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Increased Monitoring Program

From: Ryan DeVries
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To: Municipality of Strathroy-Caradoc
Paul Zuberbuhler B.Sc, B.Comm, C.E.T.

Re: Closed Caradoc Landfill

File #: 14067

Date: May 21, 2025

Paul:

The purpose of this Letter is to describe our recommended Increased Monitoring Program (IMP) at the Closed Caradoc Landfill. This IMP is being suggested in response to concerns raised regarding the potential that there is leachate impacted groundwater discharging to the watercourse(s) traversing the north and south sides of the Closed Caradoc Landfill. Following multiple site investigations and meetings with the Ministry of the Environment, Conservation and Parks (MECP), it was determined that more information is required before any conclusions can be made regarding this potential concern.

The purpose of the Increased Monitoring Program suggested in the following sections is to provide the additional information required to help inform an opinion on potential impacts and, if required, future next steps.

Additional Sample Locations:

Since the adjacent private property owners are not allowing access to their property at this time for the Municipality to continue sampling from previously established monitoring locations and monitoring wells, two Plans have been developed. One plan (Plan 1) assumes that access and monitoring will only be available on Municipally owned lands (i.e. the existing Closed Landfill property or within existing road allowances). The second plan (Plan 2) assumes that the Municipality will be able to obtain an updated written agreement from the adjacent property owners to continue to sample from previously established monitoring wells and locations.

Prior to beginning the IMP, we are recommending that 4 additional piezometers be installed at key locations along the north (2) watercourse and south (2) watercourse. These piezometers will provide information on the local groundwater quality in locations adjacent to the stream. We note that the groundwater quality adjacent to the stream is only one factor impacting stream quality and that groundwater flow/movement, seasonal variations in quality, etc. will also need to be taken into account.

New suggested piezometer locations are indicated on the attached Drawing No. 1 (Plan 1) and Drawing No. 2 (Plan 2) and descriptions of each location are as follows:

Piezometer 1 – Proposed at a location where the MECP noted multi-meter elevated readings. Also, it is located near where the meandering stream is closest to the existing landfill mound on the north side.

Piezometer 2 – Proposed at the location where the MECP collected their second set of samples during the Nov./24 sampling event. Results of a number of parameters were elevated above Provincial Water Quality Objectives (PWQO). Main elevated parameter of concern was ammonia.

Piezometer 3 – Proposed along the south watercourse at a location where the meandering stream is closest to the existing landfill mound on the south side. Will help to assess whether there are any impacts to the south watercourse.

Piezometer 4 – Proposed along the south watercourse at a location where the south watercourse enters the site property. Also located in an area where some small soil staining was evident, suggesting a possible area for groundwater seepage.

Proposed Increased Monitoring Program:

The proposed sample frequencies are shown in Table 1 (Plan 1) and Table 2 (Plan 2). As noted earlier, sample locations are shown on Drawing No. 1 (Plan 1) and Drawing No. 2 (Plan 2). Table 3 indicates the suggested sample parameters.

Table 1
Proposed Increased Monitoring Program
Groundwater/Surface Water Samples

[illegible]

| | |
|------------------|------------------------------------------------------------------------------------|
| STP drain | Continue to collect one sample in the fall as per the approved monitoring program. |
| MW1 | |
| MW2 | |
| MW3 | |
| MW8 | |

Table 2
Proposed Increased Monitoring Program
Groundwater/Surface Water Samples

| Monitoring Location | Month 1 | Month 2 | Month 3 | Month 4 | Month 5 | Month 6 | Month 7 | Month 8 | Month 9 | Month 10 | Month 11 | Month 12 |
|-----------------------|------------------------------------------------------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|
| Stream East of Gate | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Point 1 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Stream Near Point 1 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| PZ1 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Stream Near PZ2 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| PZ2 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Stream East Side Rear | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Stream West of Gate | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| PZ4 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| PZ3 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Stream West Side Rear | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| STP drain | Continue to collect one sample in the fall as per the approved monitoring program. | | | | | | | | | | | |
| MW1 | | | | | | | | | | | | |
| MW2 | | | | | | | | | | | | |
| MW3 | | | | | | | | | | | | |
| MW4 | | | | | | | | | | | | |
| MW5 | | | | | | | | | | | | |
| MW6 | | | | | | | | | | | | |
| MW7 | | | | | | | | | | | | |
| MW8 | | | | | | | | | | | | |
| MW9 | | | | | | | | | | | | |

