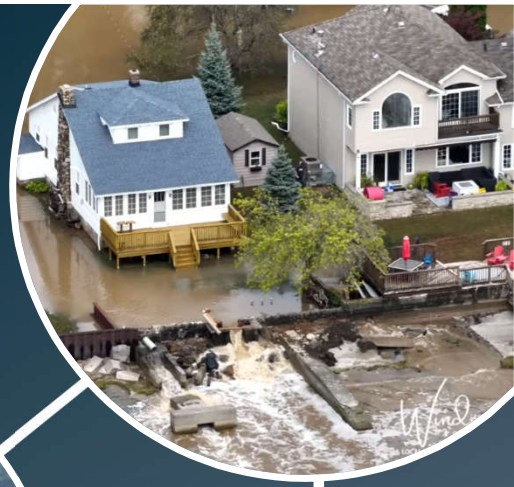
Living Through a 1:100 Year Flood Event

Ontario Drainage Conference
LICO – January 2026



Lindsay Dean
Drainage Superintendent
Town of Essex

James Bryant P.Eng.
Director, Watershed Management Services
Essex Region Conservation Authority

Presentation Outline

ABOUT US

- Where are we located?
- Watershed Characteristics
- Flood Forecasting & Warning Program

STORM HISTORY

- Storm Details & Parallels
- Harrow 1989
- August 2023
- September 2025

ACTIONS (during)

- Communication
- Response
- Data Collection

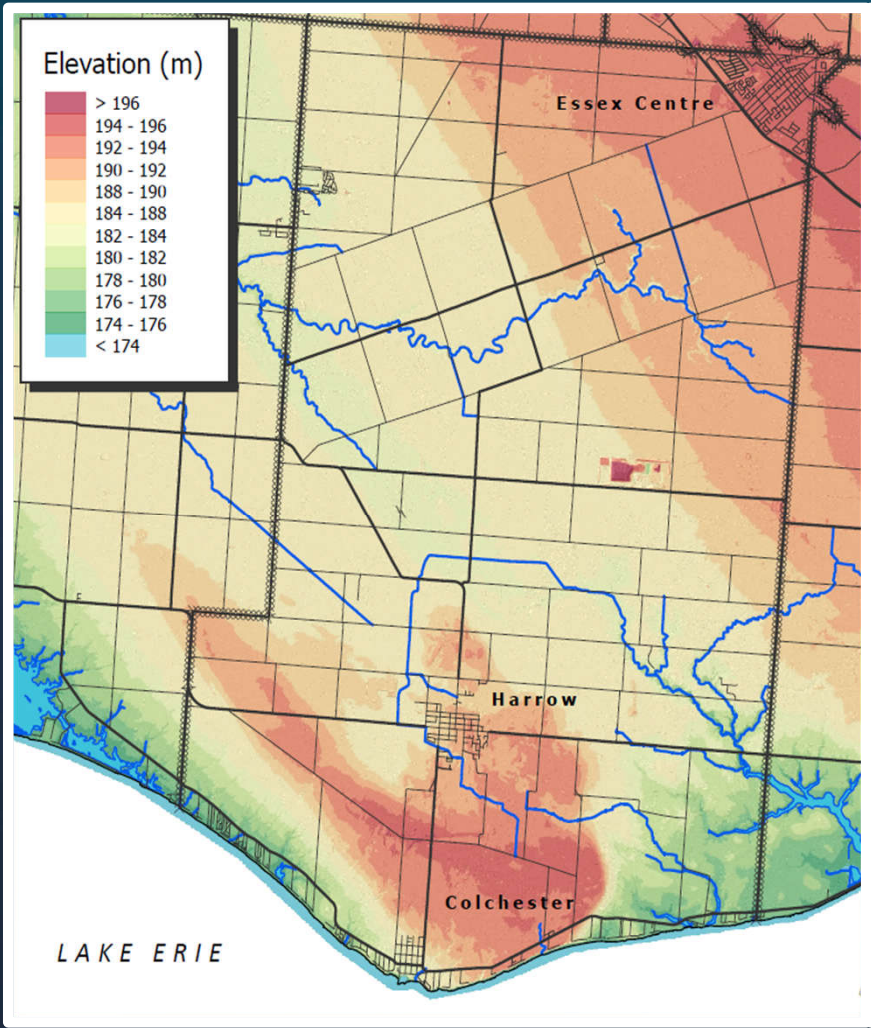
ACTIONS (after)

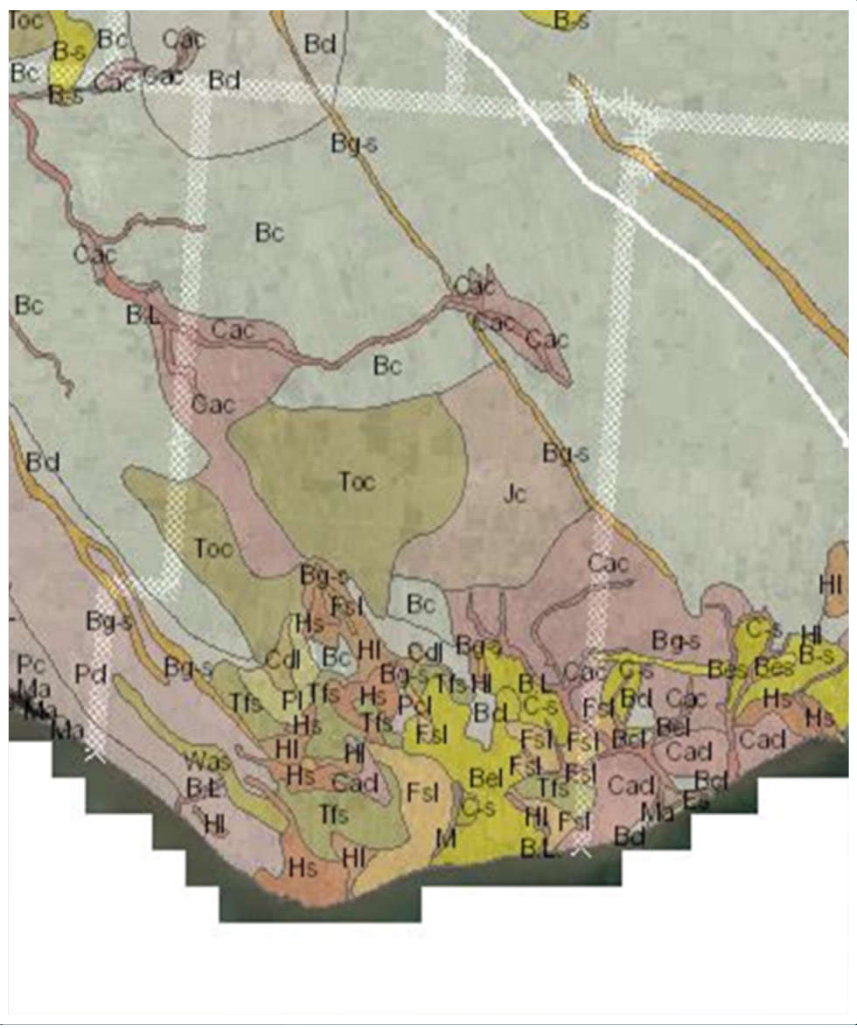
- Flood Mapping
- Structure Impact Assessment
- DRAO Program
- Lessons Learned

WHERE ARE WE LOCATED?

