ONTARIO SOCIETY OF PROFESSIONAL ENGINEERS

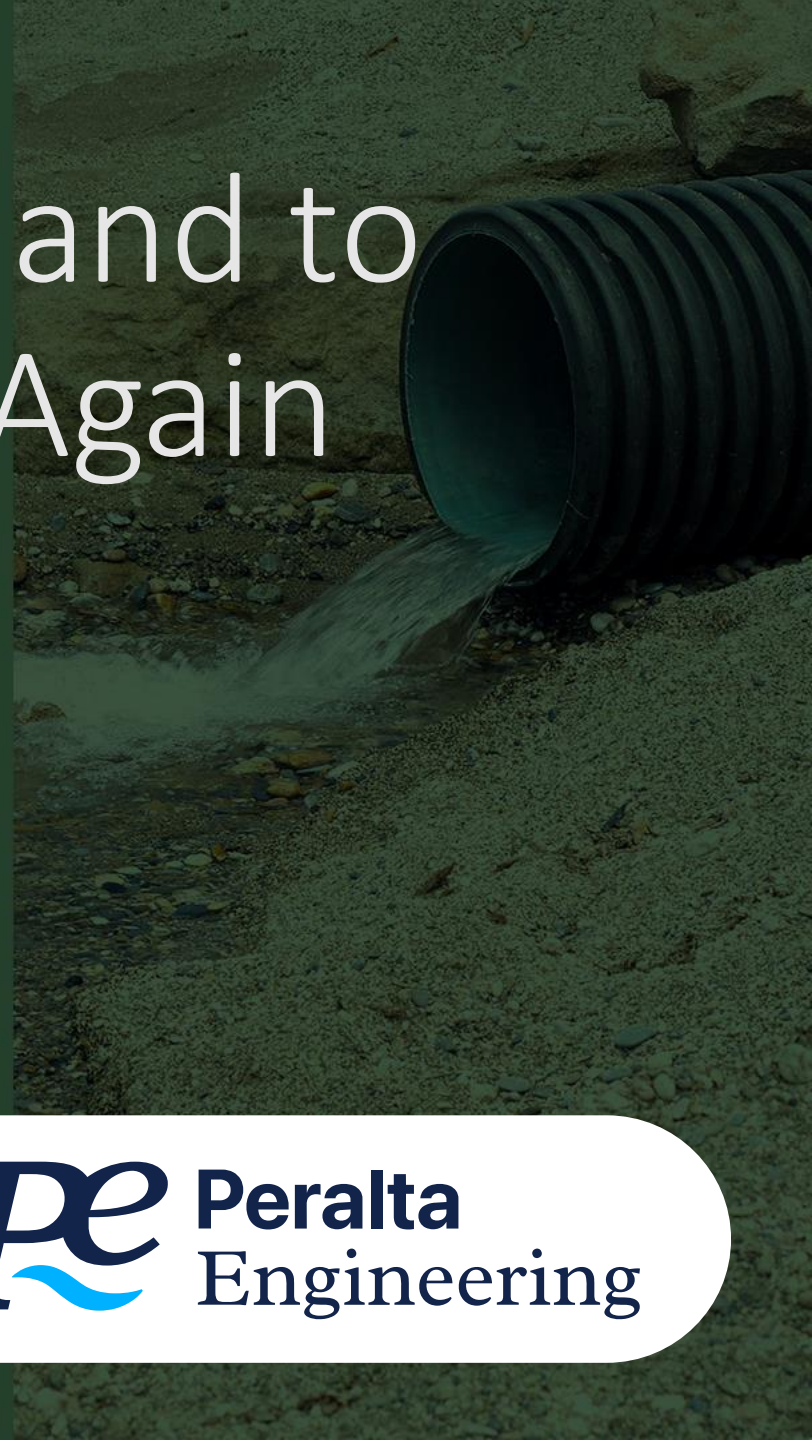
Land Drainage Conference 2025

October 16 & 17

Delta Hotels Guelph Conference Centre

Full Circle: From Wetland to Farmland and Back Again

(Through the Drainage Act)



Land Drainage Conference 2025

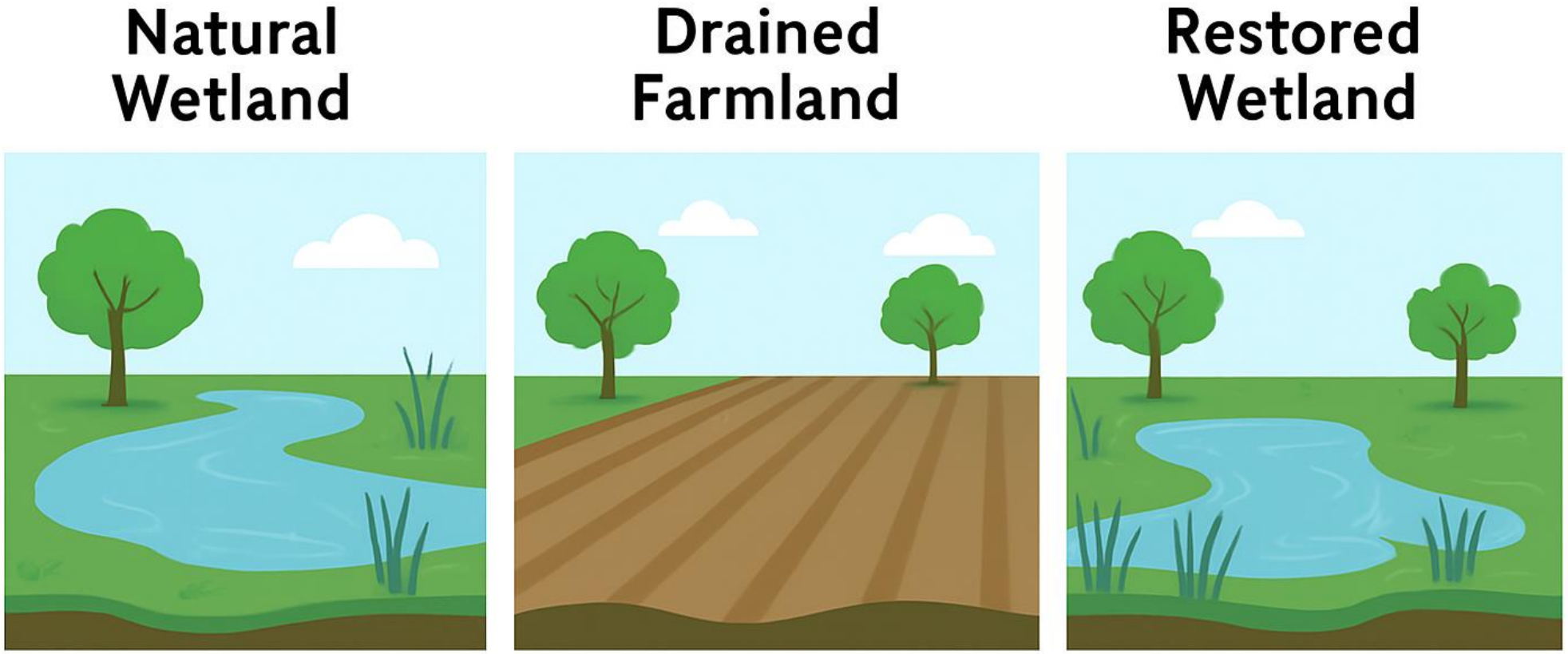
October 17, 2025

Presented By: Antonio (Tony) Peralta, P.Eng.

Land Drainage Committee

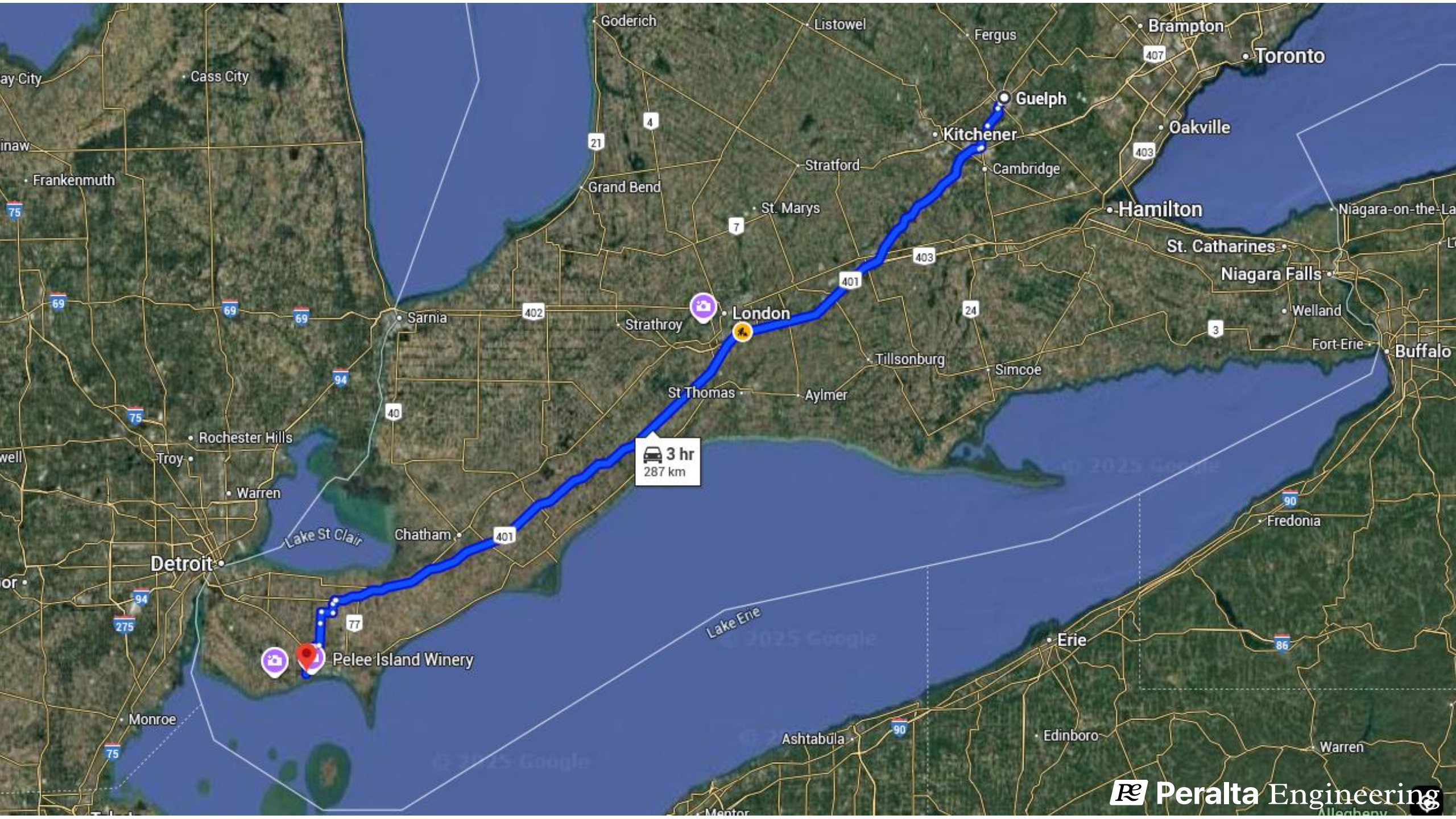
Peralta Engineering

Full Circle: From Wetland to Farmland and Back Again



Overview

- Project Site and Drainage Background
- Scoping Meeting and Appointment
- Pump and its Operations
- Pre-Consultation and On-Site Meeting
- Technical Approach and Key Challenges
- Report Details
- Dewatering and Fish Salvage Operations
- Construction
- Outcome and Results
- Closing Remarks



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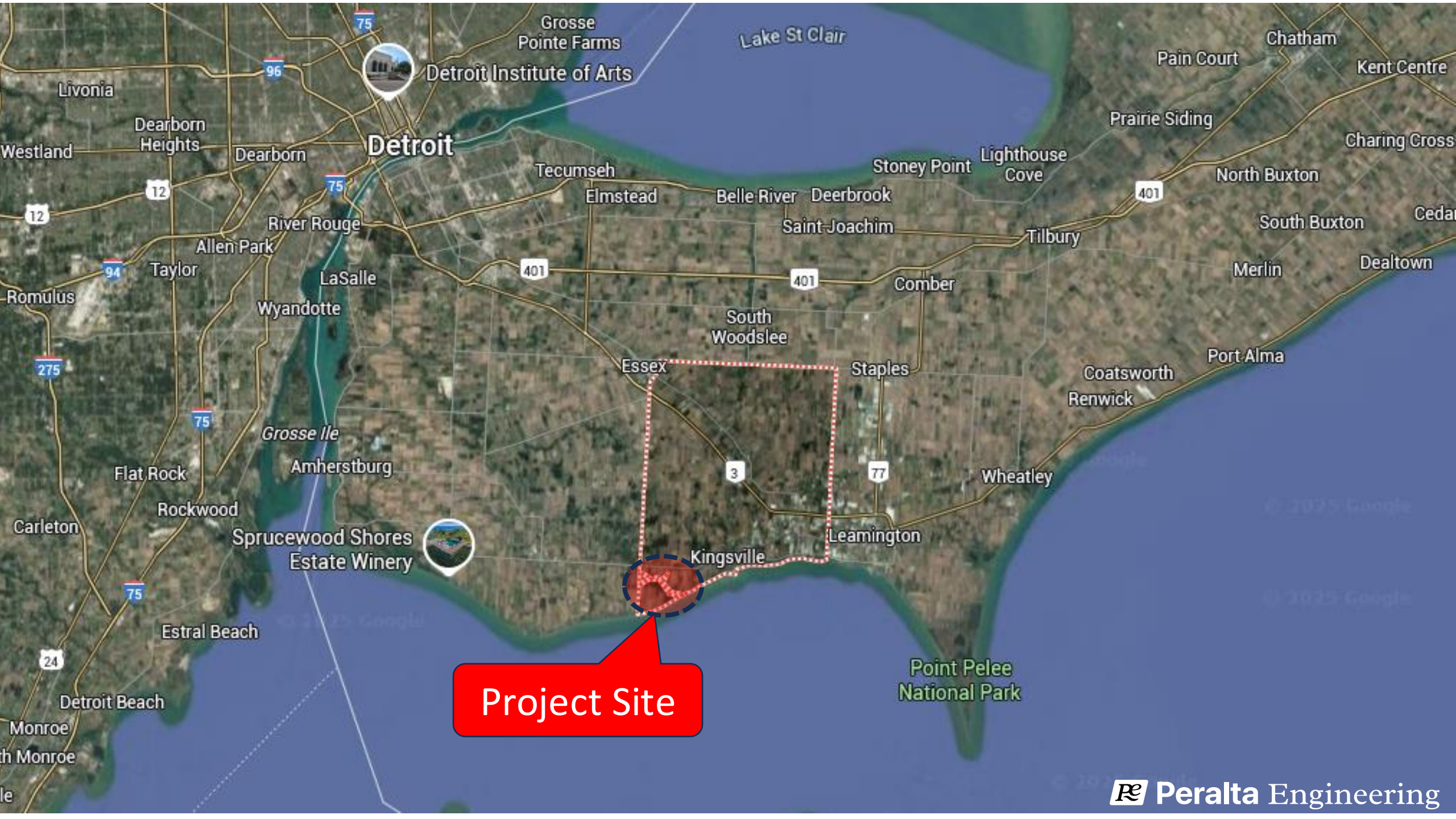
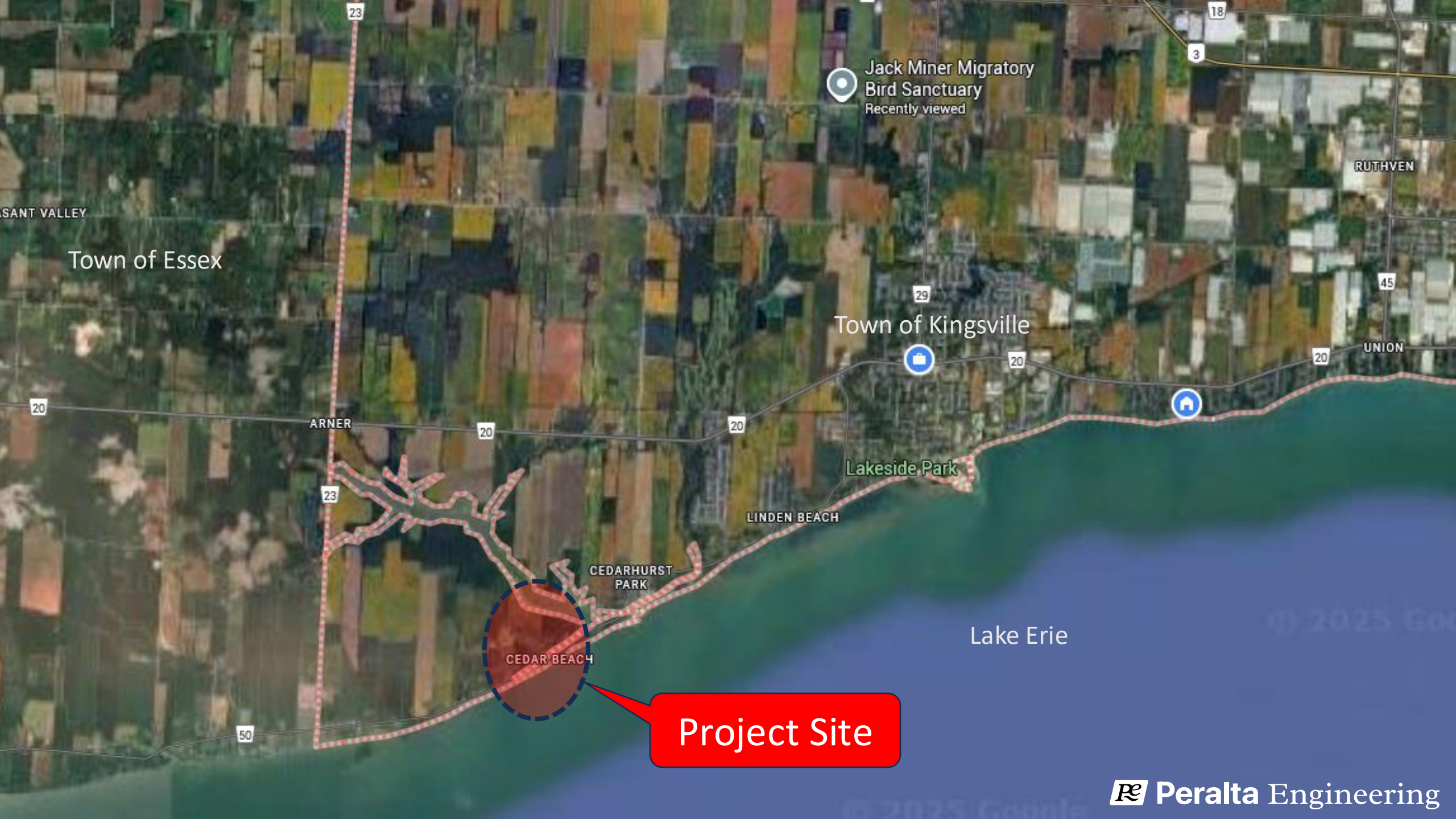