Table 3
Standard and Metals Analyses
Groundwater/Surface Water Samples

1) **Standard Analysis Parameters:**

| | |
|---------------|-------------------|
| Calcium | Iron |
| Magnesium | Manganese |
| Potassium | Sodium |
| Chloride | Nitrate |
| Nitrite | Sulphate |
| Ammonia | DOC |
| Alkalinity | Conductivity |
| pH | Hardness |
| Total Anions | Nitrate + Nitrite |
| Total Cations | Ion Balance |

Calculated T.D.S.

2) **Metals Parameters:**

| | |
|------------|-----------|
| Aluminum | Arsenic |
| Barium | Beryllium |
| Boron | Cadmium |
| Chromium | Copper |
| Lead | Nickel |
| Selenium | Silver |
| Zinc | Antimony |
| Bismuth | Cobalt |
| Molybdenum | Tin |

3) **Additional:**

Total Phosphorous

Additional Notes:

- Record observations (including pictures) regarding flow at Point 1, PZ1, PZ2, PZ3 and PZ4 with particular attention paid to whether there is any surface overland flow occurring at these locations (i.e. groundwater seepage).
- For in-stream samples, also record the water pH and temperature at the time of the sample.

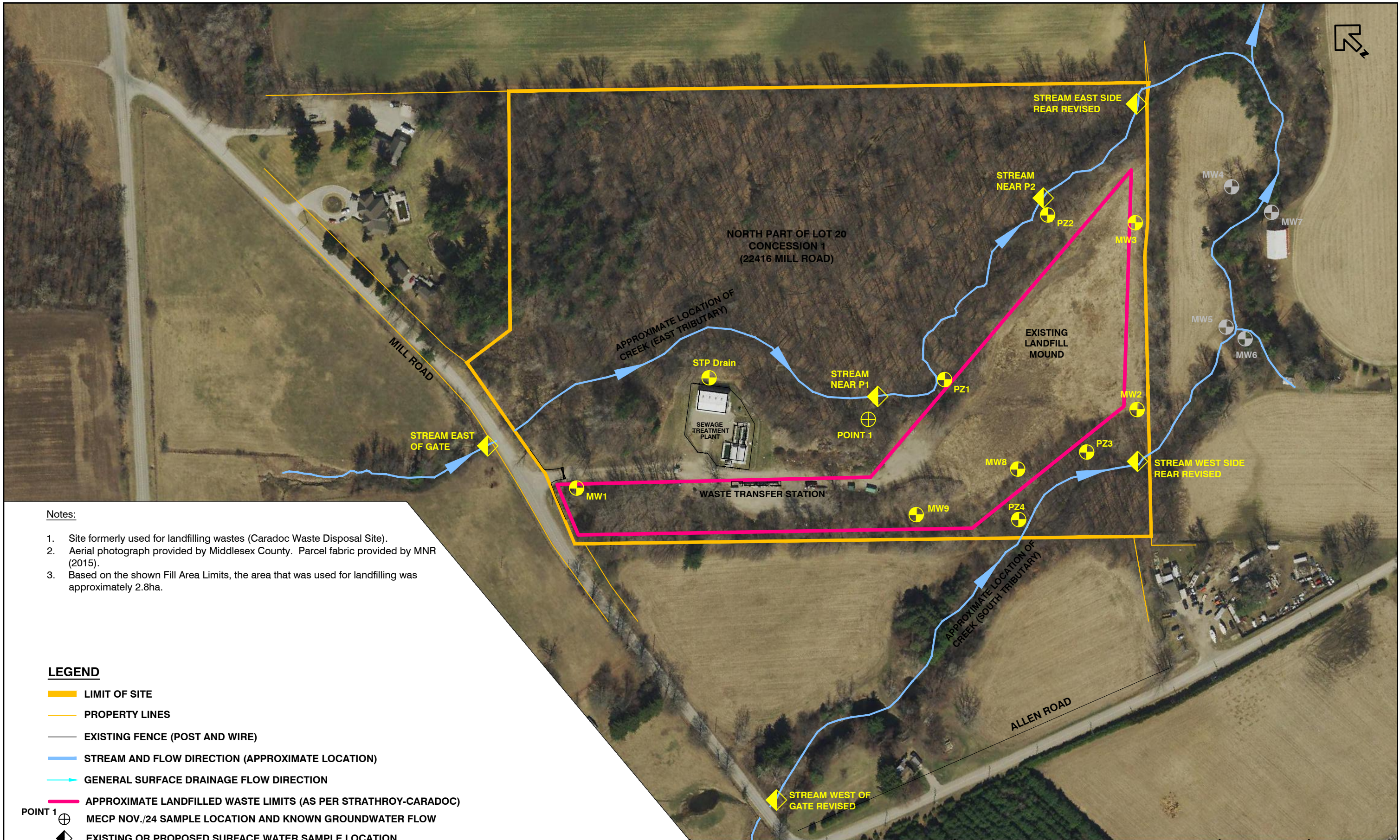
- When collecting groundwater samples from the piezometers, first purge a minimum of two well casing volumes of water, then allow the piezometer to recover prior to sampling. For the piezometer samples, filter using 0.45-micron disposable filters as the samples are collected into the lab-provided sample containers.