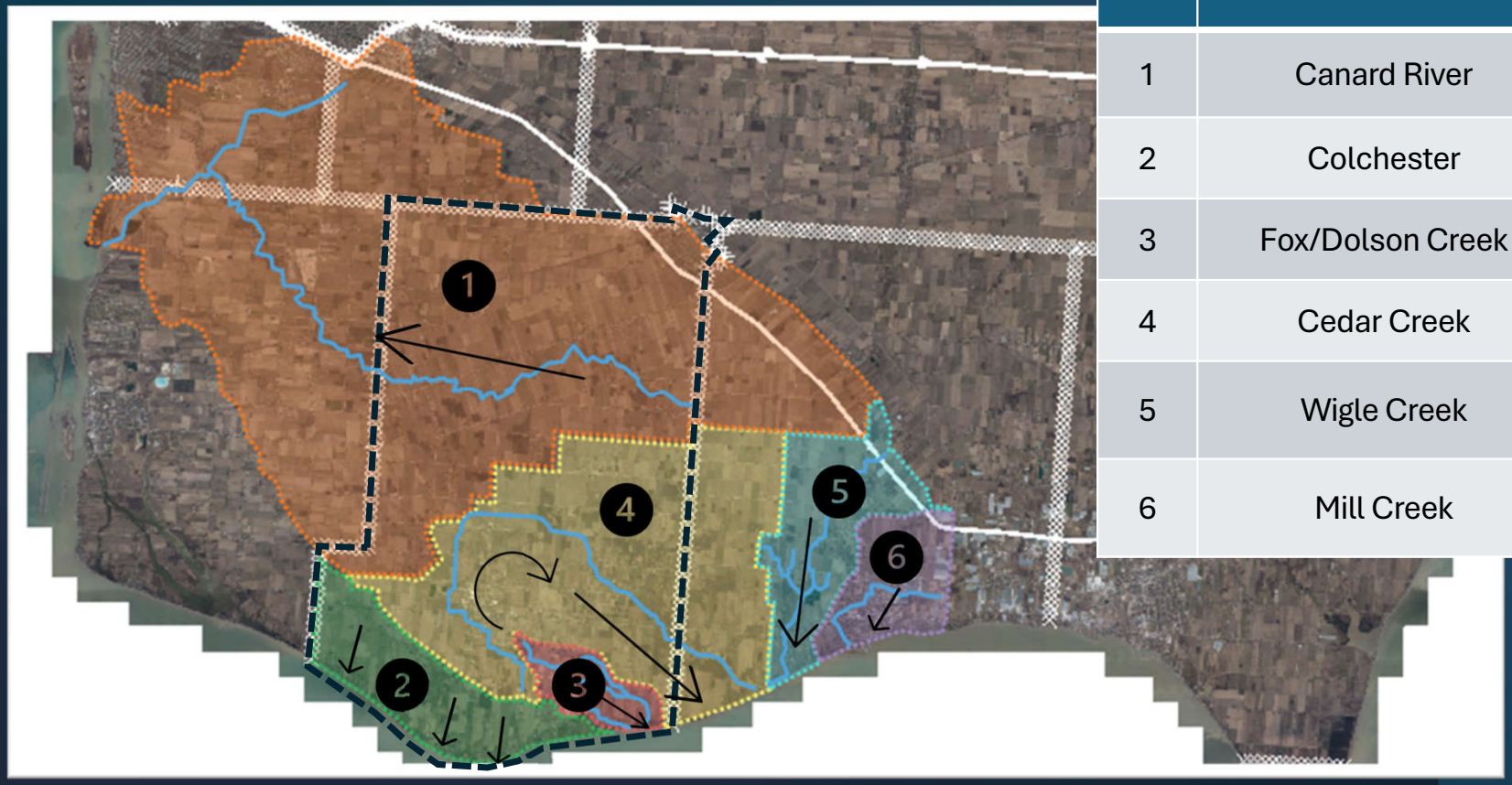
Town of Essex Watershed Characteristics

- Generally flat topography
- Lacks major river
- Relies on natural and constructed channels for drainage
- Soil is a mixture of poor draining clay soils and sandy loams in the south





Town of Essex Watershed Characteristics (Cont'd)



ID	Watershed	Approx. Drainage Area (Sq. Km)
1	Canard River	342.76
2	Colchester	35.46
3	Fox/Dolson Creek	12.12
4	Cedar Creek	128.04
5	Wigle Creek	35.30
6	Mill Creek	21.62

Flood Forecasting & Warning (FFW) Program

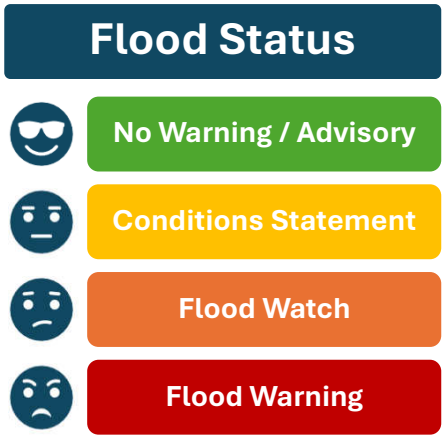
FFW Mandatory P&S – S. 2(2) Ontario Regulation 686/21

Mandatory Service

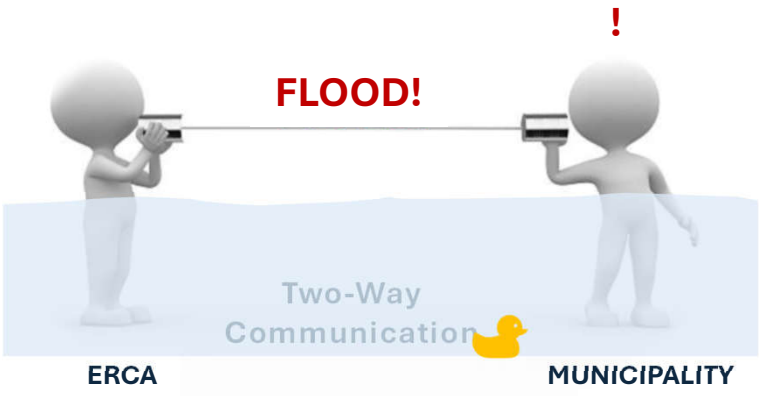
1. Maintain information on surface water hydrology.
2. Develop a FFW Operating and flood contingency procedures.
3. Maintain stream gauge network as part of Prov-Fed hydrometric network and, where advisable, local stream flow gauges.
4. Monitor weather, climate, and watershed conditions w/ local, provincial, and federal data sources
5. Analyze local surface water hydrology conditions related to forecasting flood potential, risk, and impacts.
6. Communicate through messaging to inform partners of flood potential or actual impacts of flood events in a timely manner.
7. Provide ongoing communications to facilitate emergency and flood operations during a flood event; and post event documentation.

