB T2C 5N1</p> <p>4. 505 Quarry Park Blvd., Calgary, AB T2C 5N1</p>	<p>1. Easement</p> <p>2. (a) Lease 2. (b) Agreement</p> <p>3. Lease</p> <p>4. Lease</p>	43310-0076	Part of Lot 19, Concession 4, Moore, St. Clair


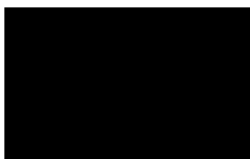

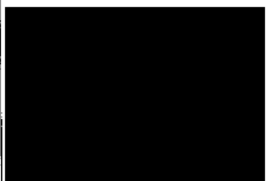


Ministry of North Development and Mines for Minister of Mines, Mining Lands Section,	933 Ramsey Lake Road, 6 th Floor, Sudbury, ON P3E 6B5	1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.) 2. Enbridge Energy Distribution Inc.	1. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0 2. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0	1. (a) Lease 1. (b) Agreement 1. (c) Easement 2. Easement	43310-0100 (Part)	Part of Lots 19 & 20, Concession 4, and Part of the Road Allowance between Concessions 4 & 5, Moore, St. Clair MINERAL RIGHTS ONLY
The Hydro-Electric Power Commission of Ontario	(Ontario Hydro) 185 Clegg Road, P.O. Box 4300, Internal R32, Markham, ON L6G 1B7	1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.) 2. Enbridge Energy Distribution Inc.	1. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0 2. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0	1. (a) Lease 1. (b) Agreement 1. (c) Easement 2. Easement	43310-0100 (Part)	Part of Lots 19 & 20, Concession 4, and Part of the Road Allowance between Concessions 4 & 5, Moore, St. Clair SURFACE RIGHTS ONLY



Ontario Hydro	185 Clegg Road, P.O. Box 4300, Internal R32, Markham, ON L6G 1B7	1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.) 2. Enbridge Energy Distribution Inc.	1. 3501 Tecumseh Road, Mooretown, ON N0N 1M0 2. 3501 Tecumseh Road, Mooretown, ON N0N 1M0	1. (a) Lease 1. (b) Agreement 1. (c) Easement 2. Easement	43310-0100 (Part)	Part of Lots 19 & 20, Concession 4, and Part of the Road Allowance between Concessions 4 & 5, Moore, St. Clair SURFACE RIGHTS ONLY
The Corporation of the County of Lambton	789 Broadway Street, Wyoming, ON N0N 1T0				43303-0111	Part of the Original Road Allowance between Concessions 4 & 5, Moore, St. Clair
The Corporation of the Township of St. Clair	1155 Emily Street, Mooretown, ON N0N 1M0				43303-0111	Part of the Original Road Allowance between Concessions 4 & 5, Moore, St. Clair




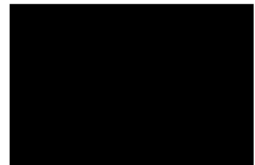
Lands Adjacent to the Drilling Area





OWNER:	ADDRESS:	ENCUMBRANCE HOLDER:	ADDRESS:	ENCUMBRANCE:	PIN #	LEGAL DESCRIPTION:
The Hydro-Electric Power Commission of Ontario	(Ontario Hydro) 185 Clegg Rd., P.O. Box 4300, Internal R32, Markham, ON L6G 1B7	1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.) 2. Enbridge Gas Inc. (Union Gas Limited) 3. The Hydro-Electric Power Commission of Ontario	1. 3501 Tecumseh Rd., Mooretown, ON N0N 1M0 2. 3501 Tecumseh Rd., Mooretown, ON N0N 1M0 3. (Ontario Hydro) 185 Clegg Rd., P.O.Box 4300, Internal R32, Markham, ON L6G 1B7	1. (a) Lease 1. (b) Agreement 1. (c) Easement 1. (d) OEB Order 2. Easement 3. Easement	43303-0052 (Part)	Parts of Lot 18, Concession 4, Moore, Parts of Lots 19 & 20, Concession 5, Moore, & Parts of the Road Allowance between Concessions 4 & 5, Moore, and Parts of the Road Allowance between Lots 18 & 19, Concession 4, Moore (Courtright Line), St. Clair SURFACE RIGHTS ONLY