The intention with this IMP is that at the outset of the one-year sample program, the Municipality will have enough information to determine if any next steps (i.e. remediation) should be considered. Should the sample results suggest that remediation is not necessary, the IMP would also provide a supporting argument for a reduced monitoring program moving forward.

Let us know if you have any questions on any of the above information or require any additional details at this time.

Ryan DeVries, P.Eng.

RPD:hv



- Notes:
- 1. Site formerly used for landfilling wastes (Caradoc Waste Disposal Site).
 - 2. Aerial photograph provided by Middlesex County. Parcel fabric provided by MNR (2015).
 - 3. Based on the shown Fill Area Limits, the area that was used for landfilling was approximately 2.8ha.

LEGEND

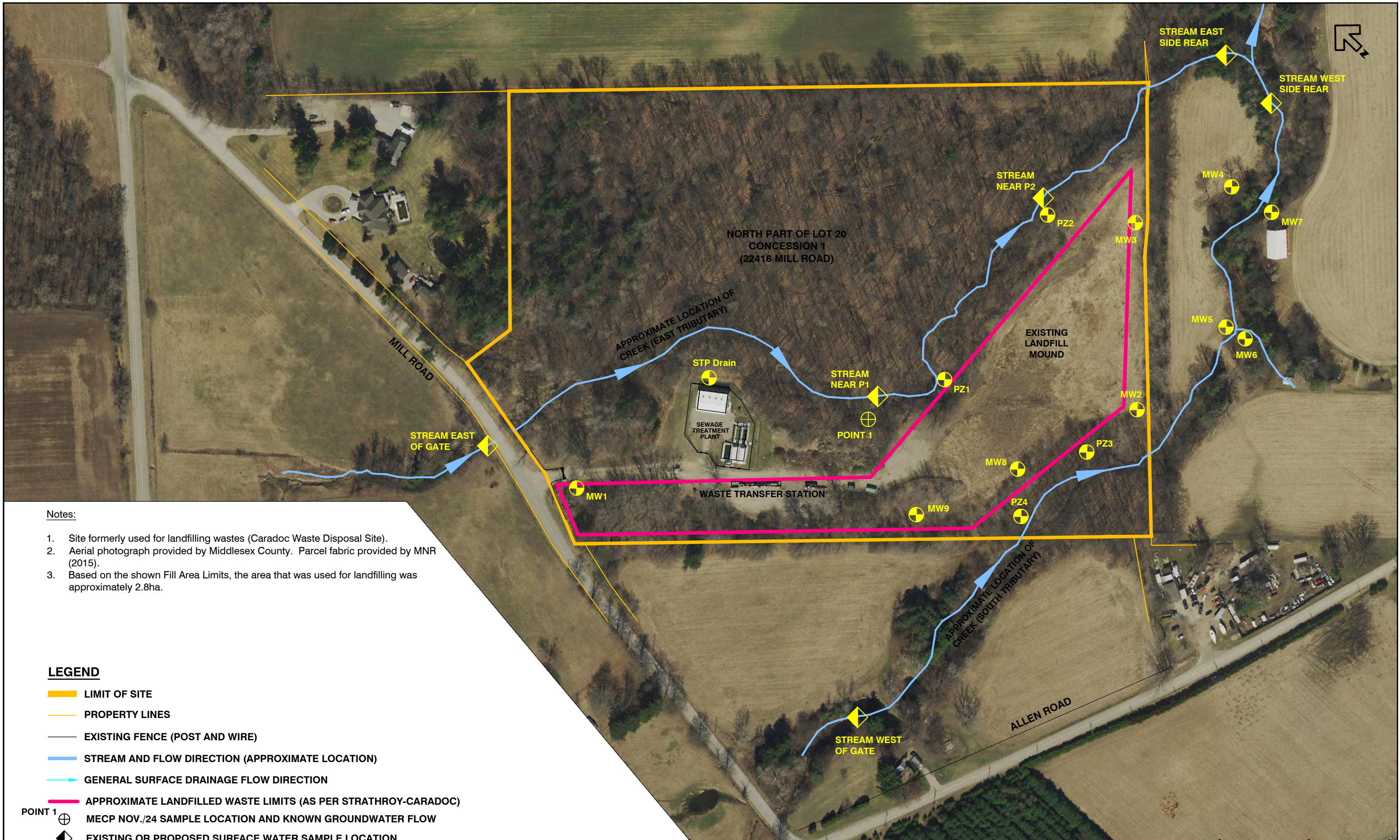
- LIMIT OF SITE
- PROPERTY LINES
- EXISTING FENCE (POST AND WIRE)
- STREAM AND FLOW DIRECTION (APPROXIMATE LOCATION)
- GENERAL SURFACE DRAINAGE FLOW DIRECTION
- APPROXIMATE LANDFILLED WASTE LIMITS (AS PER STRATHROY-CARADOC)
- MECP NOV./24 SAMPLE LOCATION AND KNOWN GROUNDWATER FLOW
- EXISTING OR PROPOSED SURFACE WATER SAMPLE LOCATION
- PROPOSED PIEZOMETER LOCATION AND NUMBER
- ABANDONED MONITORING WELL LOCATION AND NUMBER
- EXISTING MONITORING WELL LOCATION AND NUMBER