Flood Advisories / Notifications

- Administers Flood Advisory Program on behalf of the Province of Ontario
- ERCA works with local Flood Coordinators as part of the Flood Advisory Program. Communication between ERCA and municipalities is maintained during a flood event (i.e., current and forecasted conditions, advice regarding rising/receding water levels, etc.)

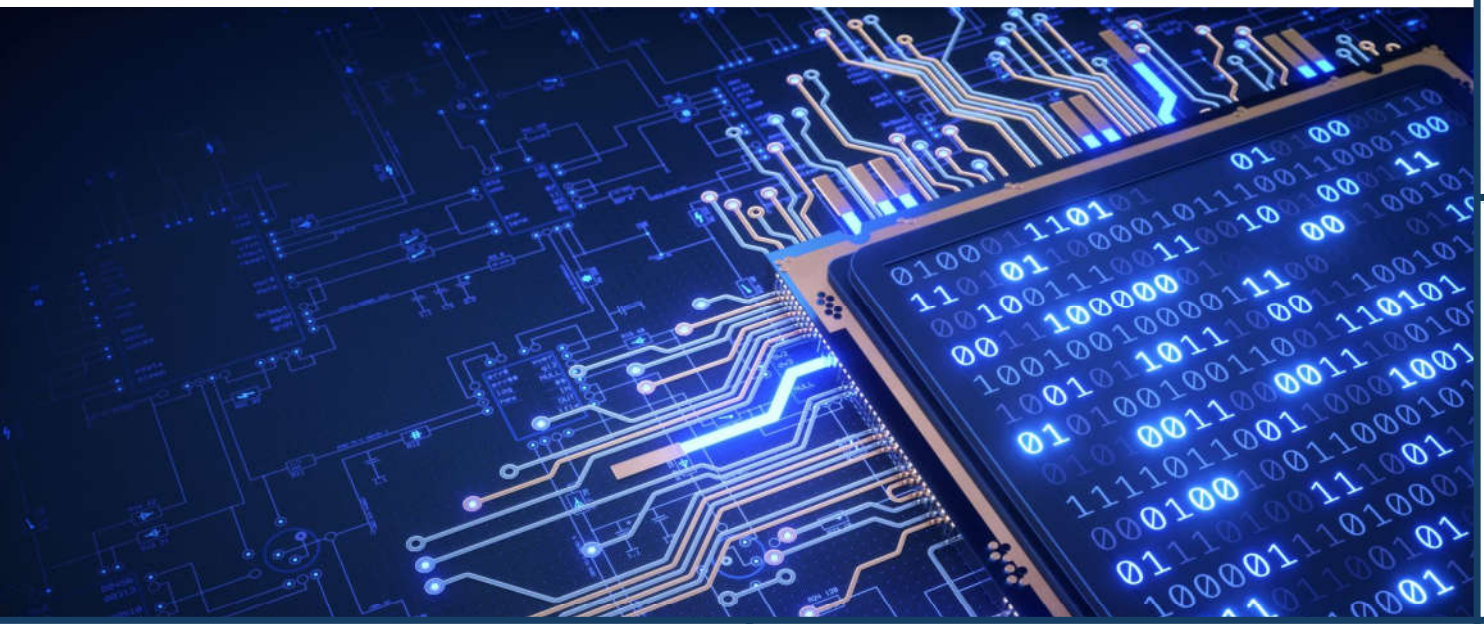


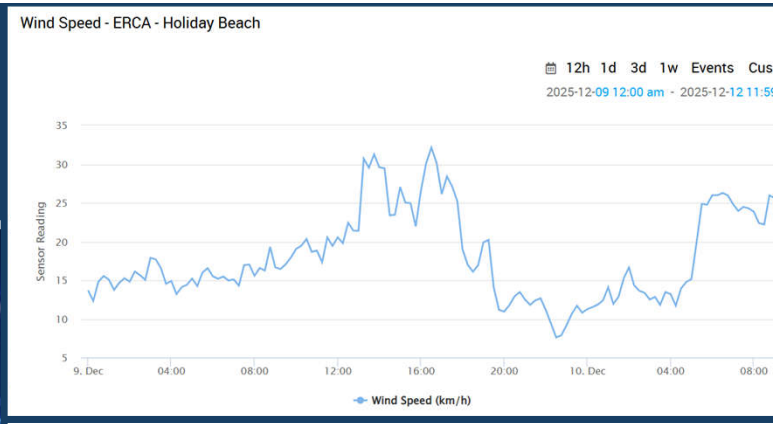
Credit: WFAA

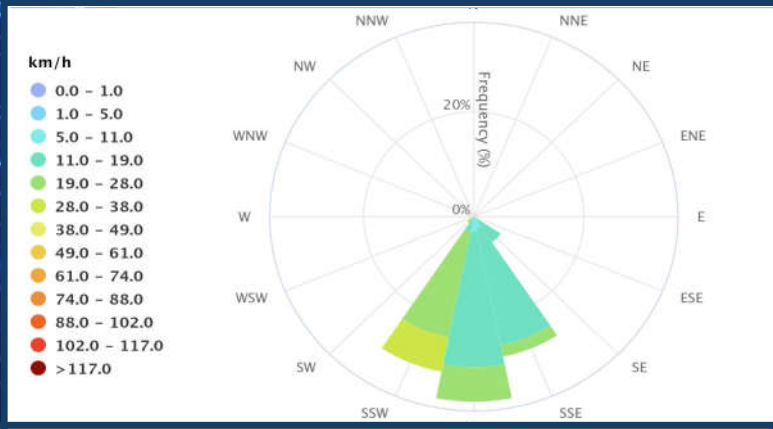


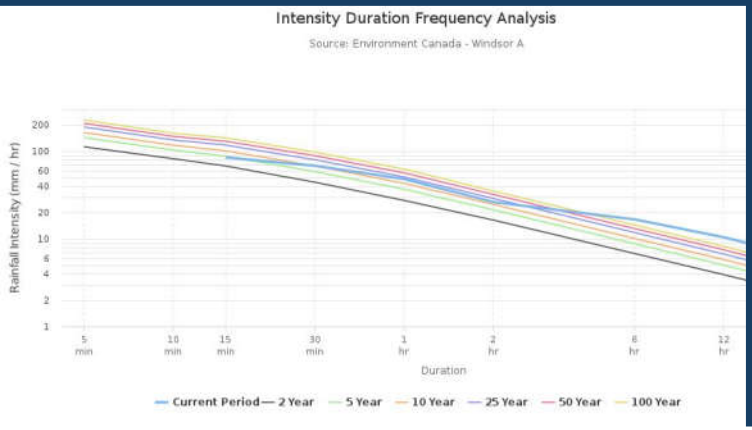
Telemetry: Climate Stations