Project Site
Detroit
Detroit Institute of Arts
Grosse Pointe Farms
Lake St Clair
Livonia
Dearborn Heights
Dearborn
Westland
Tecumseh
Elmstead
Belle River
Deerbrook
Stoney Point
Lighthouse Cove
Pain Court
Chatham
Kent Centre
Prairie Siding
Charing Cross
North Buxton
South Buxton
Tilbury
Saint-Joachim
River Rouge
Allen Park
Taylor
LaSalle
Wyandotte
Romulus
Comber
Merlin
Dealtown
South Woodslee
Essex
Staples
Coatsworth
Renwick
Port Alma
Wheatley
Grosse Ile
Amherstburg
Flat Rock
Rockwood
Carleton
Sprucewood Shores Estate Winery
Kingsville
Leamington
Estral Beach
Point Pelee National Park
Detroit Beach
Monroe
Peralta Engineering



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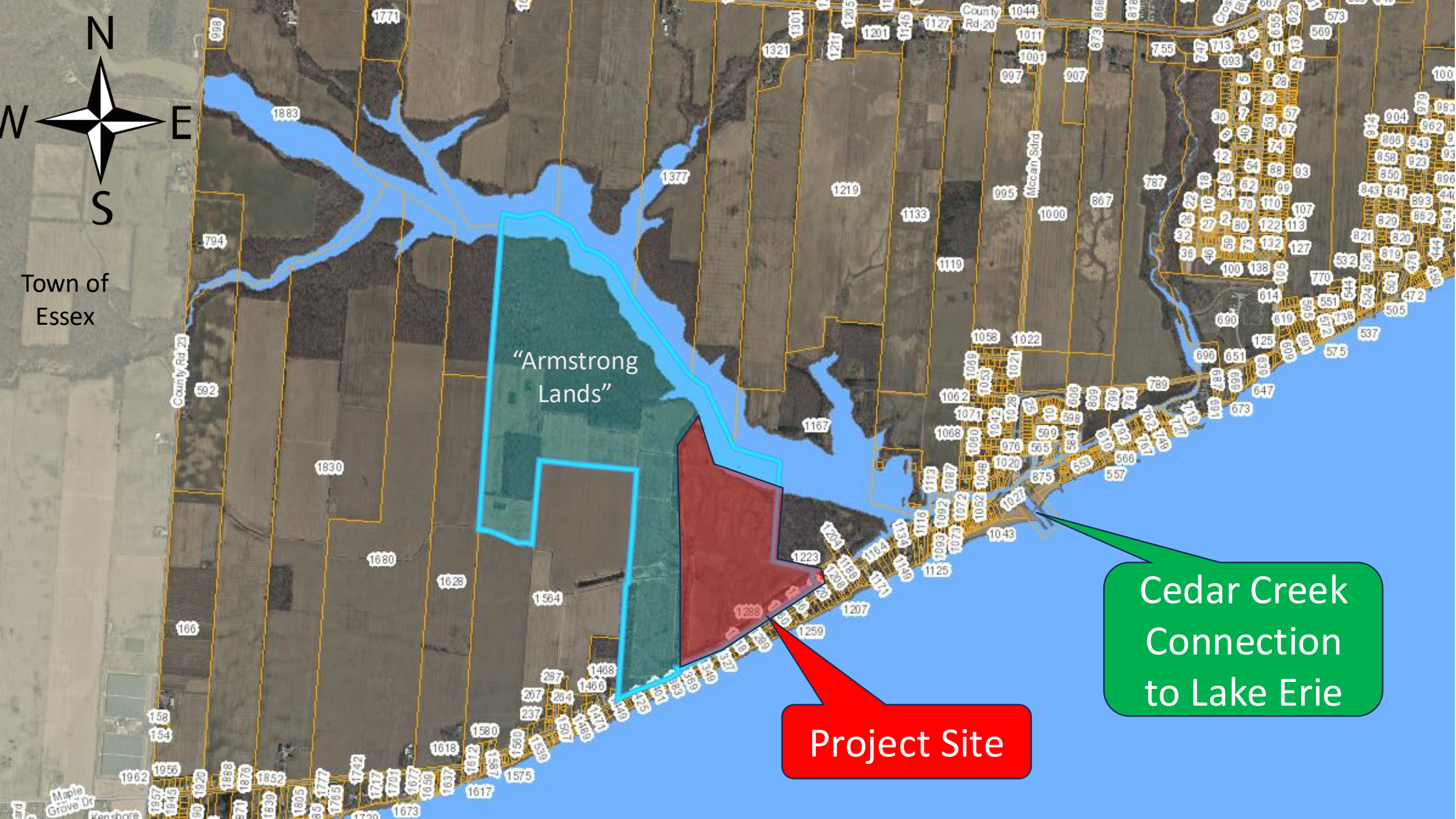
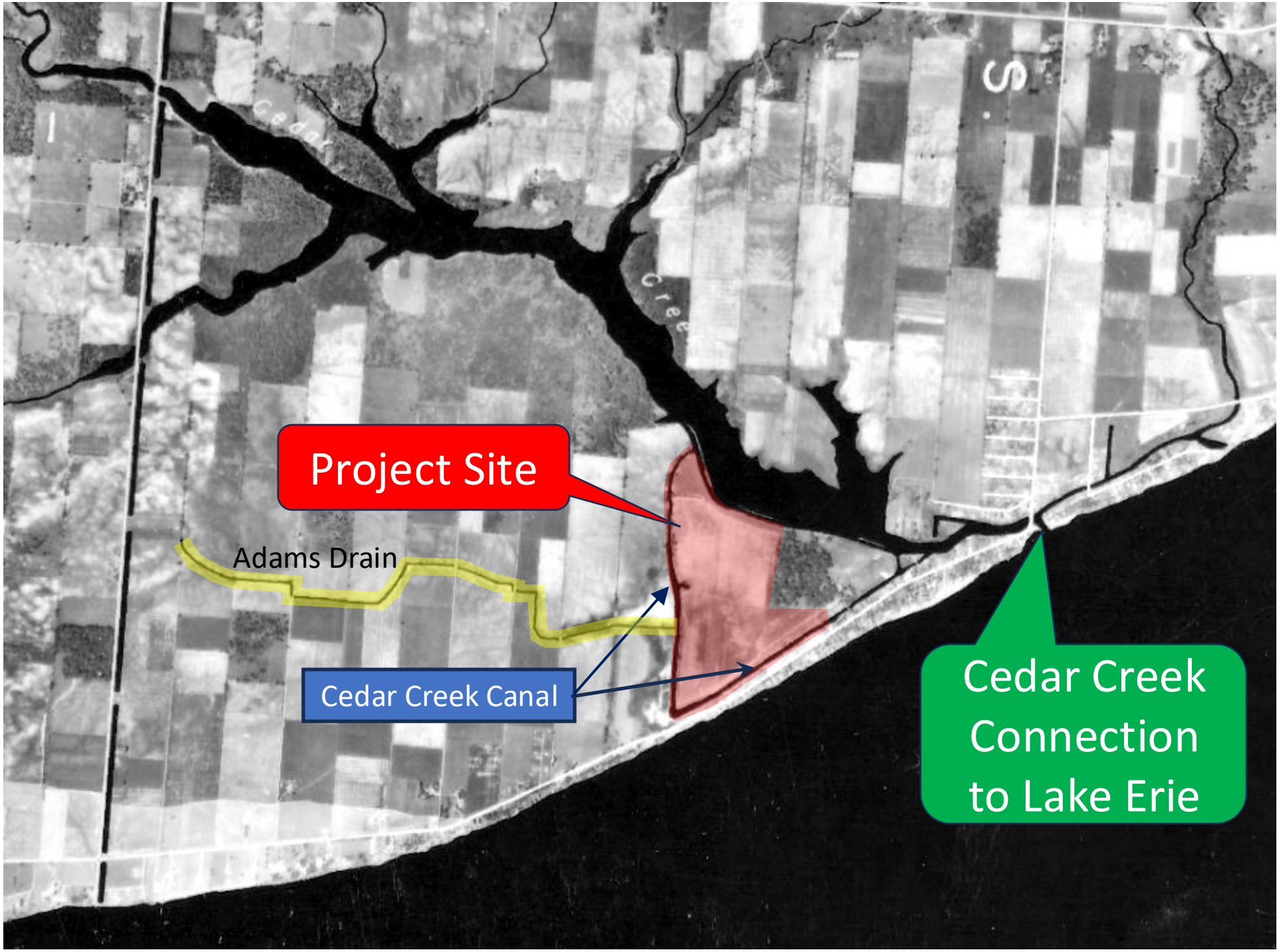
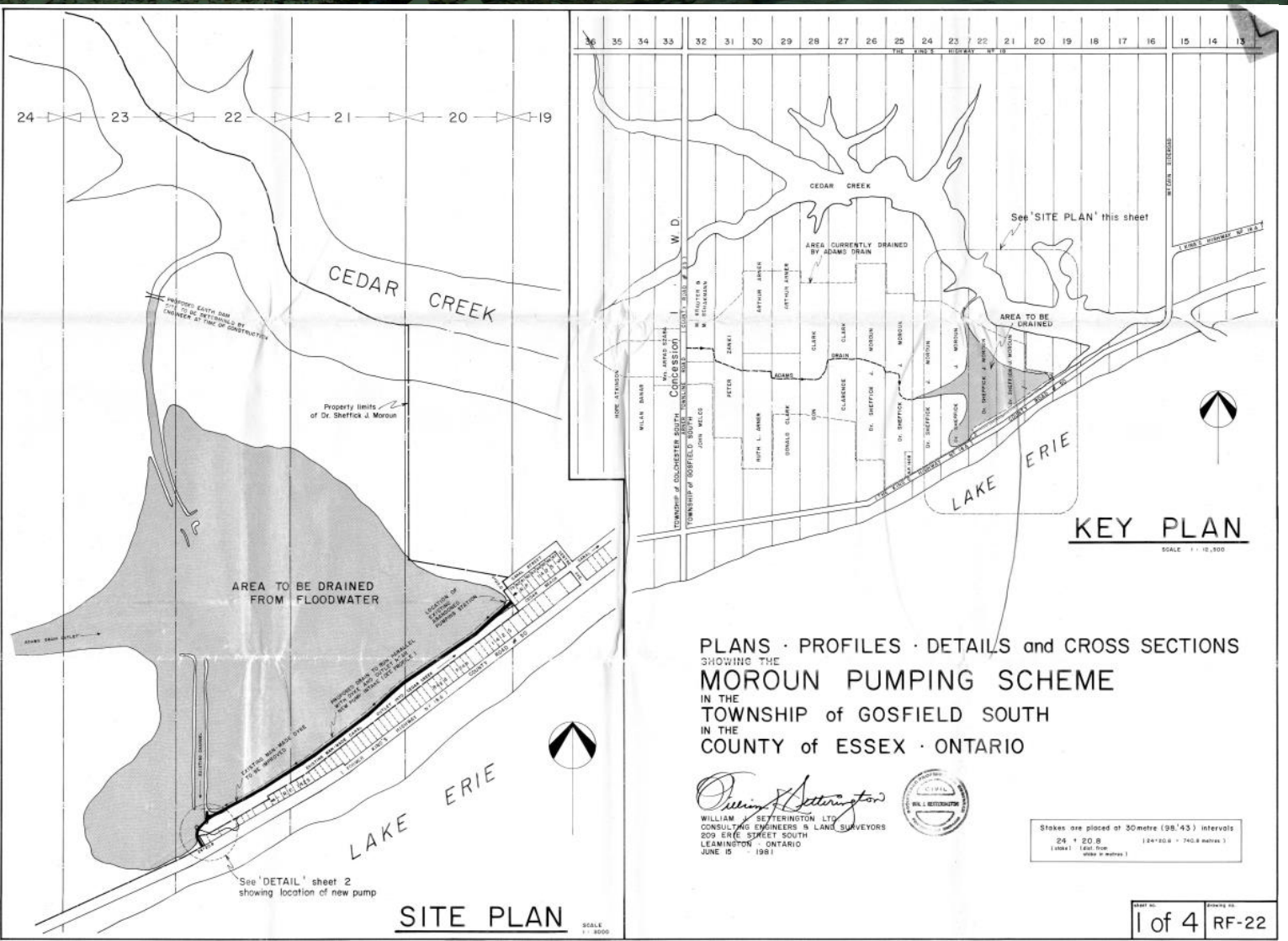

N
W
E
S
Town of Essex
"Armstrong Lands"
Project Site
Cedar Creek Connection to Lake Erie



1954 Aerial Photo

1975 Aerial Photo

1981 - Moroun Pumping Scheme



1981 Pumping Scheme Overview:

- A New Dam was installed to disconnect the Cedar Creek from the System
- New Flood Protection Dyke along the Cedar Creek Canal
- A Drain along the interior of the New Dyke
- Removal of a small Pump Station at the East End of the Site
- A New Pump Station at the West End of the Site
- Auxiliary Gravity Outlets