The Corporation of the County of Lambton	789 Broadway St., Wyoming, ON N0N 1T0	1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.) 2. Enbridge Gas Inc. (Union Gas Limited) 3. The Hydro-Electric Power Commission of Ontario	1. 3501 Tecumseh Rd., Mooretown, ON N0N 1M0 2. 3501 Tecumseh Rd., Mooretown, ON N0N 1M0 3. (Ontario Hydro) 185 Clegg Rd., P.O. Box 4300, Internal R32, Markham, ON L6G 1B7	1. (a) Lease 1. (b) Agreement 1. (c) Easement 1. (d) OEB Order 2. Easement 3. Easement	43303-0052 (Part)	Parts of Lot 18, Concession 4, Moore, Parts of Lots 19 & 20, Concession 5, Moore, & Parts of the Road Allowance between Concessions 4 & 5, Moore, and Parts of the Road Allowance between Lots 18 & 19, Concession 4, Moore (Courtright Line), St. Clair
		1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)	1. 3501 Tecumseh Rd., Mooretown, ON N0N 1M0	1. (a) Lease 1. (b) Agreement	43303-0081	Part of Lot 19, Concession 5, Moore, St. Clair


		<p>1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>2. Enbridge Energy Distribution Inc.</p> 	<p>1. 3501 Tecumseh Rd, Mooretown, ON NON 1M0</p> <p>2. 3501 Tecumseh Rd, Mooretown, ON NON 1M0</p> 	<p>1. (a) Lease 1. (b) Agreement</p> <p>2. Easement</p> <p>3. Easement</p>	43310-0074 (Part)	<p>Part of Lot 20, Concession 4, Moore, St. Clair</p> <p>PART MINERAL RIGHTS ONLY</p>
The Hydro-Electric Power Commission of Ontario	(Ontario Hydro) 185 Clegg Road, P.O. Box 4300, Internal R32, Markham, ON L6G 1B7	<p>1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>2. Enbridge Energy Distribution Inc.</p> 	<p>1. 3501 Tecumseh Rd, Mooretown, ON NON 1M0</p> <p>2. 3501 Tecumseh Rd, Mooretown, ON NON 1M0</p> 	<p>1. (a) Lease 1. (b) Agreement</p> <p>2. Easement</p> <p>3. Easement</p>	43310-0074 (Part)	<p>Part of Lot 20, Concession 4, Moore, St. Clair</p> <p>PART SURFACE RIGHTS ONLY</p>

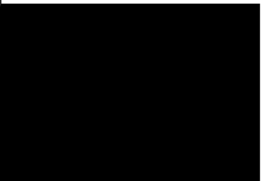
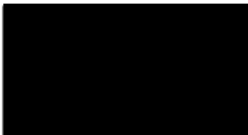
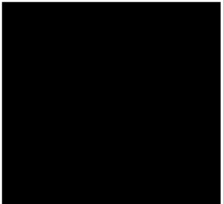
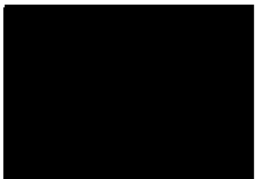
The Corporation of the County of Lambton	789 Broadway St., Wyoming, ON N0N 1T0	1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)	1. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0	1. Agreement	43310-0074 (Part)	Part of Lot 20, Concession 4, Moore, St. Clair SURFACE RIGHTS ONLY
		1. The Hydro- Electric Power Commission of Ontario 2. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.) 3. Enbridge Energy Distribution Inc.	1. (Ontario Hydro) 185 Clegg Rd., P.O.Box 4300, Internal R32, Markham, ON L6G 1B7 2. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0 3. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0	1. Easement 2. (a) Lease 2. (b) Agreement 3. Easement	43310-0074 (Part)	Part of Lot 20, Concession 4, Moore, St. Clair