Municipality of Strathroy-Caradoc
Closed Caradoc Landfill Site

General Site Plan (Existing Conditions)
Sample Locations for Increased Monitoring Program (Plan 1)

| | |
|----------------------|----------------------|
| DATE May 21, 2025 | PROJECT No. 14067 |
| SCALE NTS | Drawing No. 1 |



- Notes:
- 1. Site formerly used for landfilling wastes (Caradoc Waste Disposal Site).
 - 2. Aerial photograph provided by Middlesex County. Parcel fabric provided by MNR (2015).
 - 3. Based on the shown Fill Area Limits, the area that was used for landfilling was approximately 2.8ha.

LEGEND

- LIMIT OF SITE
- PROPERTY LINES
- EXISTING FENCE (POST AND WIRE)
- STREAM AND FLOW DIRECTION (APPROXIMATE LOCATION)
- GENERAL SURFACE DRAINAGE FLOW DIRECTION
- APPROXIMATE LANDFILLED WASTE LIMITS (AS PER STRATHROY-CARADOC)
- POINT 1 MECP NOV./24 SAMPLE LOCATION AND KNOWN GROUNDWATER FLOW
- EXISTING OR PROPOSED SURFACE WATER SAMPLE LOCATION
- PZ1 PROPOSED PIEZOMETER LOCATION AND NUMBER
- MW1 EXISTING MONITORING WELL LOCATION AND NUMBER



Municipality of Strathroy-Caradoc
Closed Caradoc Landfill Site

General Site Plan (Existing Conditions)
Sample Locations for Increased Monitoring Program (Plan 2)

| | |
|----------------------|----------------------|
| DATE May 21, 2025 | PROJECT No. 14067 |
| SCALE NTS | Drawing No. 2 |