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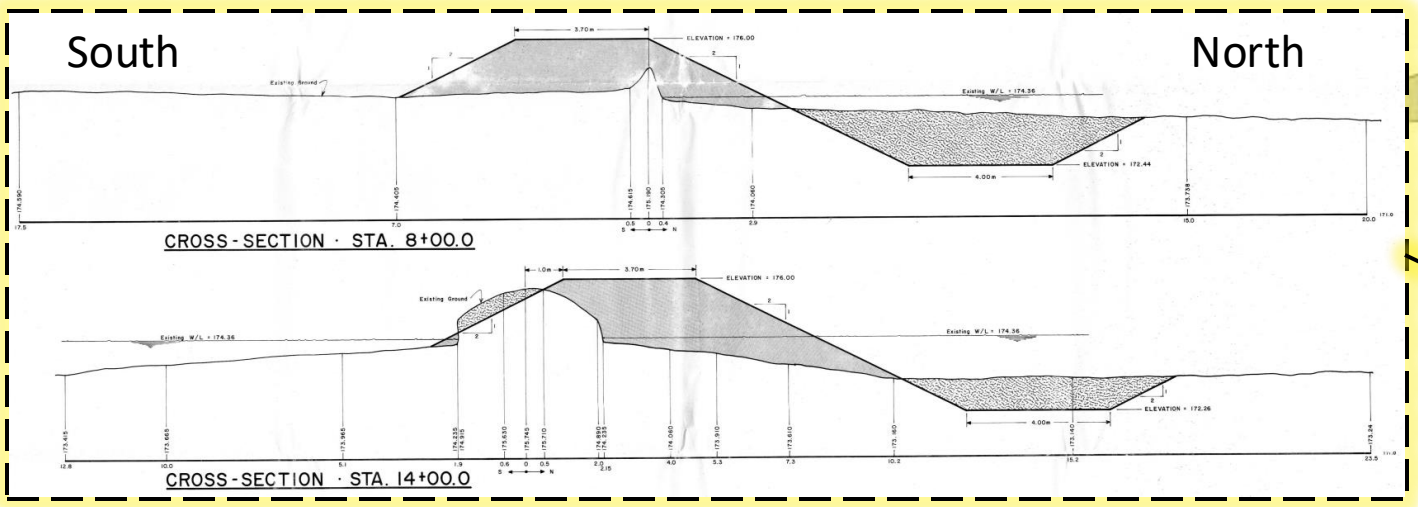
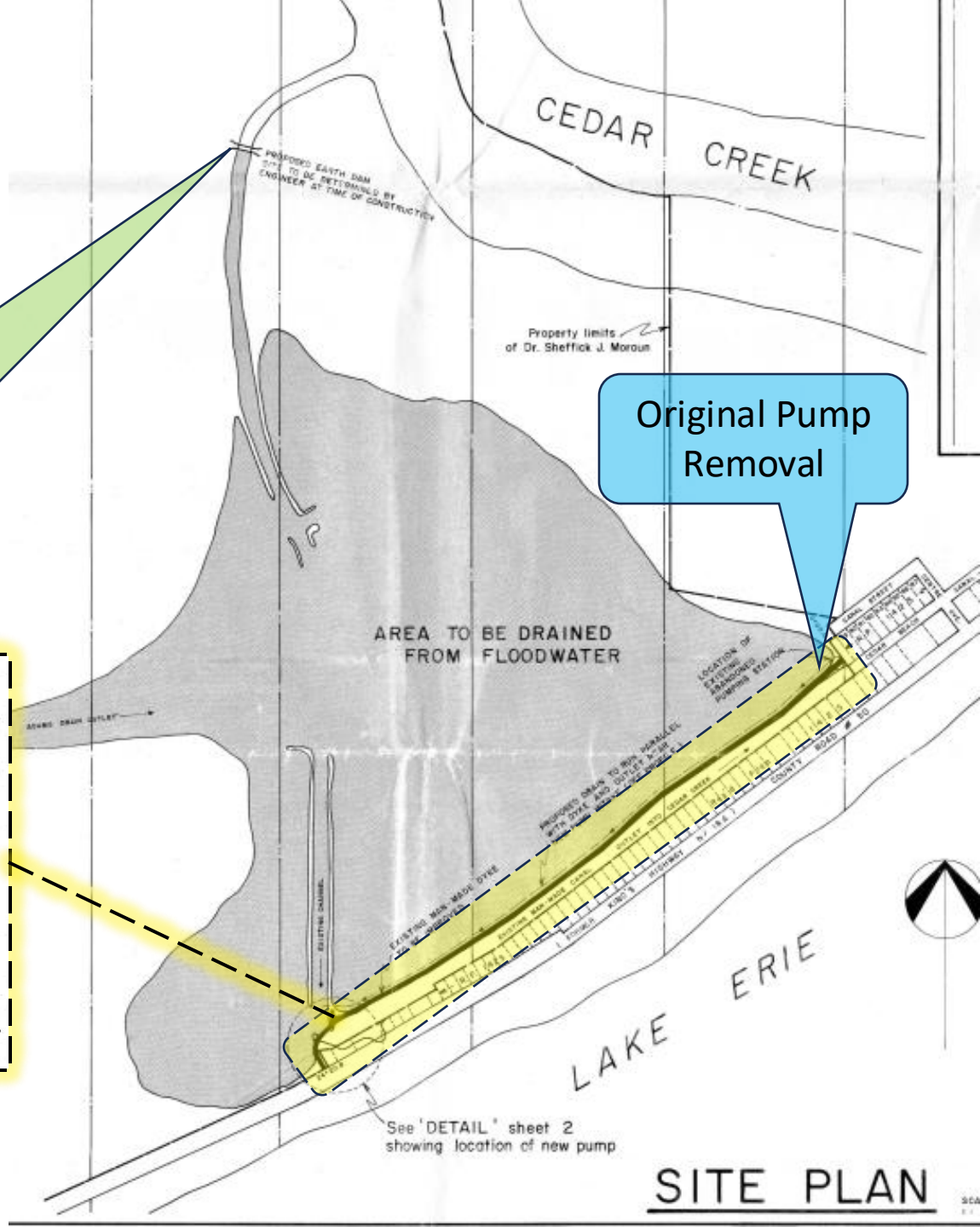
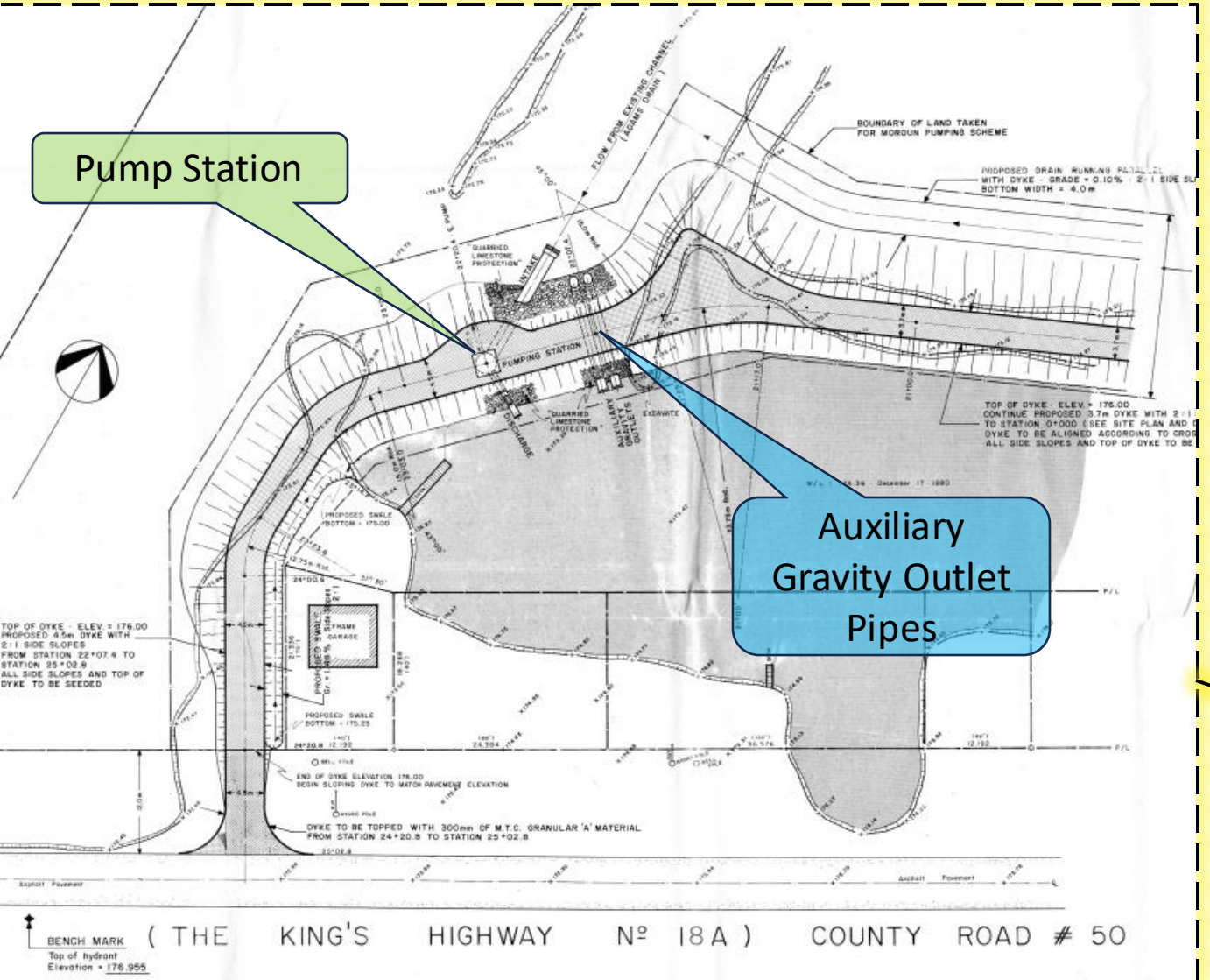
Moroun Pumping Scheme: Dam, Dyke, & Drain

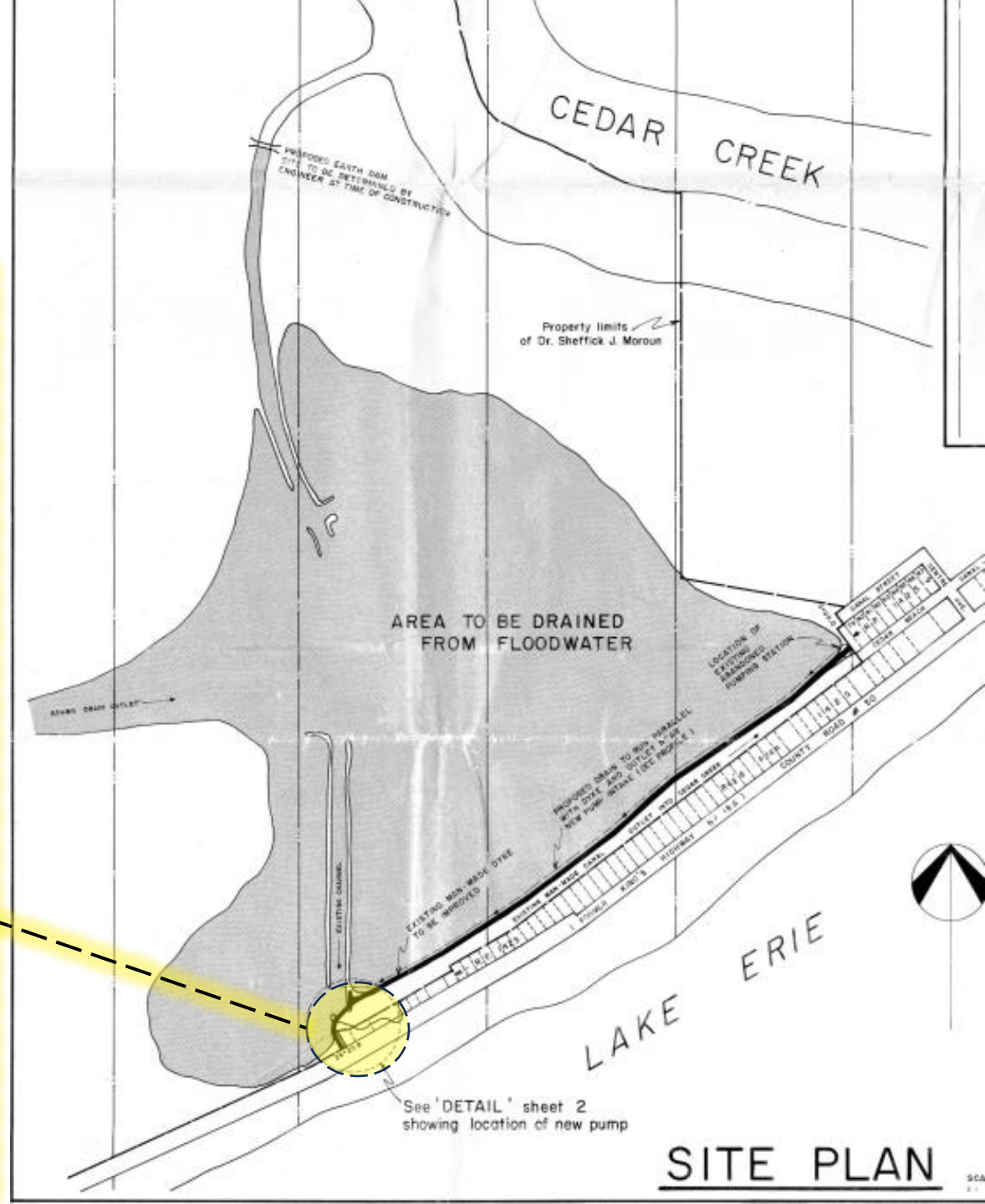
A New Dam to Plug the Existing Canal from Allowing Flows from the Cedar Creek

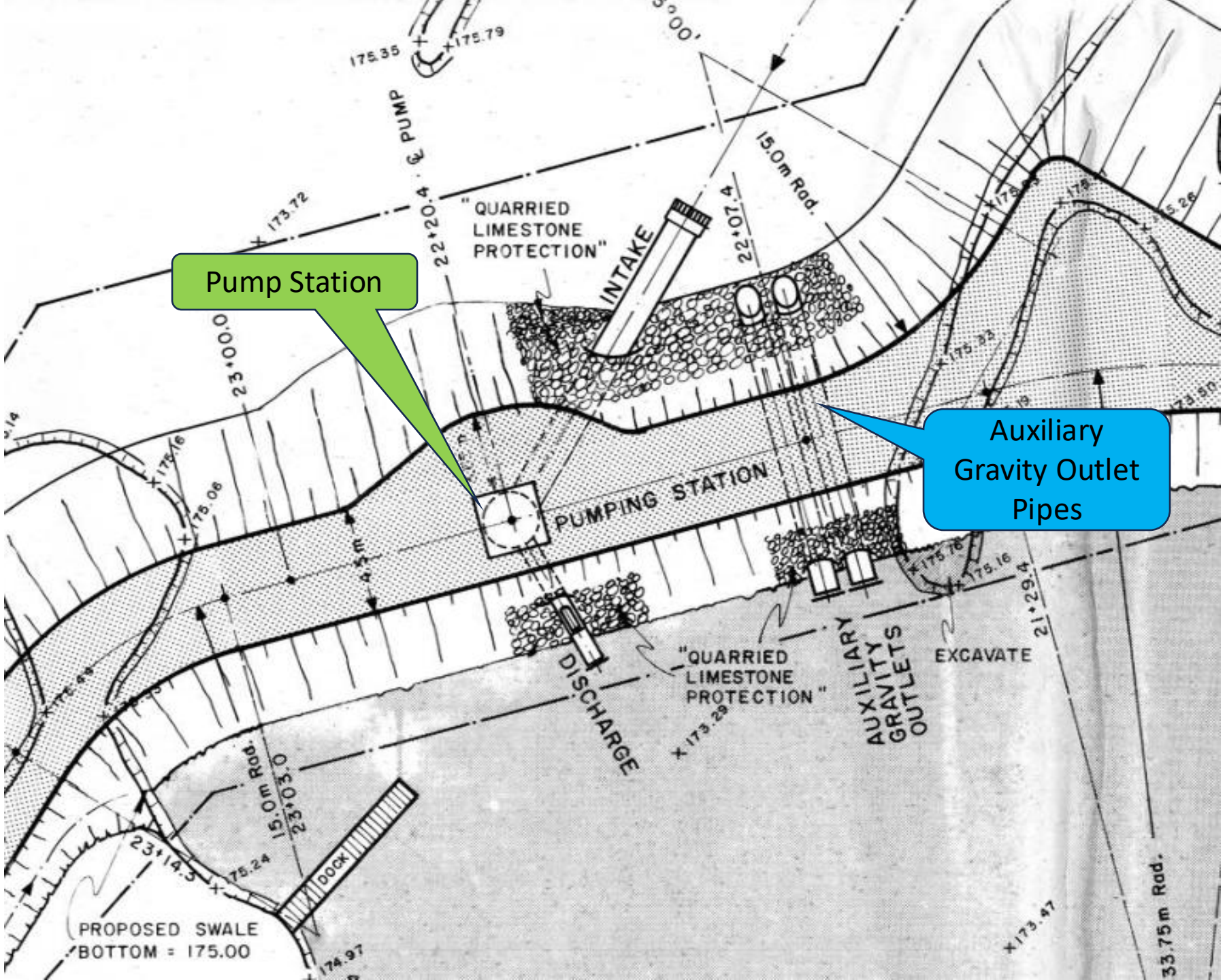




Moroun Pumping Scheme: Pump Station







Technical Details:

- 50 HP Pump Capacity:
  - 13,800 USGPM at 8' of Head
  - 12,400 USGPM at 11' of Head
- Pump Intake Pipe Size:
  - 1450mm x 965mm Arch CSP
- Pump Outlet Pipe Size:
  - Main: 600mm dia. CSP
- 1981 Water Level = 174.36m
- Pump Intake Elev. = 172.00m
- Top of Dyke Elev. = 176.00m
- Drain Elev. = 172.62m
- Auxiliary Gravity Outlets:
  - Twin 1050mm dia. CSP
  - Flap Gates
  - Invert Elev. = 173.60m

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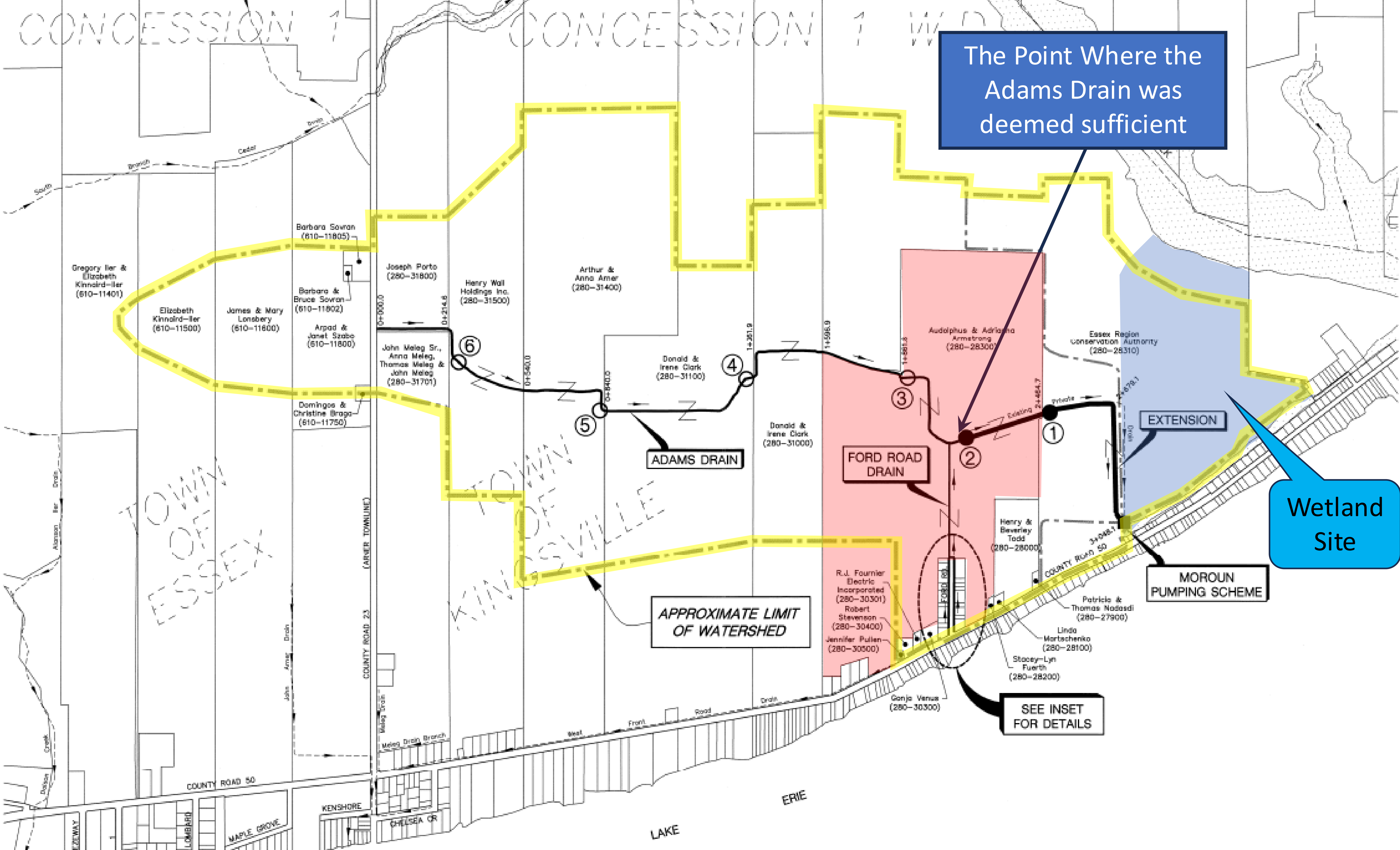
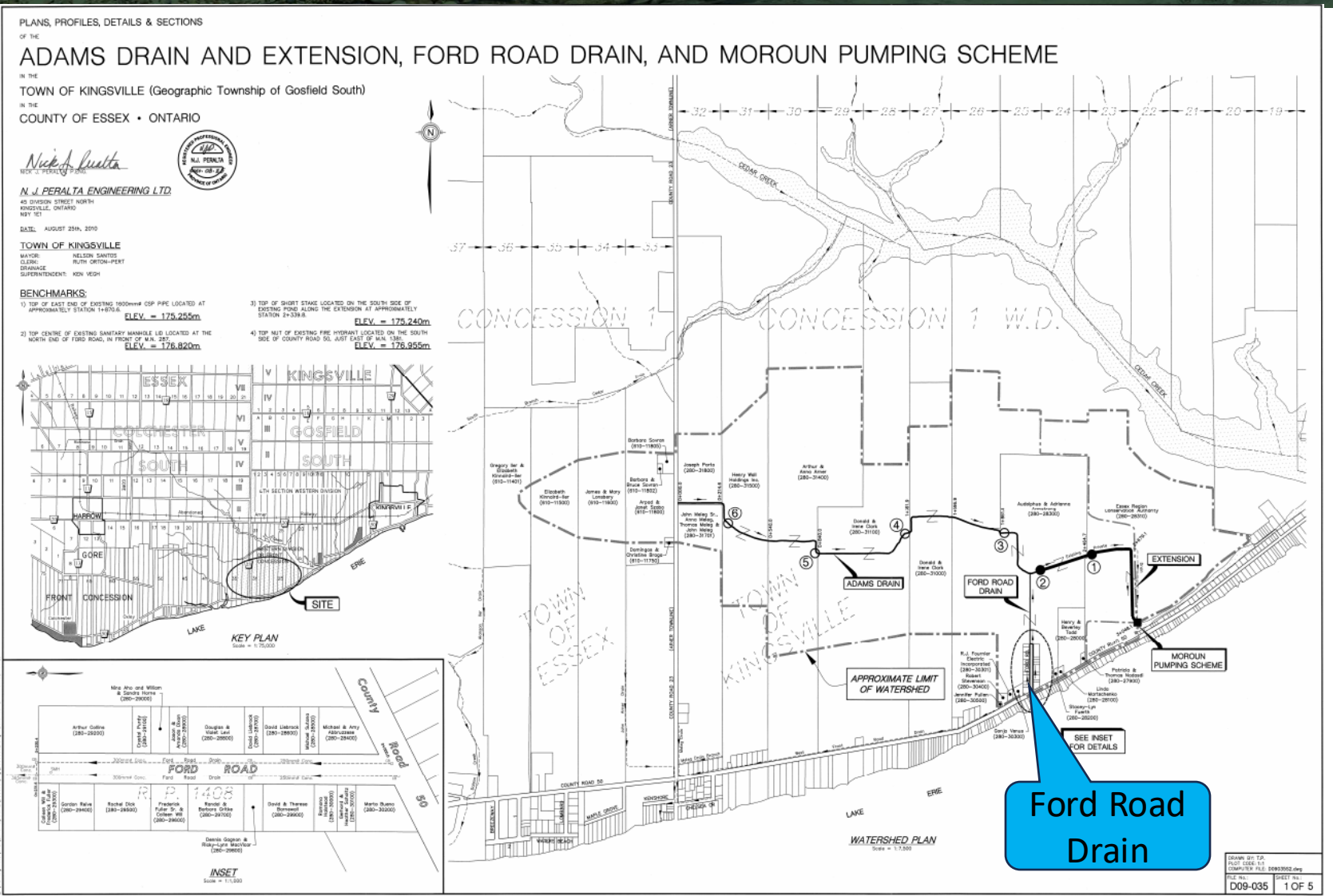


CONCESSION 1
CONCESSION 1 W.D.
The Point Where the Adams Drain was deemed sufficient
Wetland Site
Gregory Iler & Elizabeth Kinnaird-Iler (610-11401)
Elizabeth Kinnaird-Iler (610-11500)
James & Mary Lonsbery (610-11600)
Barbara Sovran (610-11805)
Barbara & Bruce Sovran (610-11802)
Arpad & Janet Szabo (610-11800)
Domingos & Christine Braga (610-11750)
Joseph Porto (280-31800)
John Meleg Sr., Anna Meleg, Thomas Meleg & John Meleg (280-31701)
Henry Wall Holdings Inc. (280-31500)
Arthur & Anna Amer (280-31400)
Donald & Irene Clark (280-31100)
Donald & Irene Clark (280-31000)
Audolphus & Adrianna Armstrong (280-28300)
Essex Region Conservation Authority (280-28310)
Henry & Beverley Todd (280-28000)
R.J. Fournier Electric Incorporated (280-30301)
Robert Stevenson (280-30400)
Jennifer Pullen (280-30500)
Gonja Venus (280-30300)
Patricia & Thomas Nadasdi (280-27900)
Linda Martschenko (280-28100)
Stacey-Lyn Fuerth (280-28200)
ADAMS DRAIN
FORD ROAD DRAIN
EXTENSION
MOROUN PUMPING SCHEME
APPROXIMATE LIMIT OF WATERSHED
SEE INSET FOR DETAILS
TOWN OF ESSEX
TOWN OF KINGSVILLE
COUNTY ROAD 23 (ARNER TOWNLINE)
COUNTY ROAD 50
FORD RD
LAKE ERIE
KENSHORE
CHELSEA CR
MAPLE GROVE
LOMBARD
South Cedar Branch Drain
Meleg Drain
Meleg Drain Branch
John Amer Drain
Alanson Iler Drain
West Front Road Drain
Dalson Creek
0+000.0
0+214.8
0+540.0
0+840.0
1+261.9
1+596.9
1+881.8
2+484.7
3+048.1
3+678.1
Existing
Private
1
2
3
4
5
6

2010 – Adams Drain Extension



2010 Adams Drain Extension (et al.):

- Extended the Adams Drain to a sufficient outlet.
  - Including new drain crossings for the affected ag lands
- Address issues with the Ford Road Drain.
- Prepared New Maintenance Schedules for the Adams, Moroun and Ford Road Drain.

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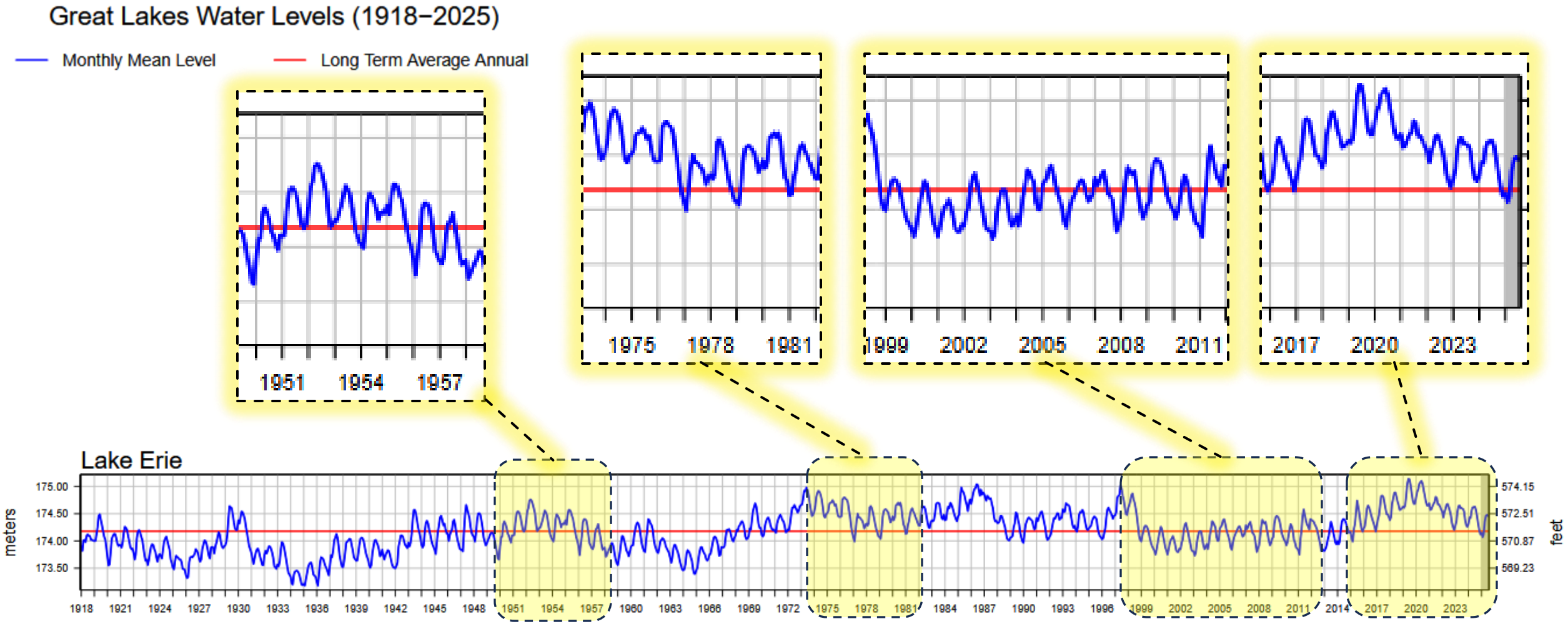
Historical Water Levels for Lake Erie



Elevations are referenced to the International Great Lakes Datum (IGLD) - 1985.