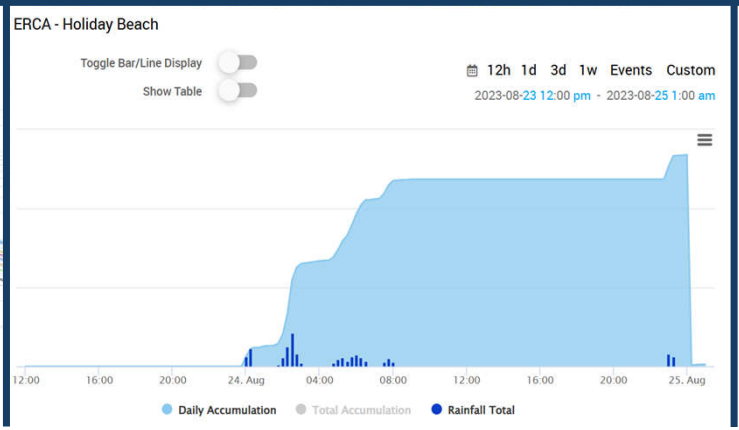
Telemetry: Data Portal

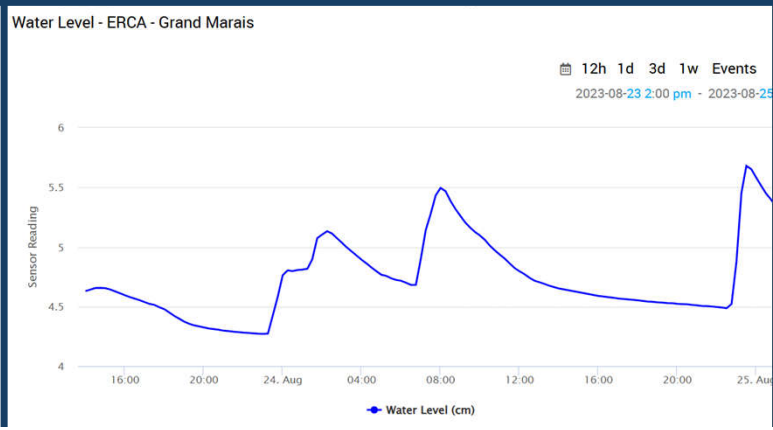


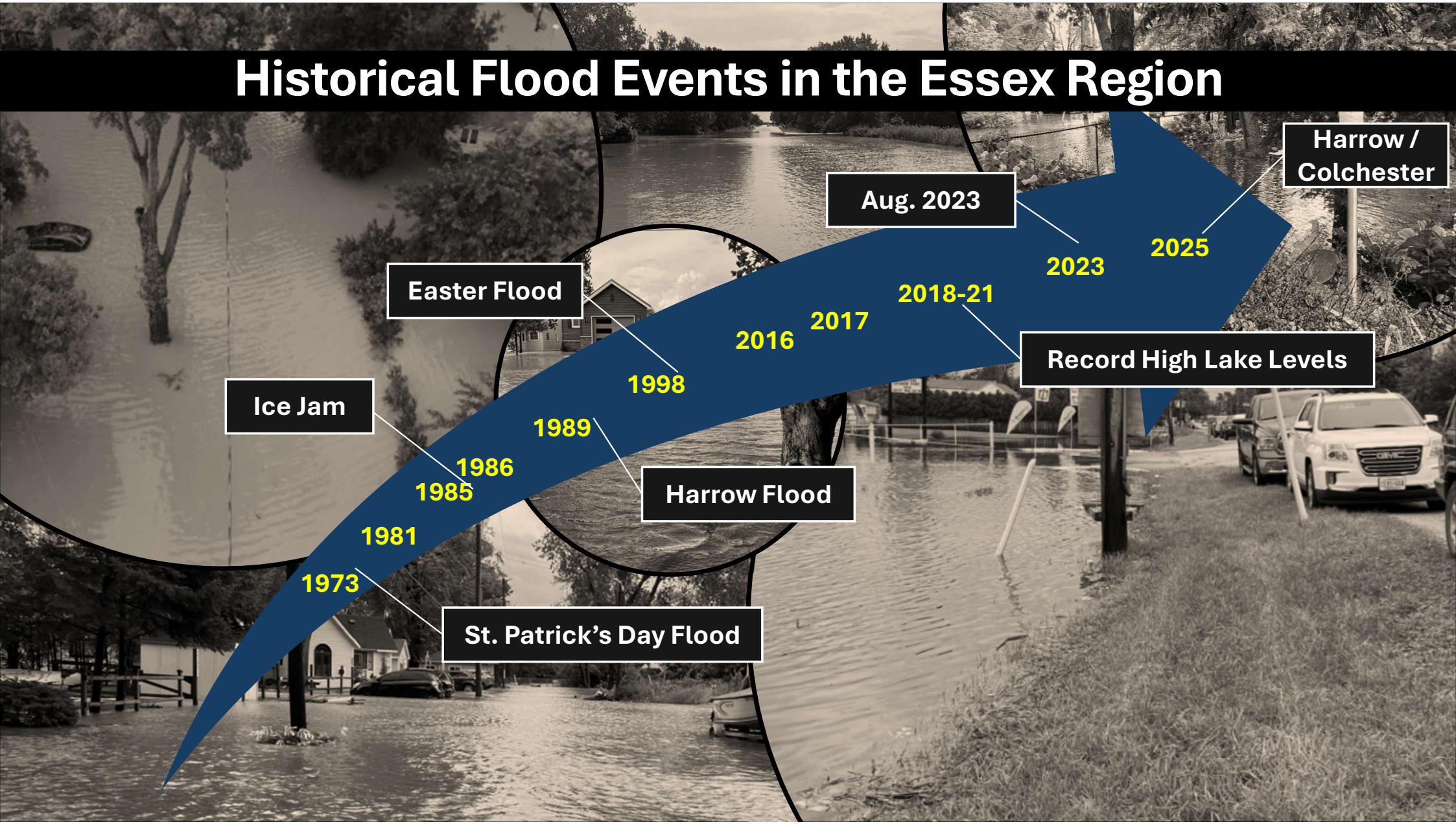


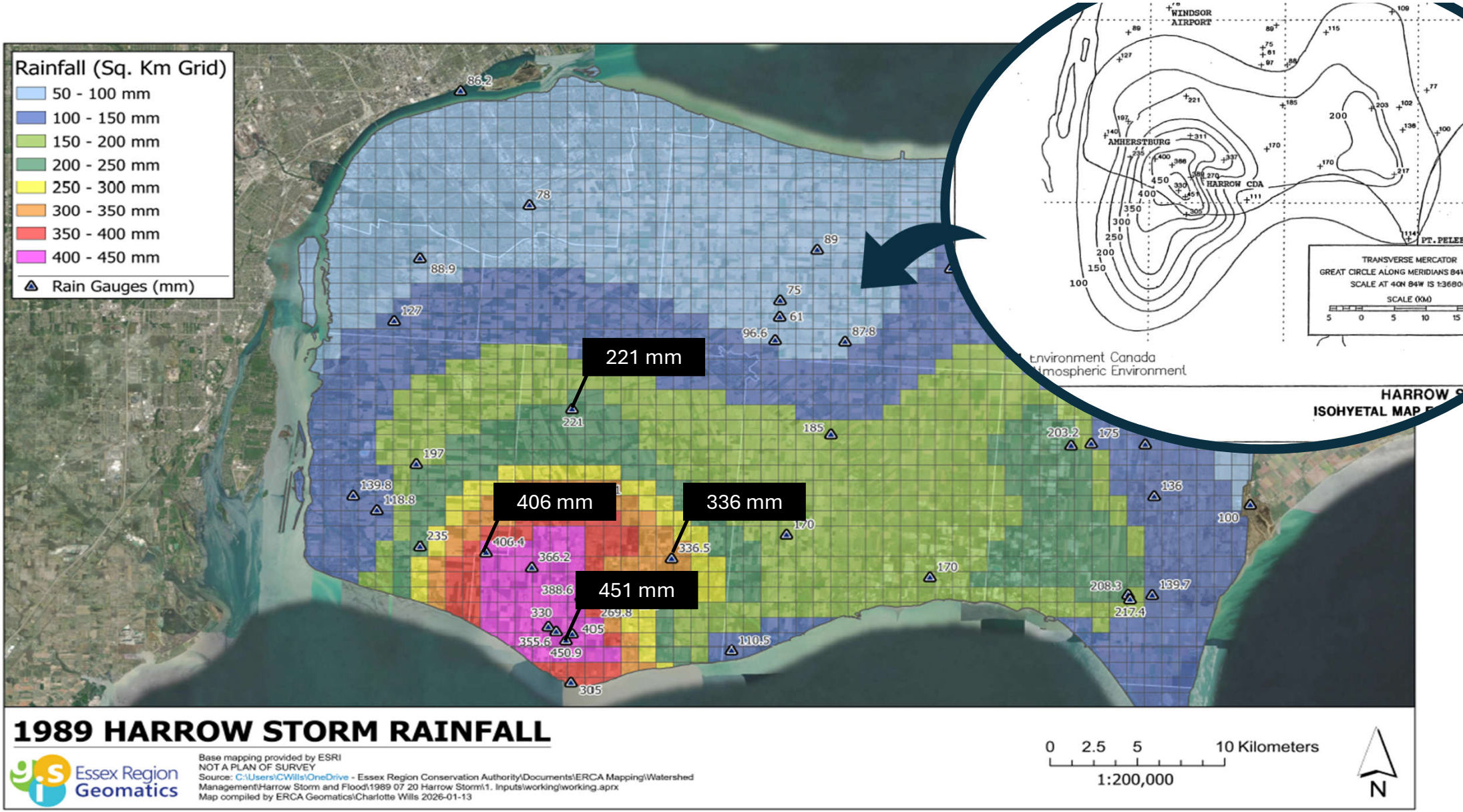




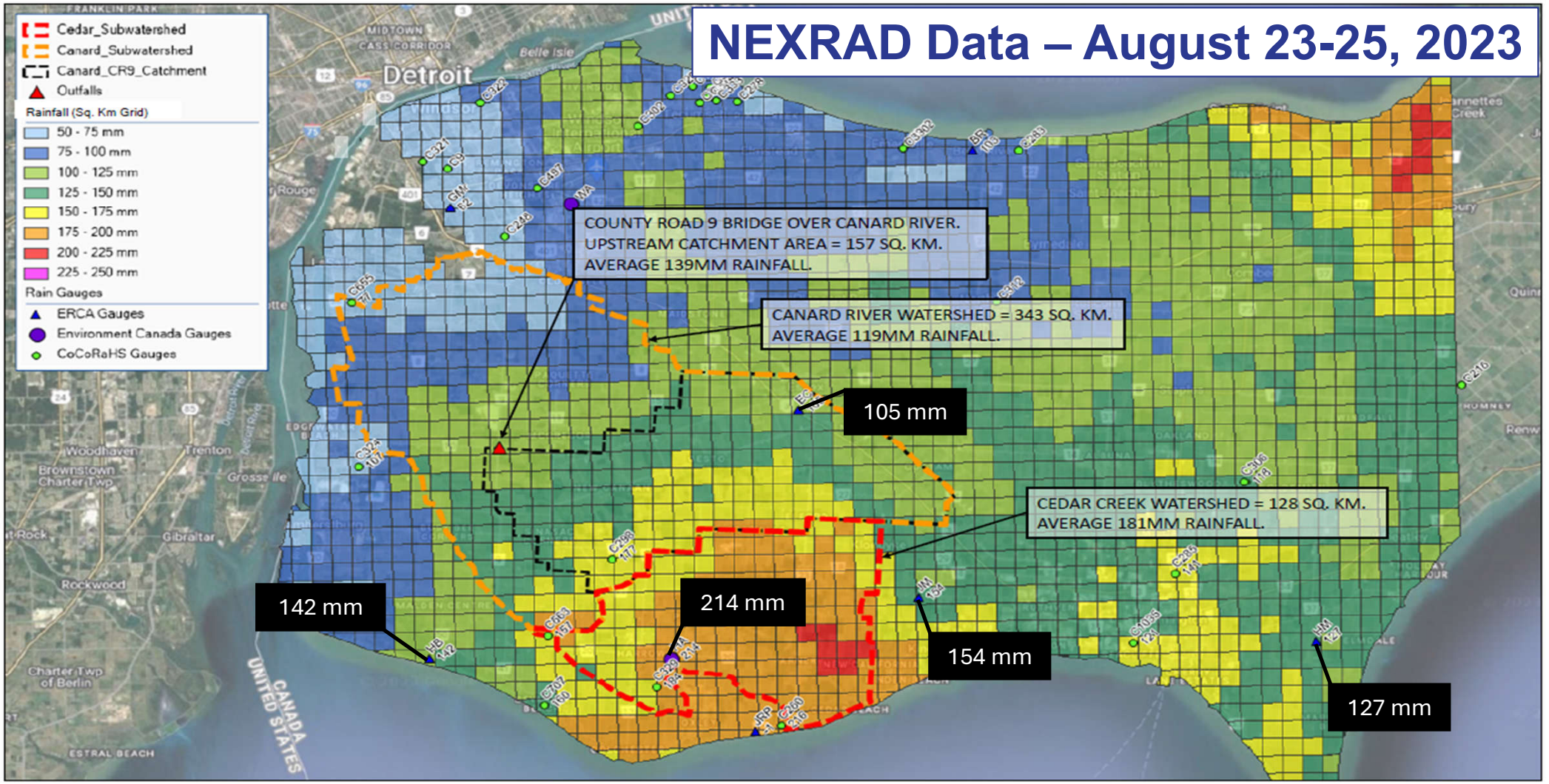





Historical Flood Events in the Essex Region
Harrow / Colchester
Aug. 2023
2025
2023
2018-21
2017
2016
Easter Flood
Record High Lake Levels
1998
Ice Jam
1989
1986
1985
Harrow Flood
1981
1973
St. Patrick's Day Flood


Rainfall (Sq. Km Grid)
50 - 100 mm
100 - 150 mm
150 - 200 mm
200 - 250 mm
250 - 300 mm
300 - 350 mm
350 - 400 mm
400 - 450 mm
Rain Gauges (mm)
221 mm
406 mm
336 mm
451 mm
WINDSOR AIRPORT
AMHERSTBURG
HARROW CDA
PT. PELEE
TRANSVERSE MERCATOR
Environment Canada
ISOHYETAL MAP
1989 HARROW STORM RAINFALL
Essex Region Geomatics
Base mapping provided by ESRI
NOT A PLAN OF SURVEY
Source: C:\Users\CWills\OneDrive - Essex Region Conservation Authority\Documents\ERCA Mapping\Watershed Management\Harrow Storm and Flood\1989 07 20 Harrow Storm\1. Inputs\working\working.aprx
Map compiled by ERCA Geomatics\Charlotte Wills 2026-01-13
0 2.5 5 10 Kilometers
1:200,000
N