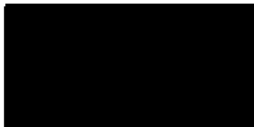

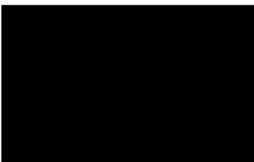
		<p>1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>2. Enbridge Energy Distribution Inc.</p>	<p>1. 3501 Tecumseh Rd, Mooretown, ON NON 1MO</p> <p>2. 3501 Tecumseh Rd, Mooretown, ON NON 1MO</p>	<p>1. (a) Lease 1. (b) Easement</p> <p>2. Easement</p>	<p>43310-0075 (Part)</p>	<p>Part of Lot 20, Concession 4, Moore, St. Clair</p> <p>SURFACE RIGHTS ONLY</p>
		<p>1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>2. Enbridge Energy Distribution Inc.</p>	<p>1. 3501 Tecumseh Rd, Mooretown, ON NON 1MO</p> <p>2. 3501 Tecumseh Rd, Mooretown, ON NON 1MO</p>	<p>1. (a) Lease 1. (b) Easement</p> <p>2. Easement</p>	<p>43310-0075 (Part)</p>	<p>Part of Lot 20, Concession 4, Moore, St. Clair</p> <p>MINERAL RIGHTS ONLY</p>

		<p>1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>2. Esso Resources Canada Limited</p> <p>3. Imperial Oil Limited</p>	<p>1. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>2. 505 Quarry Park Blvd., Calgary, AB T2C 5N1</p> <p>3. 505 Quarry Park Blvd., Calgary, AB T2C 5N1</p>	<p>1. (a) Lease 1. (b) Agreement 1. (c) Easement</p> <p>2. Lease</p> <p>3. Lease</p>	<p>43310-0078</p>	<p>Part of Lot 19, Concession 4, Moore, St. Clair</p>
		<p>1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>2. Esso Resources Canada Limited</p> <p>3. Imperial Oil Limited</p>	<p>1. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>2. 505 Quarry Park Blvd., Calgary, AB T2C 5N1</p> <p>3. 505 Quarry Park Blvd., Calgary, AB T2C 5N1</p>	<p>1. (a) Lease 1. (b) Agreement 1. (c) Easement</p> <p>2. Lease</p> <p>3. Lease</p>	<p>43310-0079</p>	<p>Part of Lot 19, Concession 4, Moore, St. Clair</p>

		1. The Hydro-Electric Power Commission of Ontario	1. (Ontario Hydro) 185 Clegg Rd., P.O.Box 4300, Internal R32, Markham, ON L6G 1B7	1. Easement	43310-0095	Part of Lot 20, Concession 3, Moore, St. Clair
		2. Ram Petroleums Limited	2. 435 Exeter Road, London, ON N6E 2Z3	2. Lease		
		3. The Corporation of the Township of St. Clair	3. 1155 Emily Street, Mooretown, ON N0N 1M0	3. Agreement		
		4. EnWin Utilities	4. 787 Ouelette Ave., Windsor, ON N9A 5T7	4. Agreement		
		5. COGECO Cable Canada Inc.	5. 5 Place Ville Marie, Suite 915, Montreal, QC H3B 2G2	5. Lease		

(Continued)	(Continued)	(Continued)	(Continued)	(Continued)	(Continued)	(Continued)
		6. Enbridge Gas Inc. (Market Hub Partners Canada L.P.)	6. 50 Keil Drive North, Chatham, ON N7L 3V9	6. Lease		
			7. 2839 St. Clair Pkwy, Sombra, ON N0P 2H0	7. Mortgage		
		8. Canadian Imperial Bank of Commerce	8. 1170 London Road, Sarnia, ON N7S 1P4	8. Mortgage		