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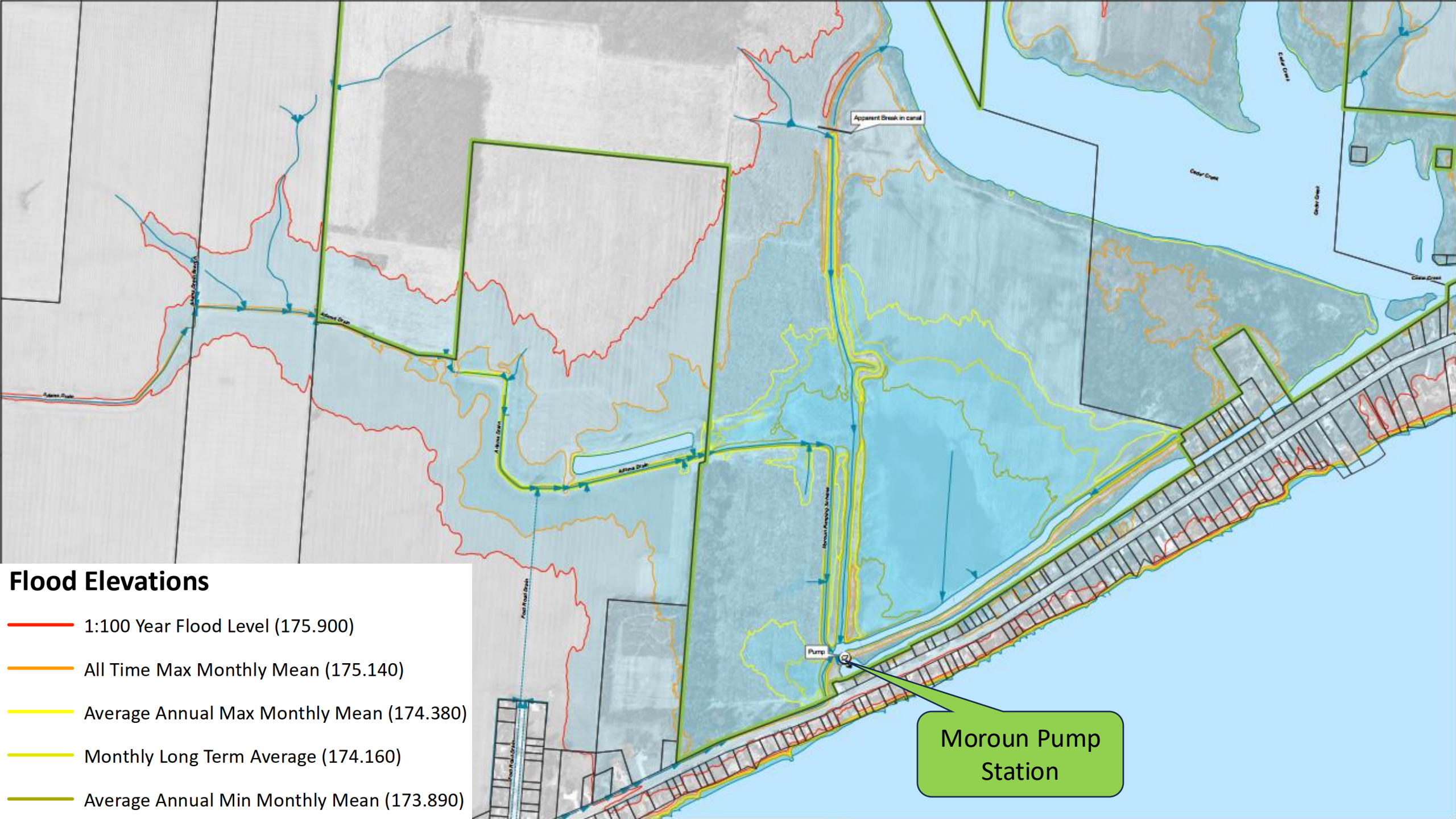


Flood Elevations

- 1:100 Year Flood Level (175.900)
- All Time Max Monthly Mean (175.140)
- Average Annual Max Monthly Mean (174.380)
- Monthly Long Term Average (174.160)
- Average Annual Min Monthly Mean (173.890)

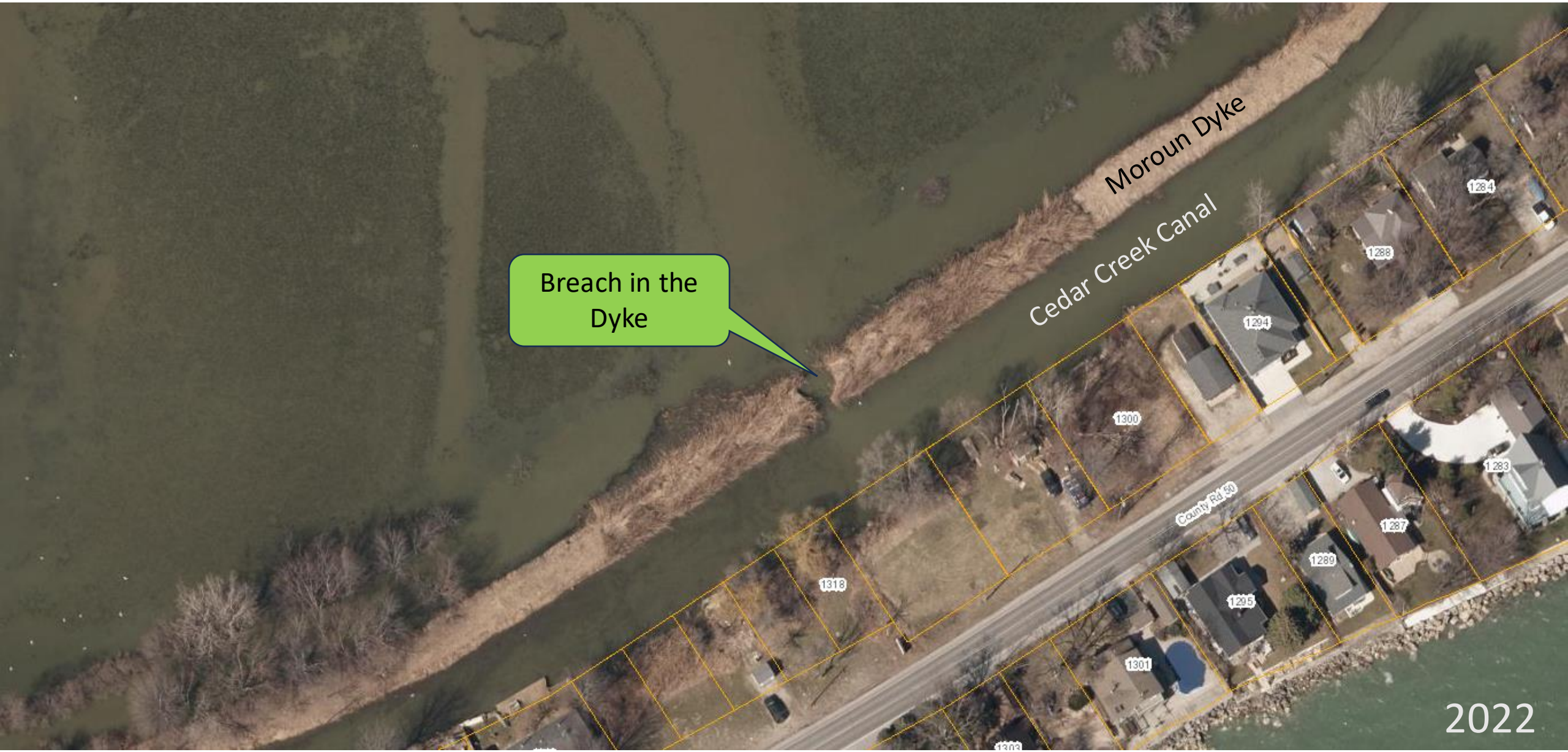
Scoping Meeting

Pre-Consultation:

- Lands owned by ERCA since 2010
- Purchased with the intention to re-naturalize the lands
- Impacted by the operation of the Moroun Pumping Scheme
- In 2021, ERCA reached out to the Town to find a way to naturalize the lands without impacts to others
- Pre-Consultation Meeting (ERCA, Town, OMAFA, Peralta) was scheduled to discuss how to proceed
- With potential impacts to the Municipal Drain → Section 78 of the Drainage Act.


2021


2022


Moroun Dyke
Cedar Creek Canal
Breach in the Dyke
1284
1288
1294
1300
1283
1287
1289
1295
1301
1318
County Rd 50
2022

Appointment

Appointment:

- December 12, 2022 – Peralta Engineering was officially appointed
  - Under Section 78 of the Drainage Act.

Intented Scope:

- Develop a design to remove the flooded lands from the Moroun Pumping Scheme permanently
  - Without any impacts on other lands

Section 95

Section 95 - Appointment of Commissioner:

- 95 (1) For the better maintenance and repair of drainage works by embanking, pumping or other mechanical operations, the council of the municipality initiating the drainage works may by by-law,
  - (a) appoint one or more commissioners with power to,
    - (i) enter into all necessary and proper contracts for the purchase of fuel, erection or repairs of buildings and purchase and repairs of machinery, and
    - (ii) do all other things necessary for successfully operating the drainage works and for keeping the embankment thereof in repair as may be set forth in the by-law appointing the commissioner or commissioners; and
  - (b) provide for defraying the annual cost of maintaining and operating the drainage works by assessment upon the lands and roads in any way liable to assessment therefor. R.S.O. 1990, c. D.17, s. 95 (1).
- 95 (2) The fees or other remuneration of a commissioner shall form part of the cost of the maintenance and repair of the drainage works.
- 95 (3) A drainage superintendent and a commissioner have the same powers as to entry on land as are given to the engineer and the engineer's assistants under subsection 12 (1).

Pump Commissioner and Pump Operations

Pump Commissioner and Pump Operations

Pre-Consultation Meeting

Essex Region Conservation Authority
sustaining the place for life

ERCA (Regulatory)
Will require a review of the design, prior to issuing a permit

Ontario
Ministry of Natural Resources and Forestry

MNRF
Lakes and Rivers Improvement Act (LRIA) Authorization may be required

Ontario
Ministry of the Environment, Conservation and Parks

MECP
Endangered Species Act exemption (under Section 23.9)

Fisheries and Oceans Canada

DFO
Project likely requires a “Letter of Advice” or “Fisheries Act Authorization”

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On-Site Meeting

Meeting Date: July 12, 2023

- **Held at the Moroun Pump Station access**
- **Questioning focused on the use of the lands and the protection of the adjacent properties**
- **Mostly positive**

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Wetland Conservation Partnership Program

- **Provincial Funding through MECP**
- The program objectives include:
  - improving the functionality or connectivity of wetlands
  - conserving, restoring or enhancing existing wetlands and their features and functions
  - mitigating the impact of urban stormwater, which is worsened by too much hard surface (such as pavement) and more frequent and intense weather events associated with climate change
  - improving shoreline resiliency to climate change impacts such as high-water levels and intense storms
- **Total value of funding = $725,000**
- **Funding deadline → December 31, 2024**

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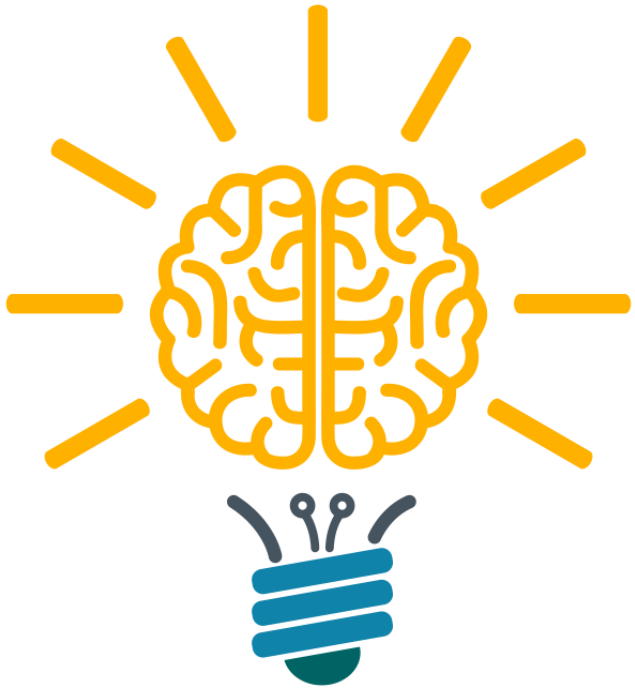
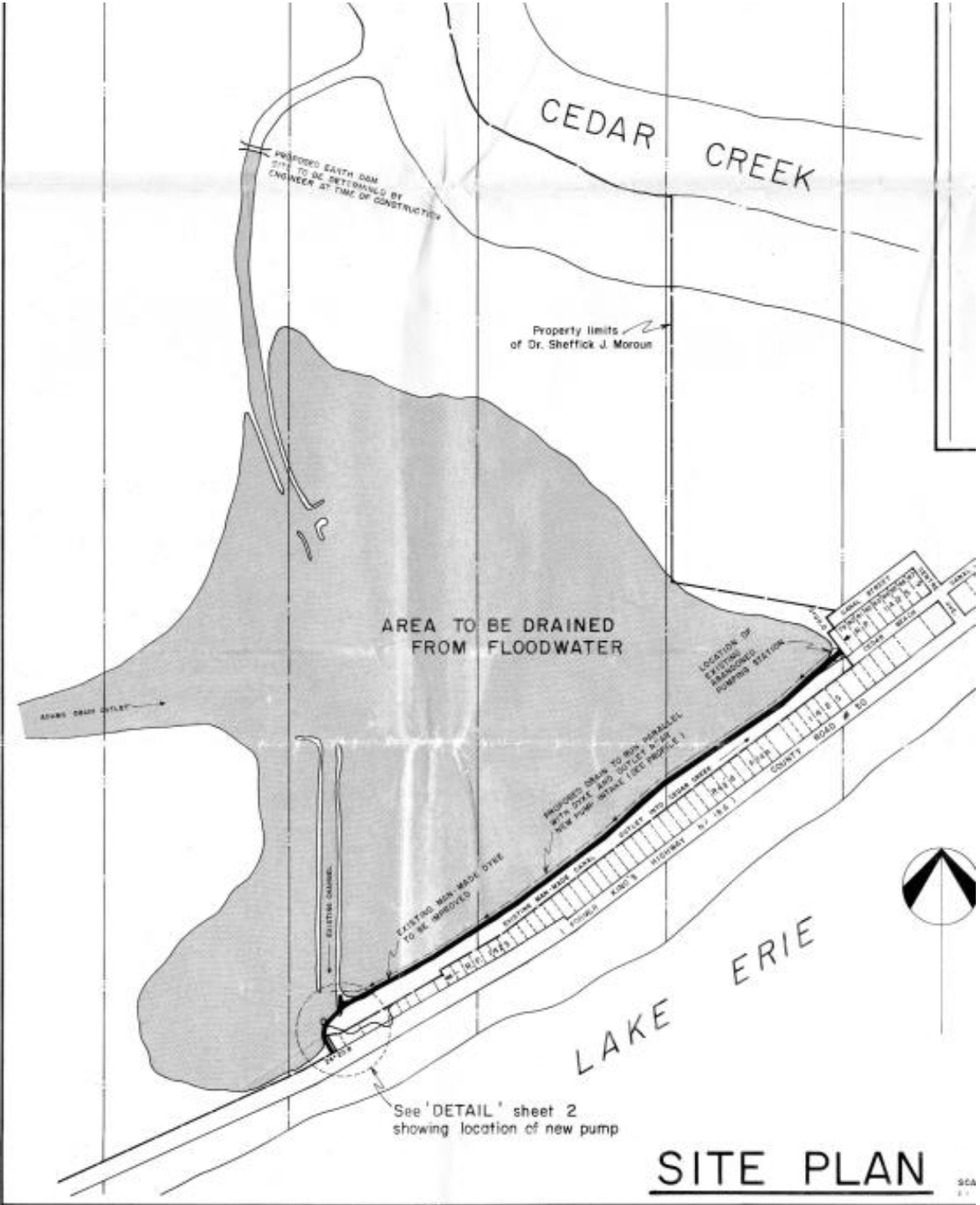
Technical Approach and Challenges