NEXRAD Data – August 23-25, 2023



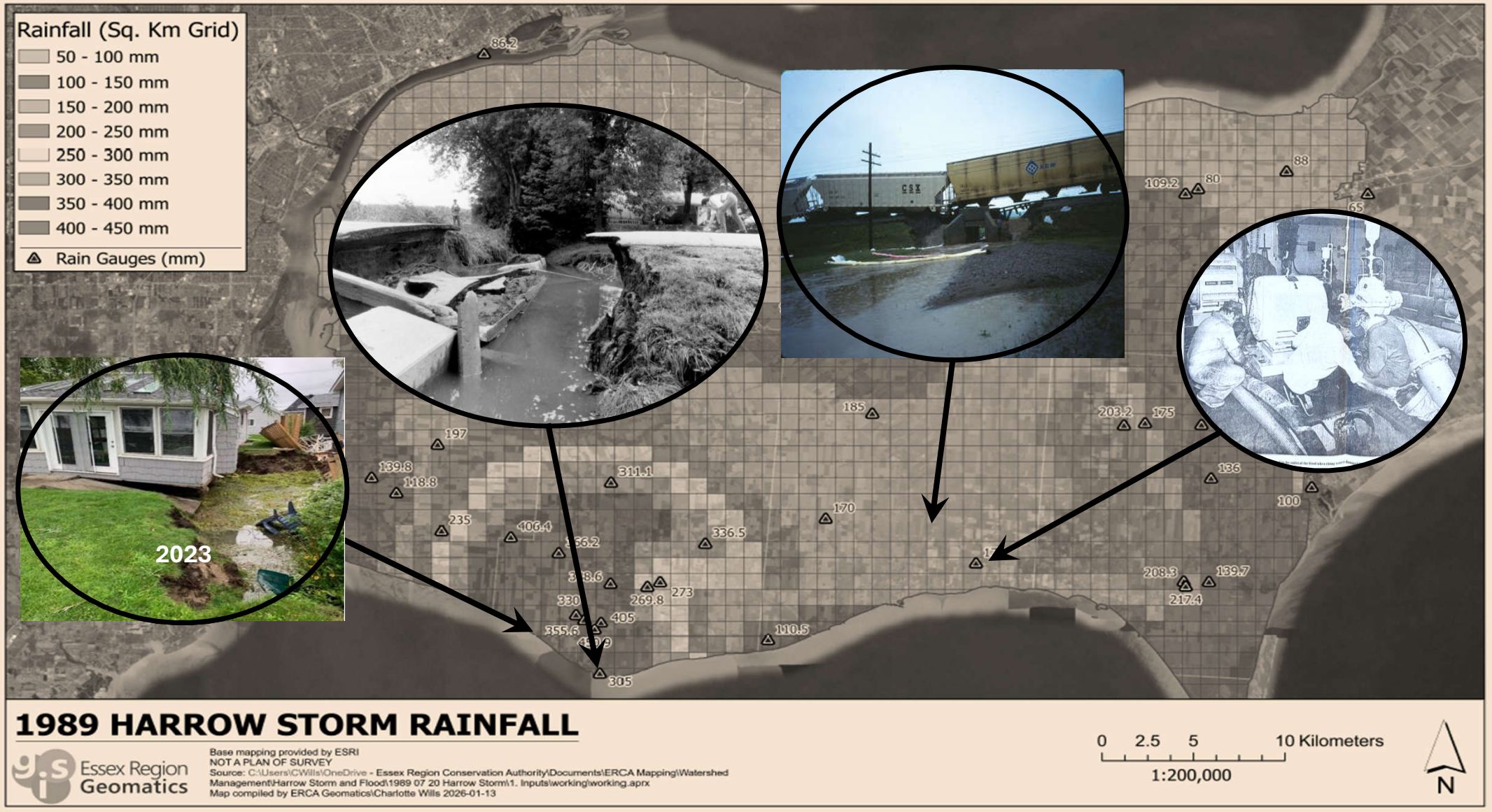
Landmark Engineers Inc.

PRELIMINARY – FOR DISCUSSION PURPOSES ONLY

Title: 37 HOUR RAINFALL – 23 AUG 12PM TO 25 AUG 1AM	Date: AUG 2023	FIGURE 1
Project: AUGUST 2023 RAINFALL	Scale: NTS	
	Project No.	

Harrow 1989 Major Flood Impacts

- Train Derailment
- Drinking WTP pumps knocked out leaving 45,000 people without water
- Water heater pilot light ignites spilled gasoline causing explosion
- 9 metre (~ 30 ft) bridge/road washout
- Cottage washed out to Lake Erie



1989 HARROW STORM RAINFALL

Essex Region Geomatics

Base mapping provided by ESRI
NOT A PLAN OF SURVEY
Source: C:\Users\CWills\OneDrive - Essex Region Conservation Authority\Documents\ERCA Mapping\Watershed Management\Harrow Storm and Flood\1989 07 20 Harrow Storm\1. Inputs\working\working.aprx
Map compiled by ERCA Geomatics\Charlotte Wills 2026-01-13

0 2.5 5 10 Kilometers
1:200,000

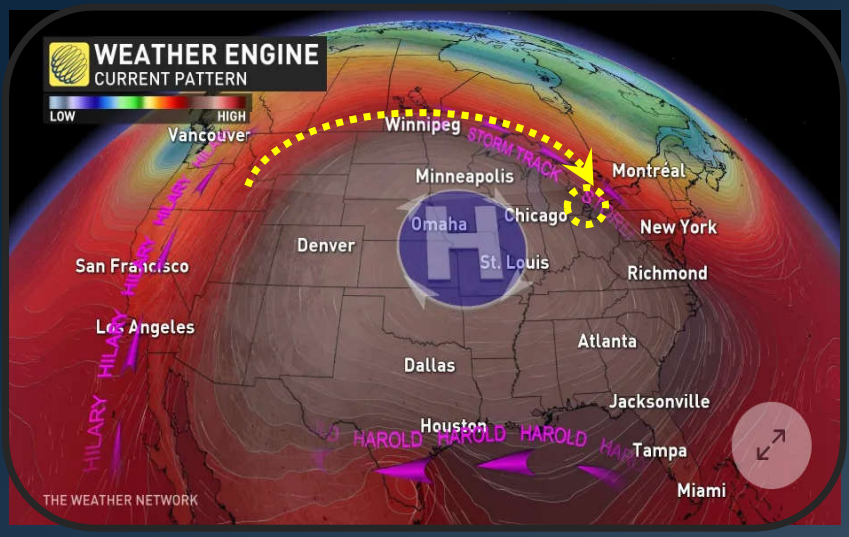
N

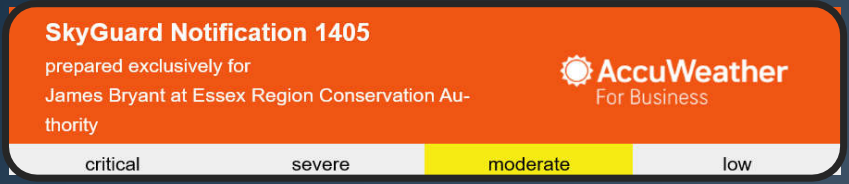
HARROW ESSEX FLOODING SEPT 24 2025. While a lot of the flood waters in the town of Harrow have receded this afternoon, residents along the shoreline are still dealin...