		1. The Hydro-Electric Power Commission of Ontario	1. (Ontario Hydro) 185 Clegg Rd., P.O.Box 4300, Internal R32, Markham, ON L6G 1B7	1. Easement	43310-0096	Part of Lot 19, Concession 3, Moore, St. Clair
		2. Mainstreet Credit Union Limited	2. 1295 London Rd, Sarnia, ON N7S 1P6	2. Mortgage		
		1. 1682468 Ontario Inc.	1. P.O. Box 1503, Station Main, Woodstock, ON N4S 0A7	1. (a) Lease 1. (b) Agreement	43310-0097	Part of Lot 19, Concession 3, Moore, St. Clair

		1. 1682468 Ontario Inc.	1. P.O. Box 1503, Station Main, Woodstock, ON N4S 0A7	1. (a) Lease 1. (b) Agreement	43310-0097	Part of Lot 19, Concession 3, Moore, St. Clair
		1. The Hydro-Electric Power Commission of Ontario 2. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)	1. (Ontario Hydro) 185 Clegg Rd., P.O.Box 4300, Internal R32, Markham, ON L6G 1B7 2. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0	1. Easement 2. (a) Lease 2. (b) Agreement 2. (c) Easement	43310-0098	Part of Lot 20, Concession 4, Moore, St. Clair

<div style="background-color: black; width: 116px; height: 49px;"></div>	<div style="background-color: black; width: 120px; height: 95px;"></div>	<p>1. Enbridge Gas Inc. (Enbridge Gas Distribution Inc.)</p> <p>2. Enbridge Energy Distribution Inc.</p>	<p>1. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p> <p>2. 3501 Tecumseh Rd, Mooretown, ON N0N 1M0</p>	<p>1. (a) Lease 1. (b) Agreement</p> <p>2. Easement</p>	<p>43310-0104</p>	<p>Part of Lot 20, Concession 4, Moore, St. Clair</p> <p>MINERAL RIGHTS ONLY</p>
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INDIGENOUS¹ CONSULTATION

1. Enbridge Gas is committed to creating processes that support meaningful engagement with potentially affected Indigenous groups (First Nations and Métis). Enbridge Gas works to build an understanding of project related interests, ensure regulatory requirements are met, mitigate or avoid project-related impacts on Indigenous interests including rights, and provide mutually beneficial opportunities where possible.
2. Pursuant to the OEB's Guidelines, Enbridge Gas provided the Ministry of Energy, Northern Development and Mines ("MENDM") with a Project description on January 14, 2021. This Project description is set out at Attachment 1 to this Exhibit.
3. Subsequently, on March 15, 2021, Enbridge Gas received a response from the MENDM indicating that, as no leave to construct approval is required for the Project, the MENDM determined that the duty to consult was not triggered and thus, it would not be delegating the procedural aspects of consultation to Enbridge Gas for the Project. A copy of this correspondence with the MENDM is provided at Attachment 2 to this Exhibit.

¹ Enbridge has used the terms "Aboriginal" and "Indigenous" interchangeably in its application. "Indigenous" has the meaning assigned by the definition "aboriginal peoples of Canada" in subsection 35(2) of the *Constitution Act, 1982*.



Asha Patel
Technical Manager
Regulatory Affairs

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Enbridge Gas Inc.
500 Consumers Road
North York, Ontario M2J 1P8
Canada

January 14, 2021

VIA EMAIL – dan.delaquis@ontario.ca

Ministry of Energy, Northern Development and Mines
Dan Delaquis
Manager (Acting), Indigenous Energy Policy
Unit 77 Grenville St.
6th Floor
Toronto, ON
M7A 1B3

Dear Mr. Delaquis:

Re: Corunna and Ladysmith A-1 Observation Well Drilling Project

The *Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario 7th Edition 2016* (Guidelines) issued by the Ontario Energy Board (Board) indicate that a project applicant shall provide the Ministry of Energy, Northern Development and Mines (Ministry) with a description of a project, in the planning process, such that the Ministry can determine if there are any Duty to Consult requirements for the project.