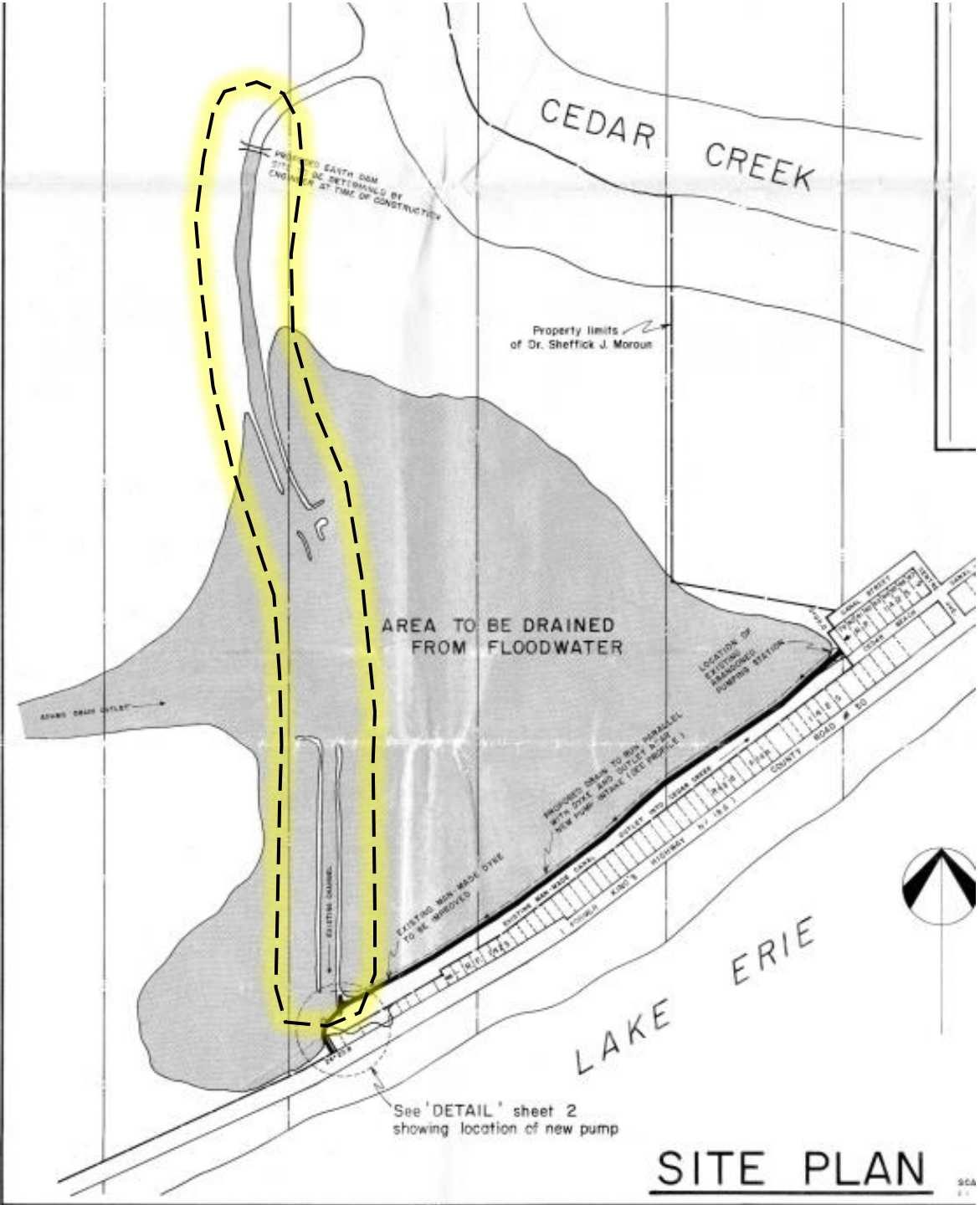


1. Derive a plan for dewatering the site without creating impacts to aquatic wildlife
2. Find an efficient way to isolate the upstream watershed from the new wetland
3. Address / Avoid Environmentally sensitive areas
4. Address Flood-proofing protection measures
5. Create a permanent connection to Lake Erie, while protecting aquatic habitat


CEDAR CREEK
Property limits of Dr. Sheffick J. Moroun
AREA TO BE DRAINED FROM FLOODWATER
LOCATION OF EXISTING ABANDONED PUMPING STATION
EXISTING MAN MADE DYKE TO BE IMPROVED
See 'DETAIL' sheet 2 showing location of new pump
LAKE ERIE
SITE PLAN

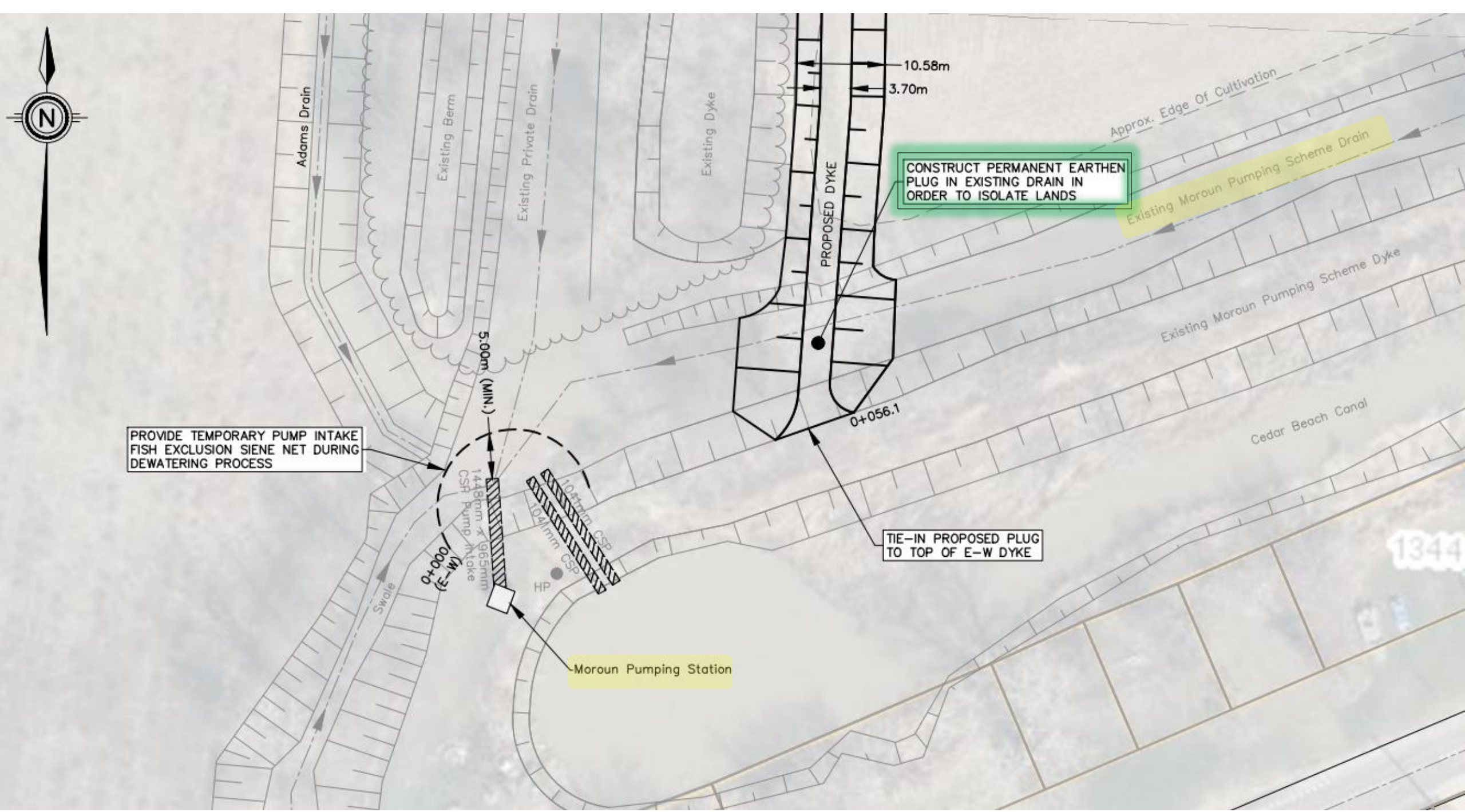
1981

2022


CEDAR CREEK
Property limits of Dr. Sheffick J. Moroun
AREA TO BE DRAINED FROM FLOODWATER
LOCATION OF EXISTING ABANDONED PUMPING STATION
EXISTING MAN MADE DYKE TO BE IMPROVED
See 'DETAIL' sheet 2 showing location of new pump
LAKE ERIE

SITE PLAN


Cedar Creek
Cedar Creek Canal

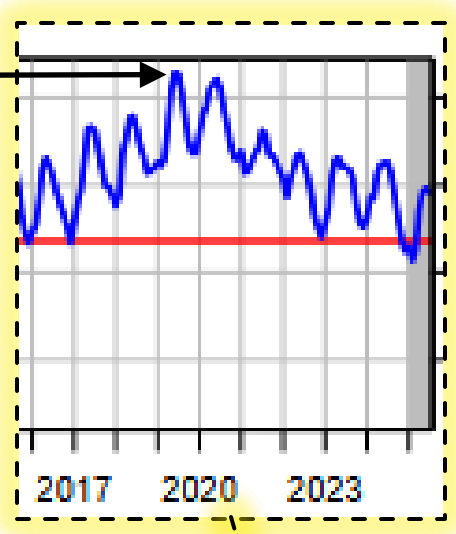

N
Adams Drain
Existing Berm
Existing Private Drain
Existing Dyke
10.58m
3.70m
PROPOSED DYKE
CONSTRUCT PERMANENT EARTHEN PLUG IN EXISTING DRAIN IN ORDER TO ISOLATE LANDS
Approx. Edge Of Cultivation
Existing Moroun Pumping Scheme Drain
Existing Moroun Pumping Scheme Dyke
Cedar Beach Canal
5.00m (MIN.)
PROVIDE TEMPORARY PUMP INTAKE FISH EXCLUSION SIENE NET DURING DEWATERING PROCESS
1448mm x 965mm CSP Pump Intake
0+000 (E-W)
1041mm CSP
1041mm CSP
HP
Swale
0+056.1
TIE-IN PROPOSED PLUG TO TOP OF E-W DYKE
Moroun Pumping Station
1344

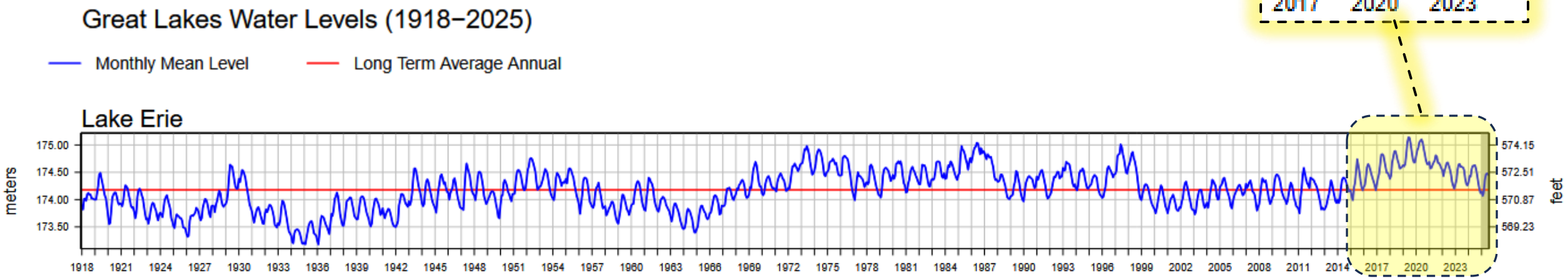
Historical Water Levels for Lake Erie

Elevations are referenced to the International Great Lakes Datum (IGLD) - 1985.

https://www.tides.gc.ca/en/monthly-historical-great-lakes-means

All-Time High =175.140m





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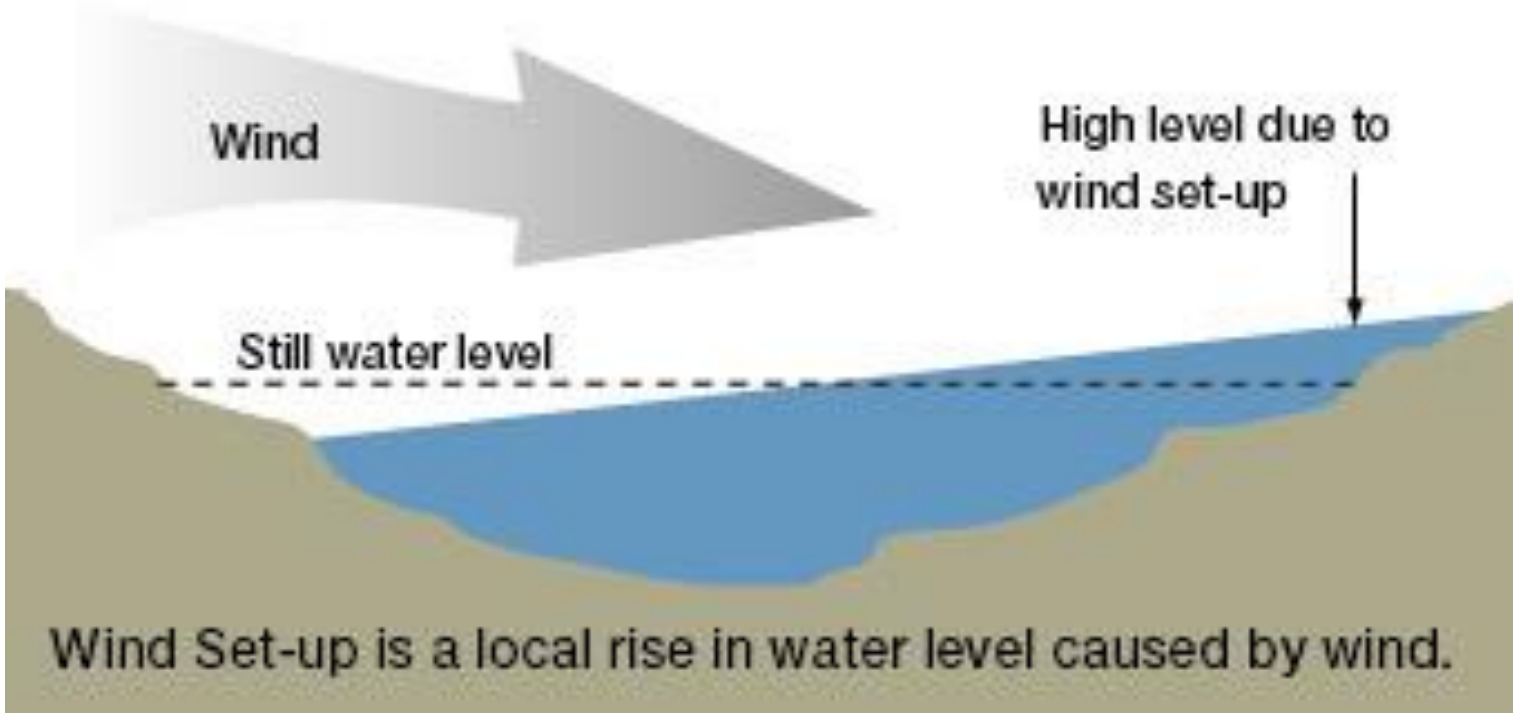
Lake Seiche

Definition:

A **lake seiche** is a standing wave in a closed or semi-closed body of water, caused by wind or pressure pushing water to one end and creating a back-and-forth sloshing motion, **like water in a bathtub**.