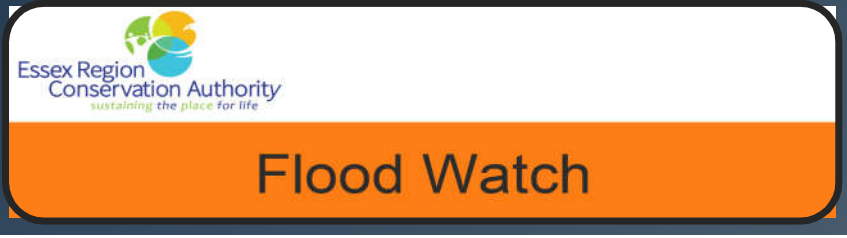
Unplanned Overland Flow Routes and Access Limitations

CR 50 Reoccurring Road Washouts

Forecast and Early Warning (August 2023)

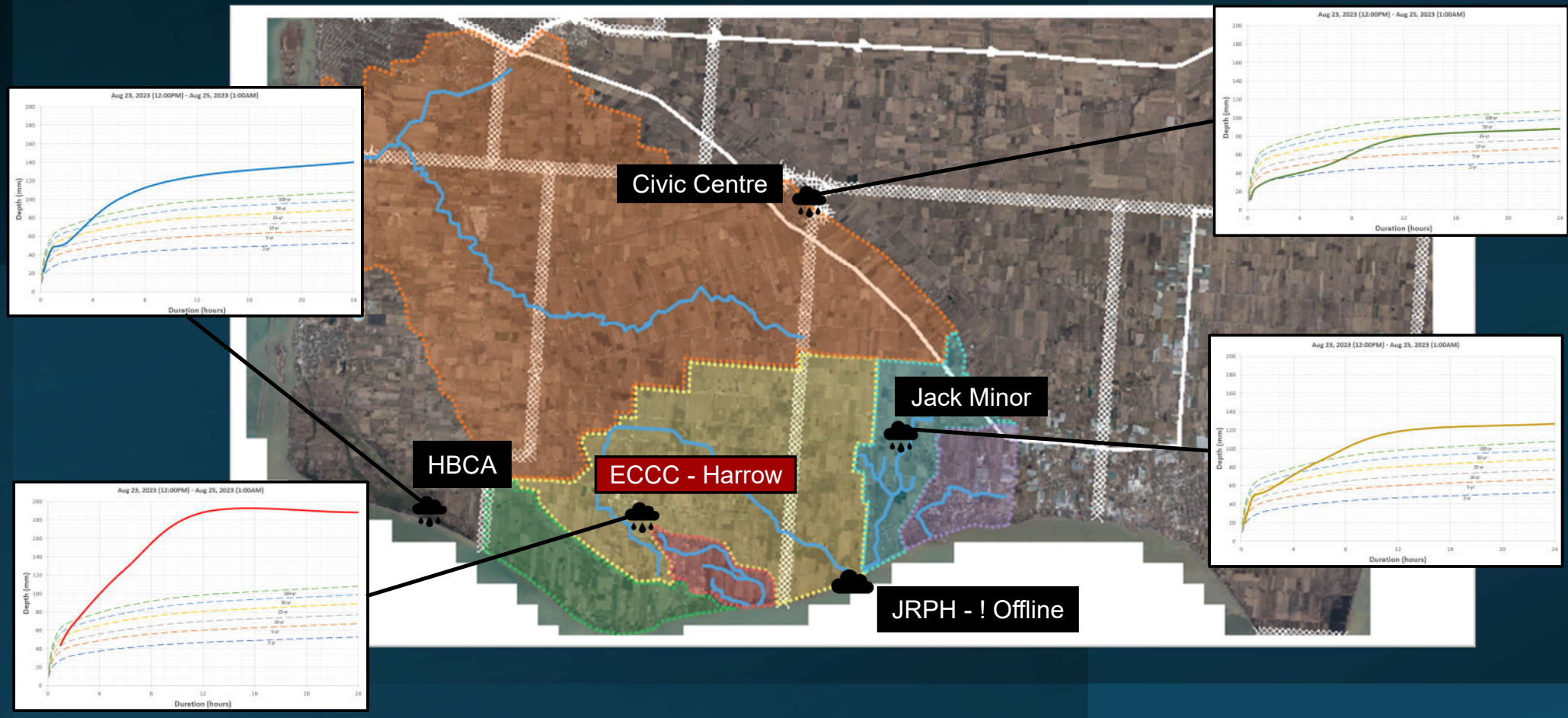






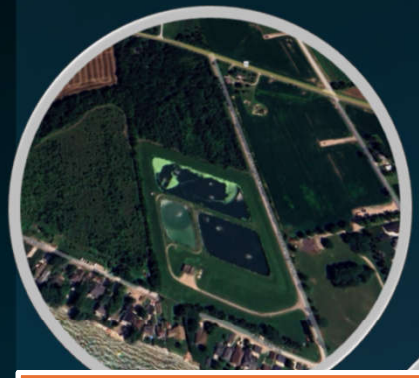
- Significant moisture pushed easterly, originating from Hurricane Hilary
- AccuWeather Skyguard Notification was for moderate rainfall/storm on Aug. 23, 2023
- Pre-wetting rain of 25-35 mm on Aug. 23, 2023
- **ERCA issued Flood Watch based on predicted rainfall and wet ground conditions.**
- **Advisory upgraded to a Flood Warning**

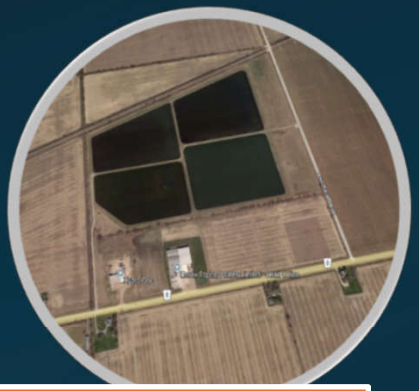
Data @ ERCA Climate Stations (Aug 23-25, 2023)

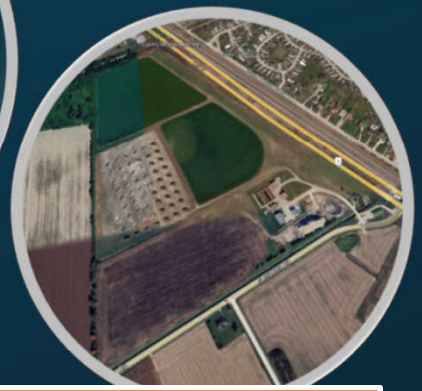


Select Road Closures (Aug. 23-25, 2023)