The purpose of this letter is to inform the Ministry that Enbridge Gas Inc. (Enbridge Gas) intends to drill two observation wells (Project) in existing Designated Storage Areas (DSA).

The Project involves:

- Drill a new A-1 observation well (TC 8) in the Corunna Storage Pool;
- Drill a new A-1 observation well (TL 8) in the Ladysmith Storage Pool

Enbridge Gas will be filing with the Board a request for a favourable report from the Board to the Ministry of Natural Resources and Forestry (MNRF) in support of the Project. Enbridge Gas is therefore contacting the Ministry to determine whether the Project triggers the Duty to Consult.

Attachment 1 contains a description of the Project's characteristics and its location for the Ministry's review and to assist it with its determination as to whether it will delegate the procedural aspects of the Duty to Consult to Enbridge Gas. While work on the Project is still in its early stages, Enbridge Gas would be pleased to discuss the Project with you should you have any questions.

Regards,

Asha Patel, CPA, CA
Technical Manager, Regulatory Applications
Enbridge Gas Inc.
416-495-5642

Attachment 1: Corunna and Ladysmith A-1 Observation Well Drilling Project

1.0 Project Summary

Enbridge Gas Inc. (Enbridge Gas) is proposing to drill two new observation wells.

The two new observation wells will be drilled in the Corunna Designated Storage Area (DSA) – TC 8 – and in the Ladysmith DSA – TL 8. The wells are being drilled to monitor the gas content and pressure in the underground storage formations, which will assist in the continued safe and reliable operation of Enbridge Gas's storage facilities.

Both of the aforementioned storage pools are part of Enbridge Gas's storage operations. Each of the storage pools is a DSA as defined in the *Ontario Energy Board Act, 1998*.

It is proposed that the drilling of well TC 8 and well TL 8 is expected to occur from April 2021 to September 2021.

Enbridge Gas plans to file an application with the Ontario Energy Board (Board) which will request a favourable report from the Board to the Ministry of Natural Resources and Forestry (MNRF) for the drilling of wells TC 8 and well TL 8.

Enbridge Gas will ensure that it has fulfilled all of the relevant requirements of CSA Z341, as they relate to the new observation wells, to the satisfaction of the MNRF.

Drilling of well TC 8, will occur on previously disturbed lands owned by Enbridge Gas. These lands are leased to a tenant farmer. Well TL 8 will be drilled on third party lands that Enbridge Gas has the right to enter into and upon for the purposes of its natural gas storage operations. Temporary gravel pads will be installed for the drilling of both wells and each pad is expected to occupy 8100 square metres or 0.0081 square kilometers. Each final well site is expected to measure approximately 60 square metres or 0.00006 square kilometers. No pipeline is required for these observation wells.

Figure 1 below shows the location of the Corunna DSA and the proposed location of well TC 8. Figure 2 shows the location of the Ladysmith DSA and the proposed location of well TL 8.

2.0 Project Information

Enbridge Gas currently operates approximately 280 billion cubic feet of natural gas storage in 35 DSAs. Twenty-three of the DSAs are in Lambton County, one in Chatham-Kent, one in Huron County and one in the Niagara region. The operation includes 266 injection/delivery wells and 96 observation wells.

The Ladysmith Storage Pool is located in Lambton County and has been in operation since 1999. There are 2 natural gas storage wells, 1 Guelph formation observation well and 1 stratigraphic test well in the Ladysmith DSA. The Corunna Storage Pool is located in Lambton County and has been in operation since 1964. There are 5 natural gas storage wells and 1 Guelph formation observation well in the Corunna DSA.

The Project will allow Enbridge Gas to monitor the gas content and pressure in the underground storage area and will assist with the continued safe and reliable delivery of natural gas to our existing and future customers.

3.0 Authorizations and Recommendations Required

An Environmental Report (ER) will be completed for the Project. Enbridge Gas either owns the lands within or has Gas Storage Lease Agreements and Petroleum & Natural Gas Lease Agreements in place for all of the DSAs. Temporary gravel pads will be installed for the drilling of the wells. Upon completion of drilling activities, the pad will be reduced and permanent well site will be established.