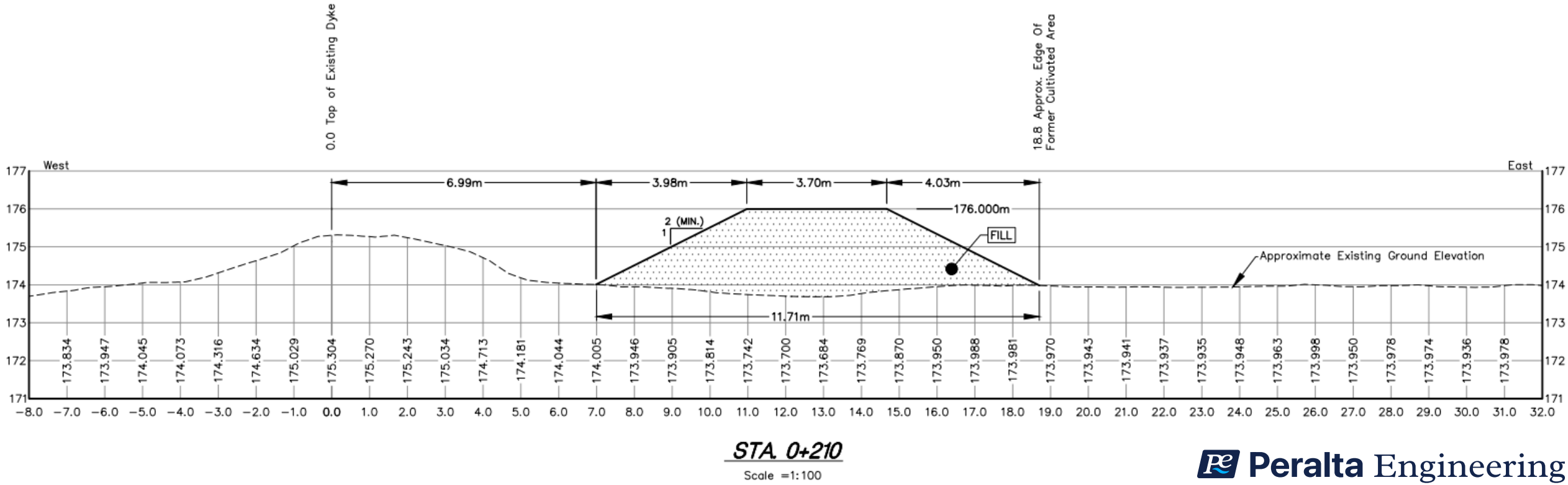
Flood Proofing Elevation

The Math…

Highest Recorded Lake Level =	175.140m
Lake Seiche =	0.600m
Freeboard =	0.260m
Top of Dyke Elevation =	176.000m

Dyke Details:

Top of Dyke Elevation =	176.000m
Top Width =	3.70m
Bank Slopes =	2 (Hor.) : 1 (Vert.)
Bottom Width (Varies) =	5.50m to 14.10m



STA. 0+210

Scale =1:100

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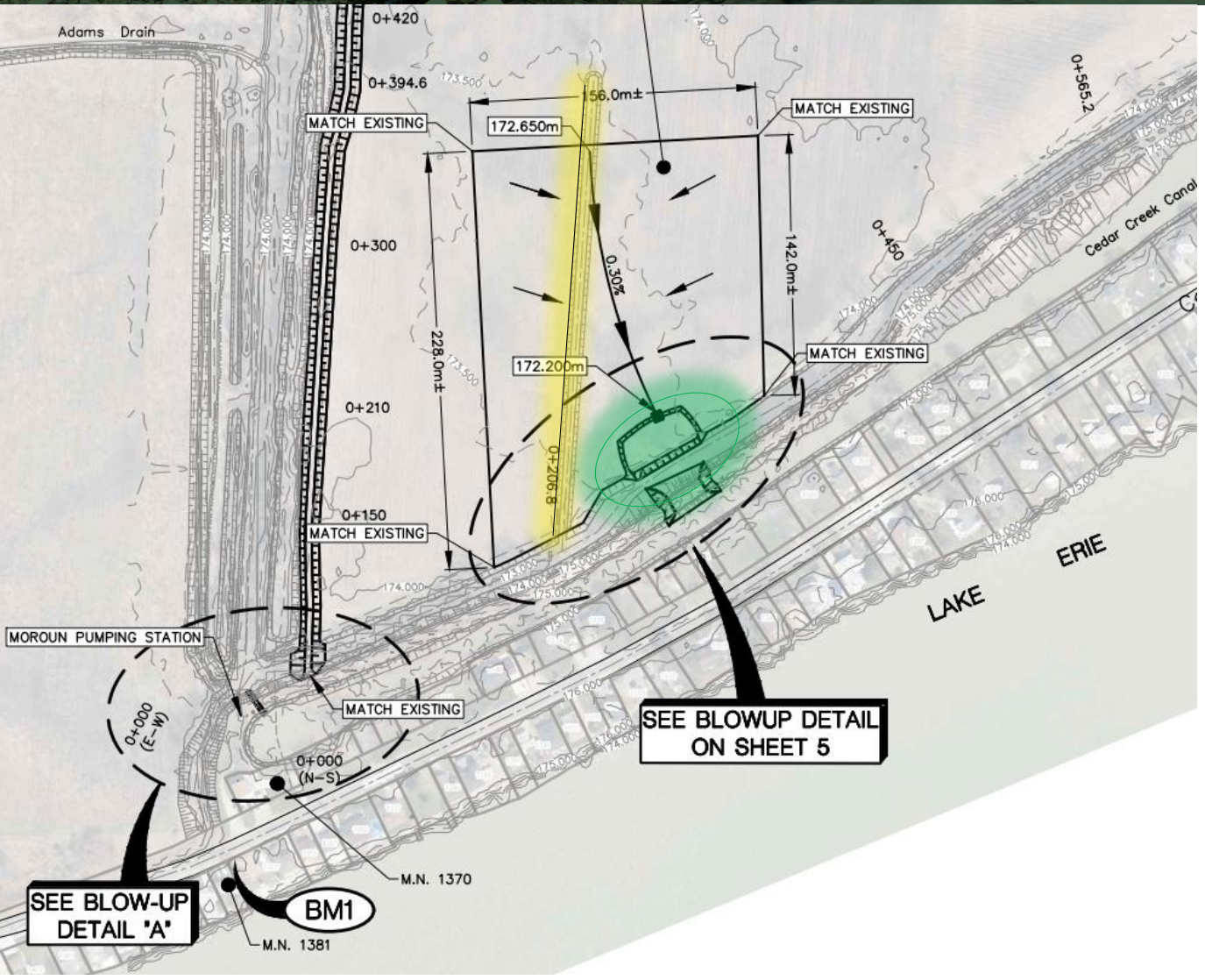
Permanent Connection to the Cedar Creek Canal



Thought Process:

1. **Remove a portion of the existing Moroun Pumping Dyke to connect to the Cedar Creek Canal**

2. **Find the lowest point along the existing dyke to:**
    1. **Maximize wetland depth**
    2. **Minimize grading/excavation**

3. **Ensure that Wetland can maintain aquatic habitat**

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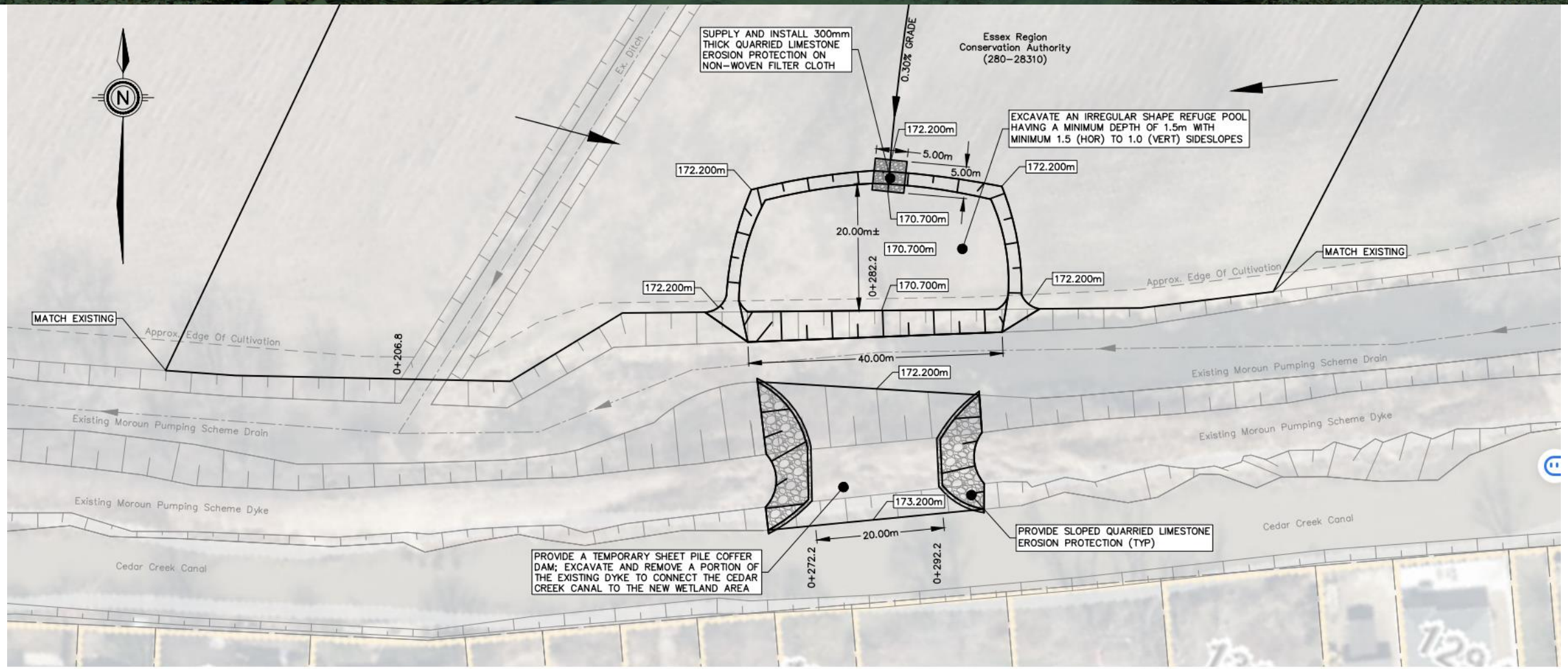
Refuge Pool



EAST-WEST DYKE PLAN (WETLAND CONNECTION)

Scale = 1:500

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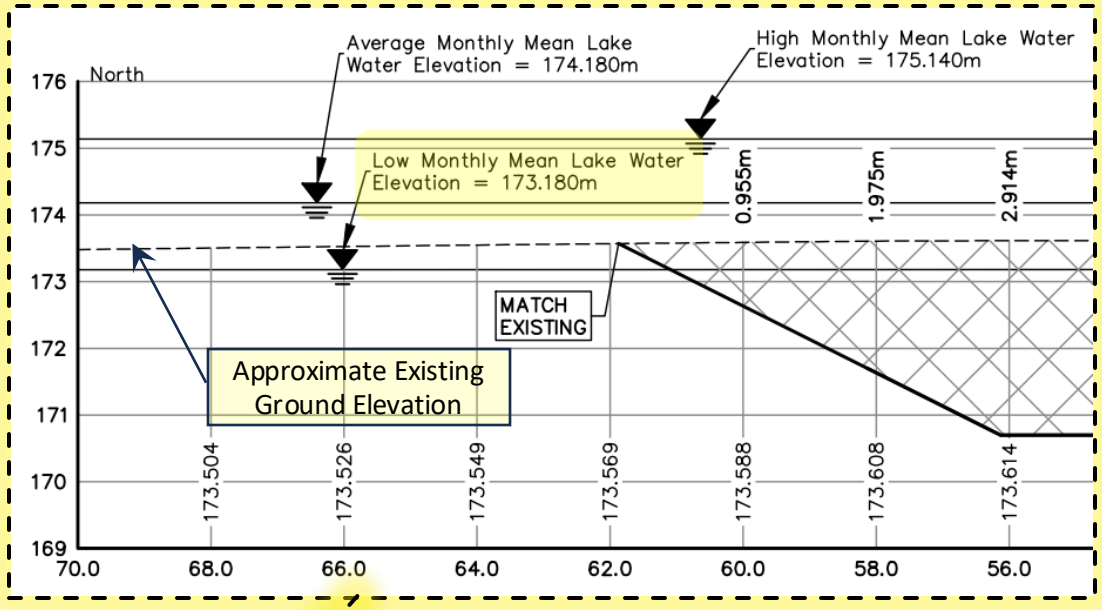
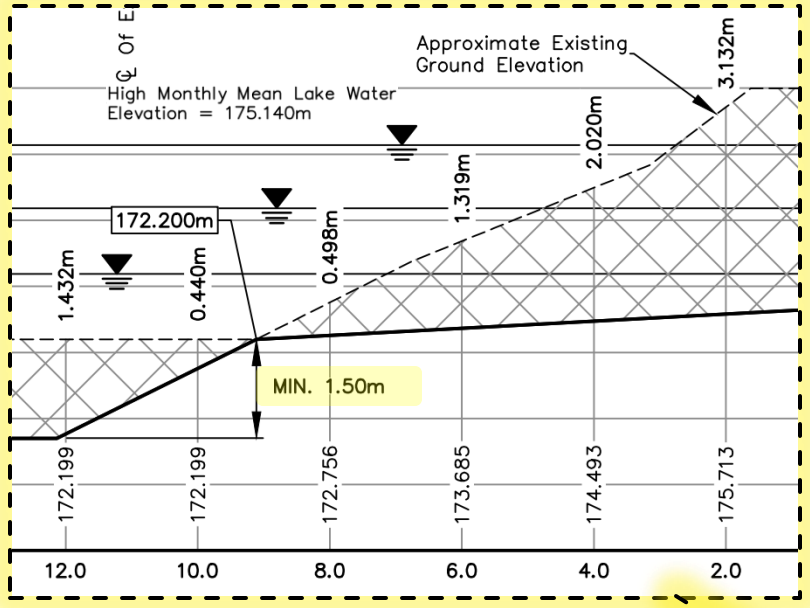
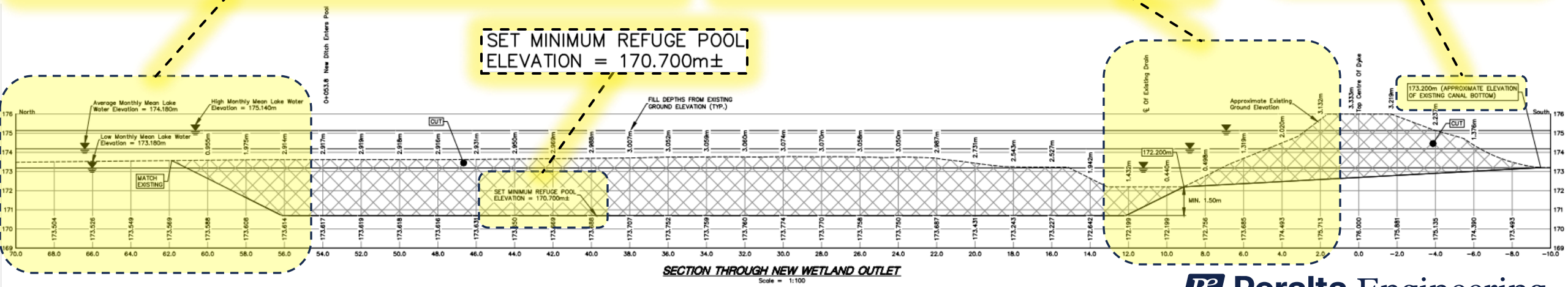
Refuge Pool



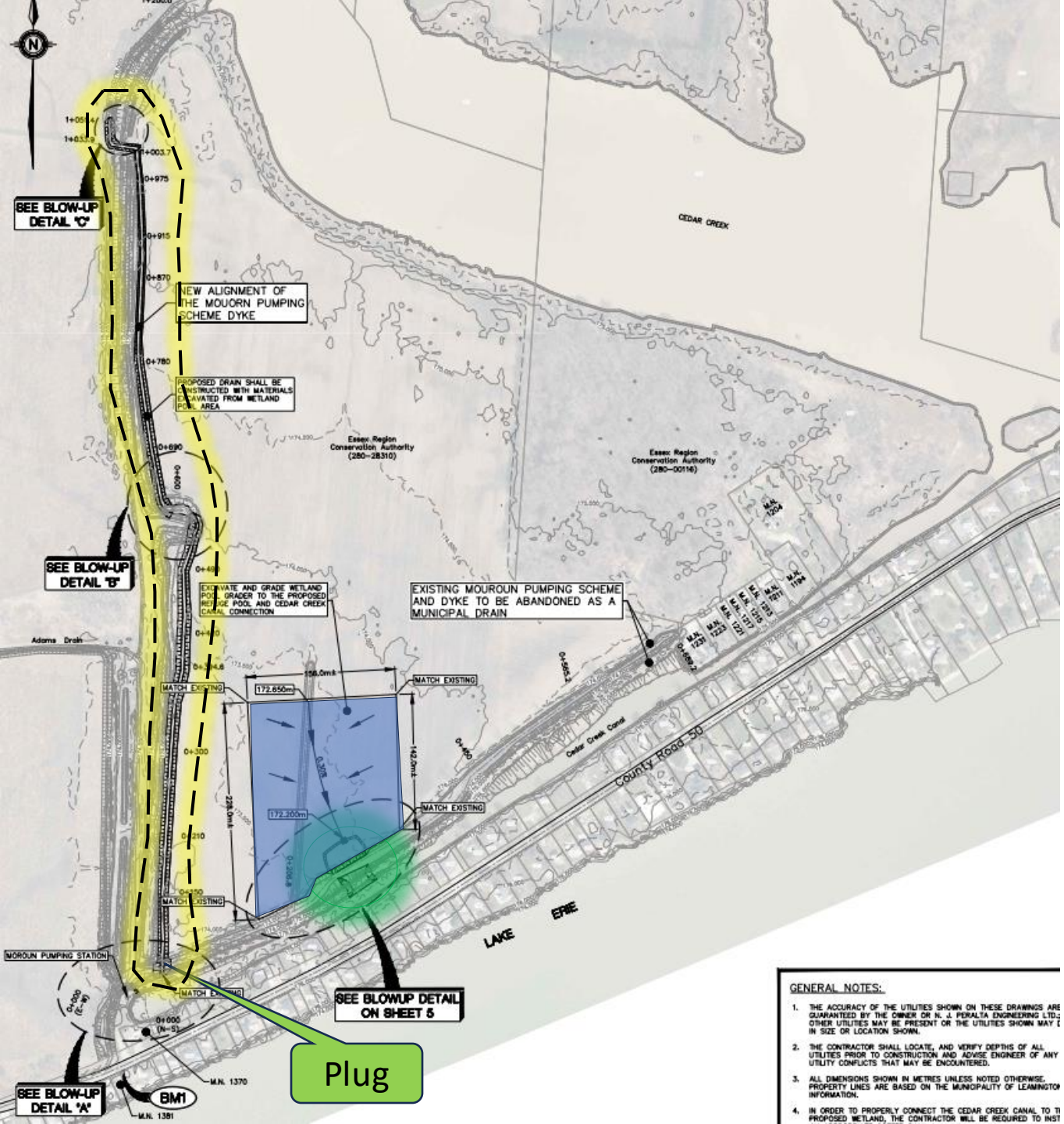


173.200m (APPROXIMATE ELEVATION OF EXISTING CANAL BOTTOM)

SET MINIMUM REFUGE POOL ELEVATION = 170.700m±



Peralta Engineering



Design:

1. The “Plug” to isolate the lands
2. Flood-proofing Dyke
3. Connection to the Cedar Creek Canal
4. Refuge Pool for aquatic habitat
5. Borrow pit for the dyke construction.

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DFO - Fisheries Act Authorization

Conditions:

- Drawdown disruption footprint of 220,000 m^2 (54.4ac.)
- Fish habitat destruction of approx. 15,000 m^2 (3.7ac.)
- Proper sediment and erosion control measures
- Timing windows
- Provisions for gradual dewatering
- Monitoring and reporting requirements (over a 3-year window)
- Letter of Credit = $15,000
- Indigenous consultation

Fisheries and Oceans Canada

Peralta Engineering

Engineer's Report - June 21st, 2024

Peralta Engineering

ENGINEER'S REPORT
(Drainage Act, RSO 1990, c. D.17)

PROJECT **Moroun Pumping Scheme Improvements**
(Geographic Township of Gosfield South)
Town of Kingsville, County of Essex
Project No. D21-118

June 21, 2024

N.J. Peralta Engineering Ltd.
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Report Included:

- Details of the environmental approvals and biological consultation
- Design rationale and details for flood-proofing measures
- Modified and re-established working corridors for the new dyke
- Established updated pump operation levels
- Future maintenance provisions & Updated Maintenance Schedules
- Provisions for the abandonment (Section 19) of the existing dyke
- Estimated Cost (Construction & Engineering) → ~ $690,000

Dewatering & Fish Salvage

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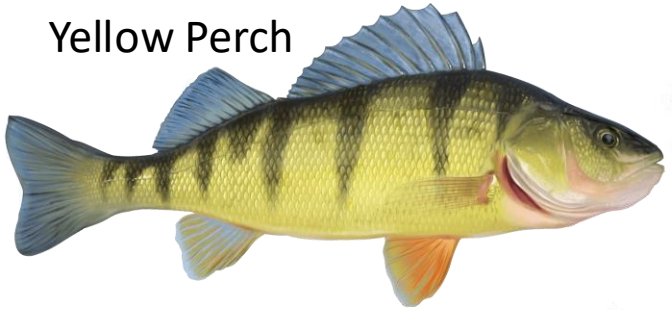
Wildlife Encountered

Freshwater Mussels



Yellow Perch

Madtom

Construction – The Plug

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Construction – Stripping Topsoil

Construction – Test Pits

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Construction – Test Pits

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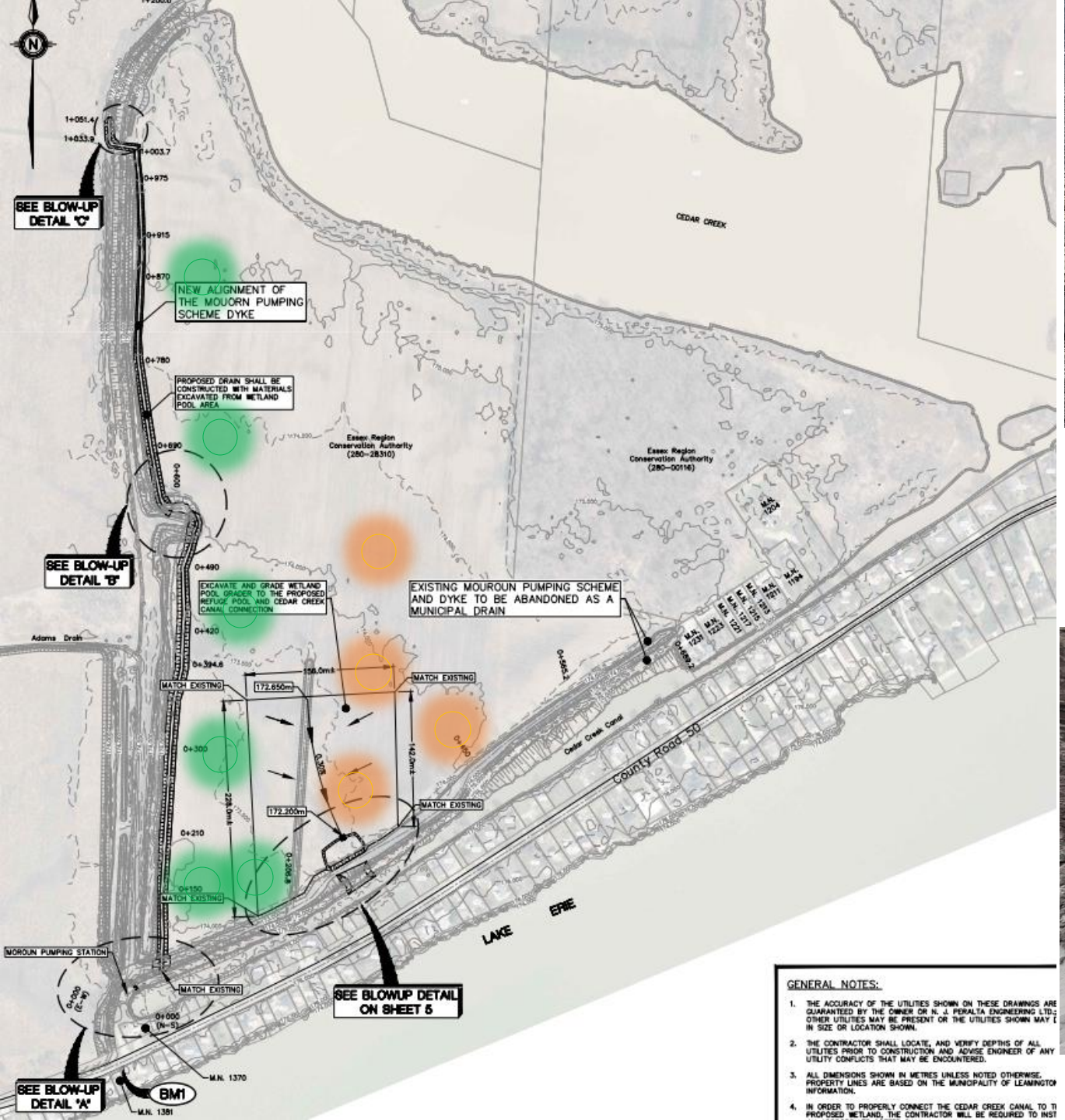

- Test Pit with Silty Clay Soil

- Test Pit with Mixed Soil

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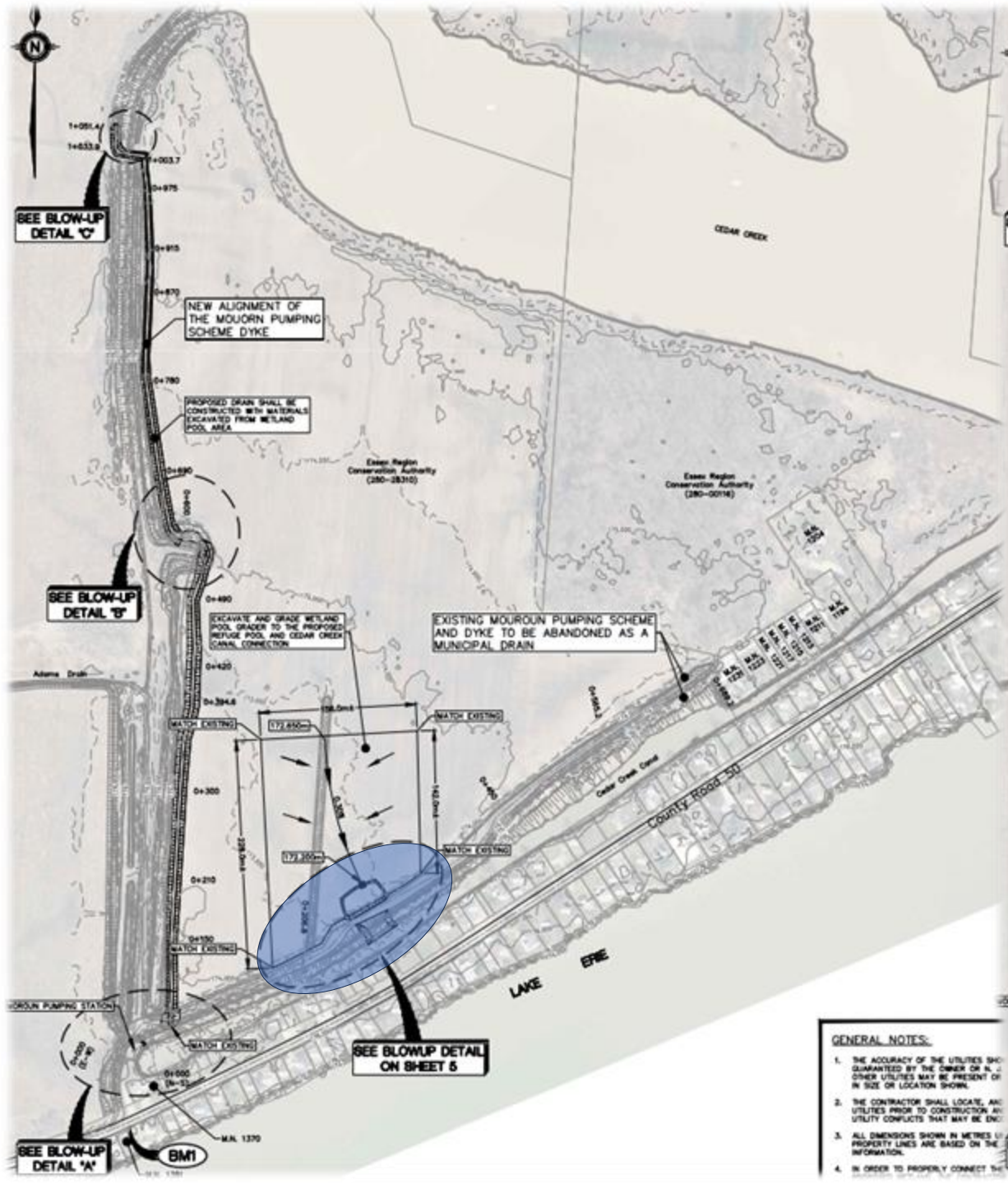

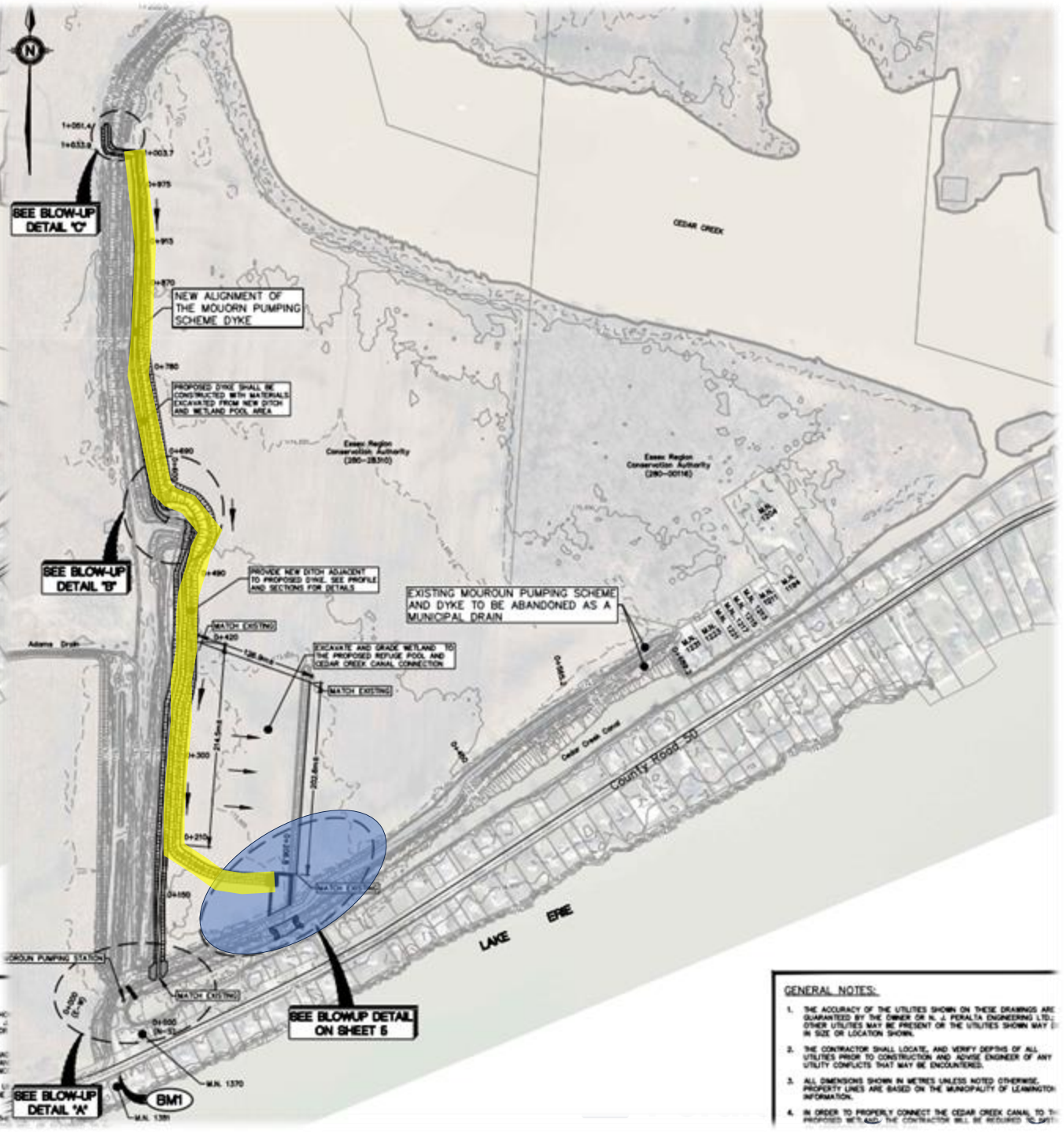

GENERAL NOTES:

1. THE ACCURACY OF THE UTILITIES SHOWN ON THESE DRAWINGS ARE GUARANTEED BY THE OWNER OR N. J. PERALTA ENGINEERING LTD.; OTHER UTILITIES MAY BE PRESENT OR THE UTILITIES SHOWN MAY BE IN SIZE OR LOCATION SHOWN.
2. THE CONTRACTOR SHALL LOCATE, AND VERIFY DEPTHS OF ALL UTILITIES PRIOR TO CONSTRUCTION AND ADVISE ENGINEER OF ANY UTILITY CONFLICTS THAT MAY BE ENCOUNTERED.
3. ALL DIMENSIONS SHOWN IN METRES UNLESS NOTED OTHERWISE. PROPERTY LINES ARE BASED ON THE MUNICIPALITY OF LEAMINGTON INFORMATION.
4. IN ORDER TO PROPERLY CONNECT THE CEDAR CREEK CANAL TO THE PROPOSED WETLAND, THE CONTRACTOR WILL BE REQUIRED TO DIVERT

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Lessons Learned

1. The Drainage Act Can Be a Tool for Environmental Restoration
2. Stakeholder Communication Is Critical
3. Use Historical Information to Help Predict Future Outcomes
4. Soil Conditions Can Be Unpredictable
5. Flexibility in Design Is Crucial
6. Public Support Is Strengthened by Transparency

Land Drainage Conference 2025

Questions?

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Thank you!