The ER will be prepared using the Board's *Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines in Ontario, 7th Edition (2016)* (Guidelines). The ER will identify potential authorizations required. Enbridge Gas's preliminary work on the Project has identified the following potential authorizations:

Provincial approvals:

- Ontario Energy Board
- Ministry of Natural Resources and Forestry
- Ministry of Heritage, Sport, Tourism and Cultural Industries
- Ministry of the Environment, Conservation and Parks

Municipal approvals:

- Township of St. Clair
- County of Lambton

Other approvals:

- St. Clair Region Conservation Authority
- Hydro One Networks Inc.

Other authorizations, notifications, permits and/or approvals may be required in addition to those identified above.

4.0 Project Activities

Planning and design activities for the Project commenced in 2020. Pursuant to the Guidelines an ER will be prepared and archaeological studies will be completed where and as required.

The drilling of the wells will be planned in accordance with the requirements of the latest addition of CSA Z341 – Storage of Hydrocarbons in Underground Formations. Pursuant to the requirements of CSA Z341 the following studies and reviews will be completed to support the Project:

- An assessment of neighbouring activities to determine the impact of the Project on: a) wells within 1 km, b) operations within 5 km, and c) the integrity of all wells penetrating the storage zone; and
- A “what if” analysis of hazards and operability (HAZOP) for each of the storage pools.

Upon receiving a drilling license from the MNRF Enbridge Gas will commence operations to drill well TC 8 and well TL 8.

A copy of the application filed with the Board will be provided to all landowners in the Corunna DSA and the Ladysmith DSA.

5.0 Potential Environmental Effects and Mitigation Measures

The ER will assess physical, natural and socio-economic features potentially impacted by construction activities. Mitigation measures will be recommended as part of the ER to minimize potential adverse effects to the environment. It is expected that the majority of adverse environmental and/or socio-economic effects will be construction related. These effects are expected to be temporary and transitory.

Mitigation measures recommended in the ER will be followed in conjunction with Enbridge Gas’s Construction and Maintenance Manual. In addition, Enbridge Gas will use professional judgement, past experience, industry best practices and any additional feedback received through the consultation process when constructing the Project.

6.0 Project Benefits

The installation of the A-1 observation wells will allow Enbridge Gas to monitor the gas content and pressure in the underground storage area and will assist with the continued safe and reliable delivery of natural gas to our existing and future customers.

7.0 Contact Information

Regulatory Affairs:

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Technical / MNRF Contact:

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Figure 1: Corunna DSA & Proposed Location of Well TC 8

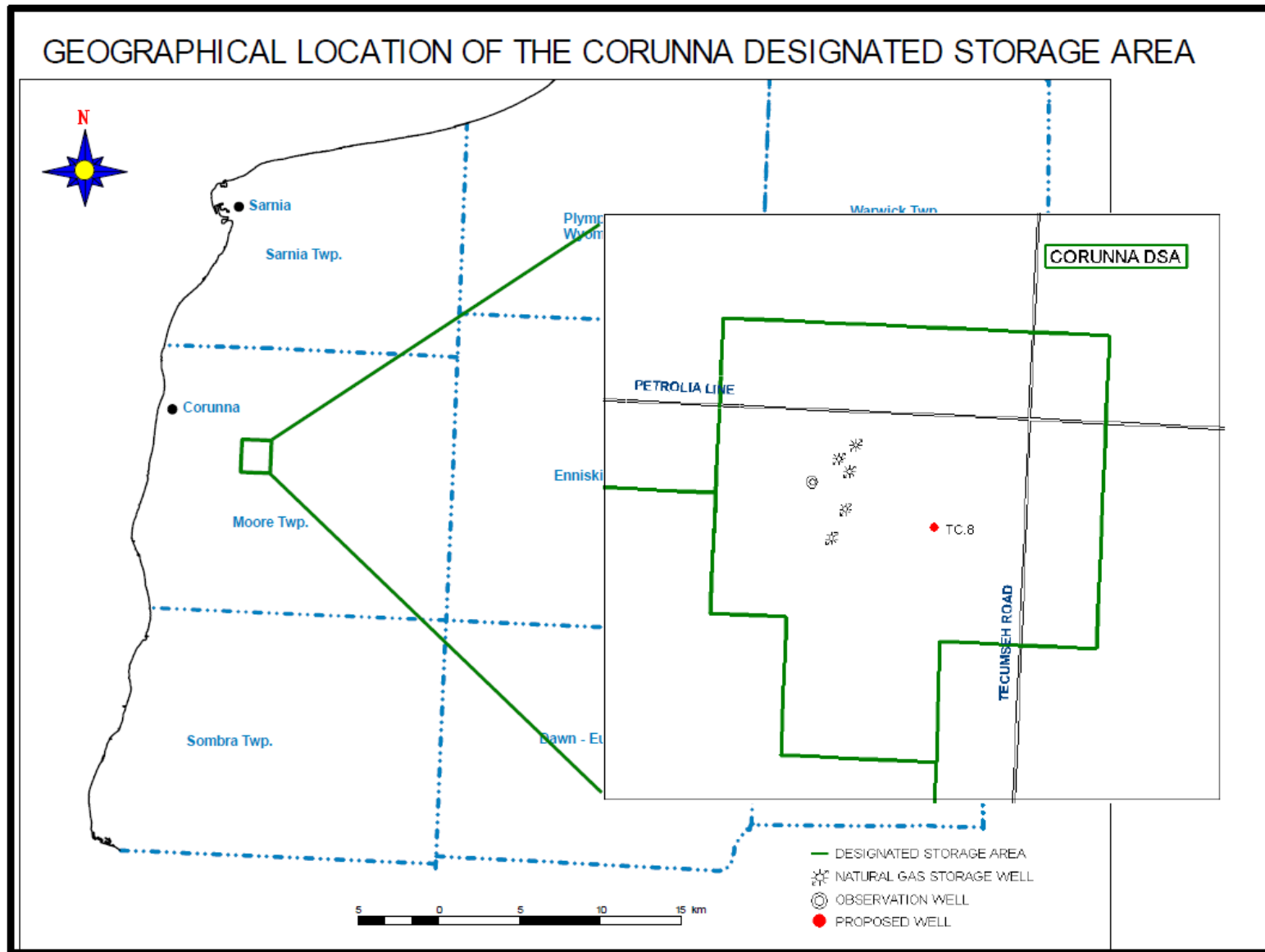
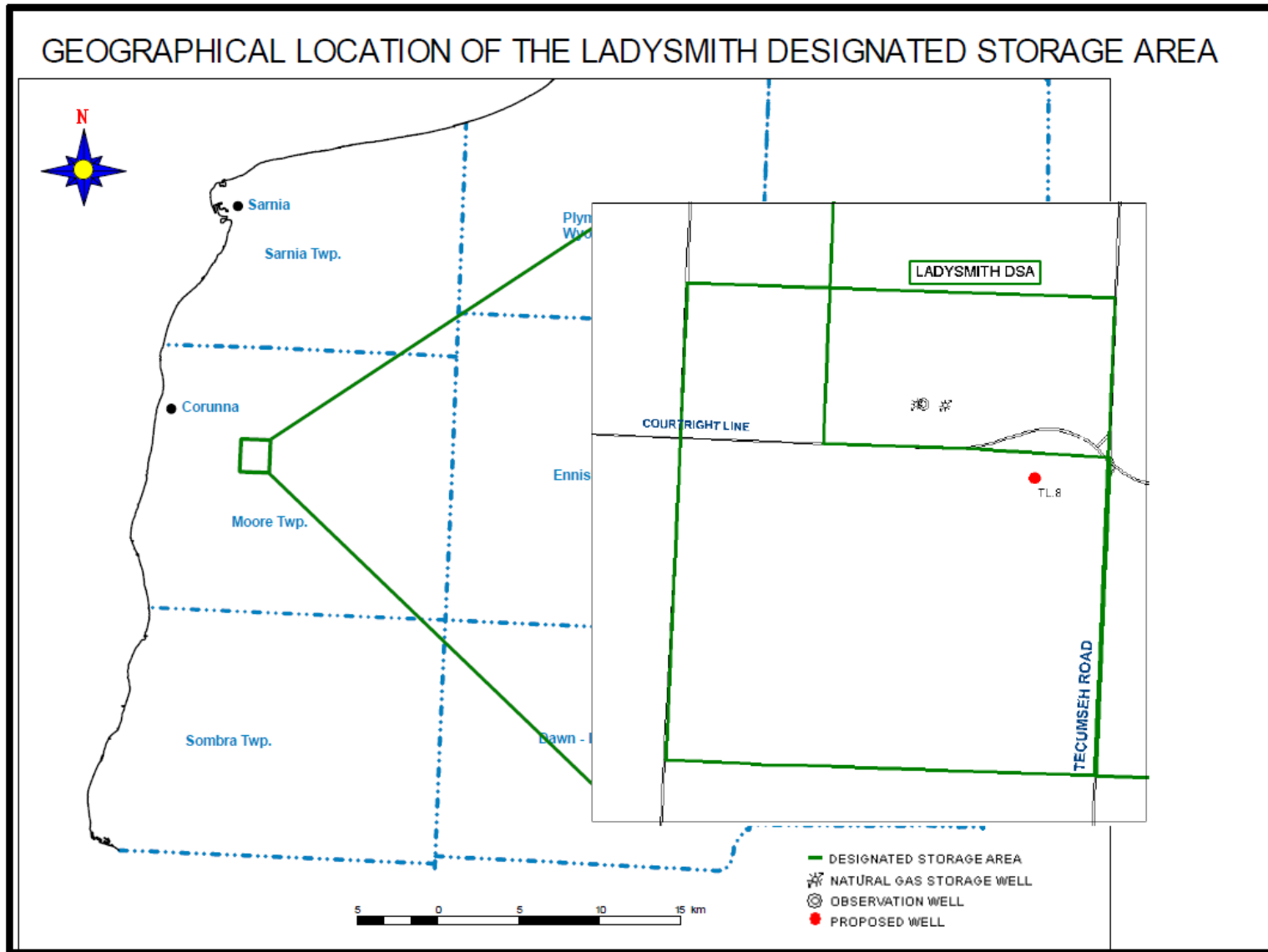


Figure 2: Ladysmith DSA & Proposed Location of Well TL 8



From: Delaquis, Dan (ENDM) <Dan.Delaquis@ontario.ca>
Sent: Monday, March 15, 2021 11:11 AM
To: Asha Patel <Asha.Patel@enbridge.com>
Cc: Scott, Alyssa (ENDM) <Alyssa.Scott@ontario.ca>; Ashe, Rosalind (ENDM) <Rosalind.Ashe@ontario.ca>; Johnston-Weiser, David (ENDM) <David.Johnston-Weiser@ontario.ca>; Catherine Pennington <Catherine.Pennington@enbridge.com>
Subject: [External] Non-LTC projects

EXTERNAL: PLEASE PROCEED WITH CAUTION.

This e-mail has originated from outside of the organization. Do not respond, click on links or open attachments unless you recognize the sender or know the content is safe.

Hi Asha,

I wanted to touch base with you on a couple projects that Enbridge flagged to ENDM for delegations: the 2022 Storage Enhancement Project and the Corunna and Ladysmith A-1 Observation Well Drilling Project.

Based on the nature of these two projects not requiring a Leave to Construct, ENDM will not be providing a delegation. Enbridge can go ahead with whatever other permits/approvals required for these projects.

Let me know if you have any further questions. My team will follow up with the members on your team regarding the individual requests.

Thanks,
Dan