Other Environmental Impacts (Aug. 23-25, 2023)







8 x Daily Average

4 x Daily Average

- 14 x Daily Average Flows
- bypassed over 7,000 m³ of raw sewage

9 x Daily Average

Field Data Collection & Post-Processing

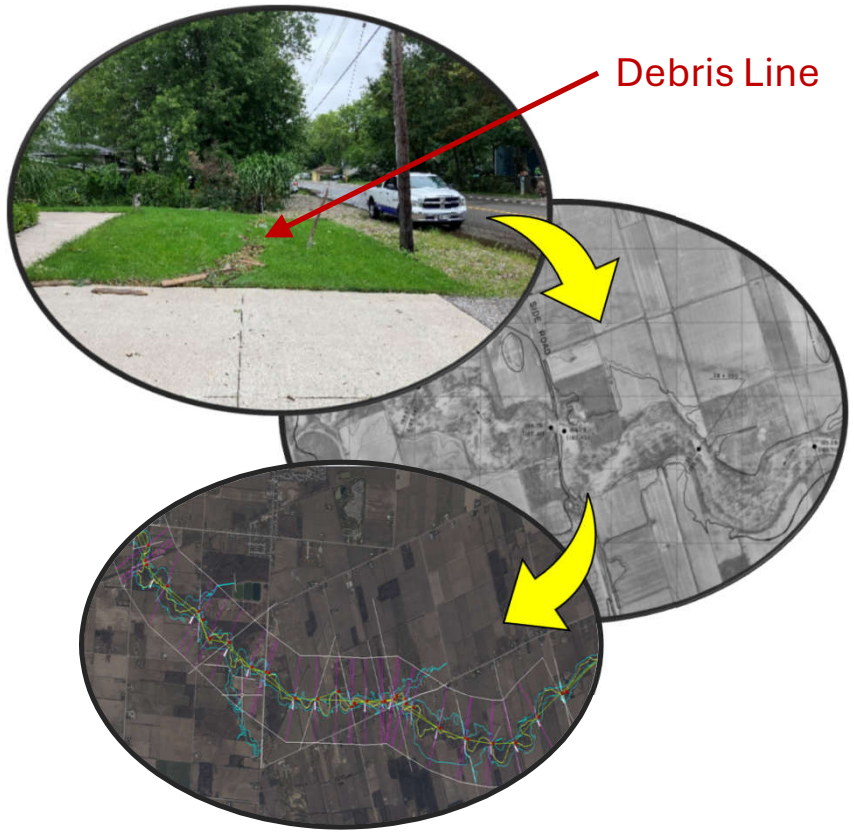
Use the measured observed water levels and identify where these fall at the specific points along the channel (O1 and O2).

Identify the modelled water levels corresponding to these points (M1 and M2).

Calculate adjustment factor, which is the ratio of the differences between observed and modelled water levels to create an adjustment factor (A).

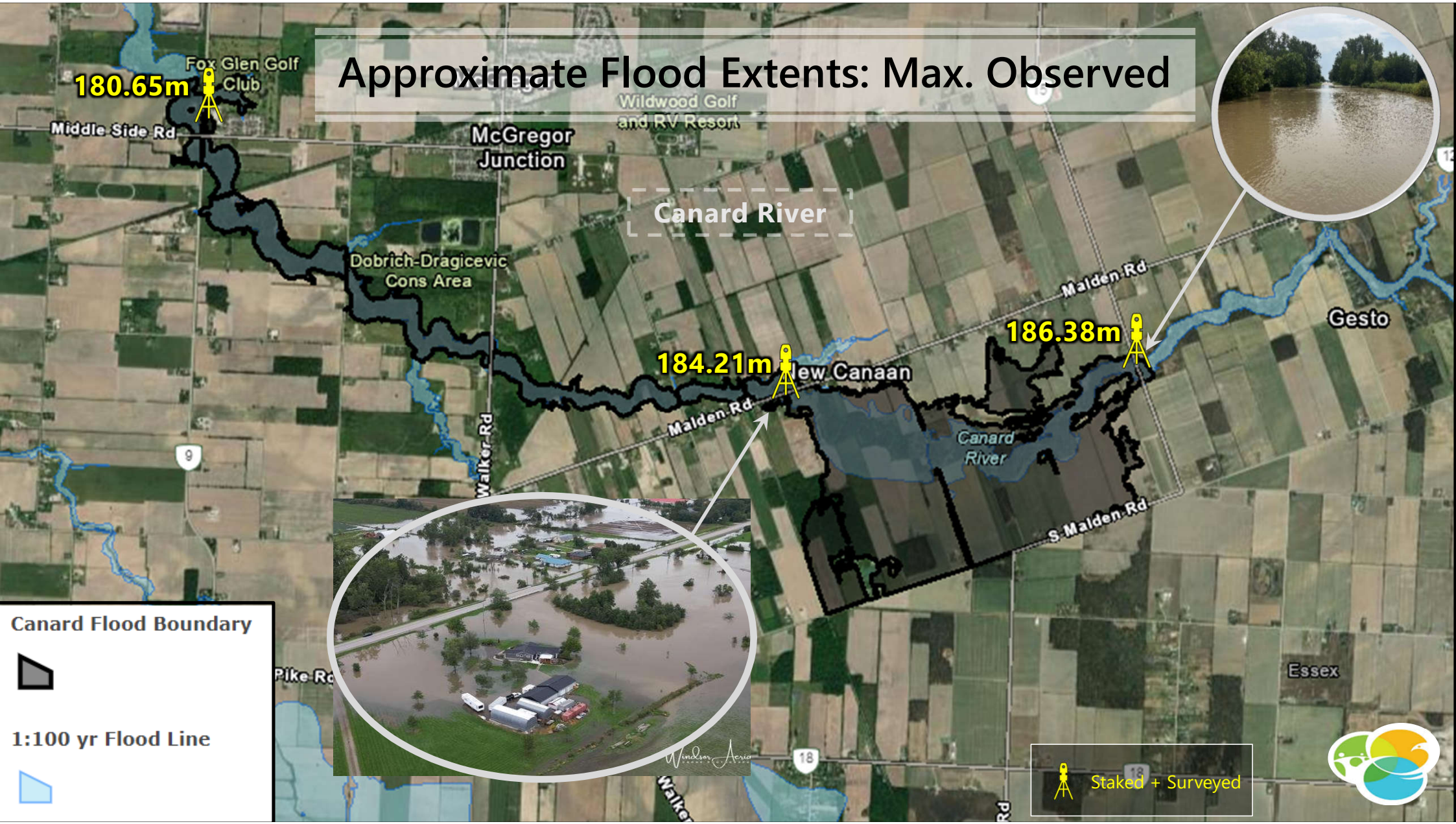
Interpolate observed water levels by using the modelled data differences and adjustment factors to estimate flood levels between measured points and establish a rough hydraulic gradient.

$$Interpolated\ Water\ Levels = O_{n+1} = O_n + (M_{n+1} - M_n) \times A$$

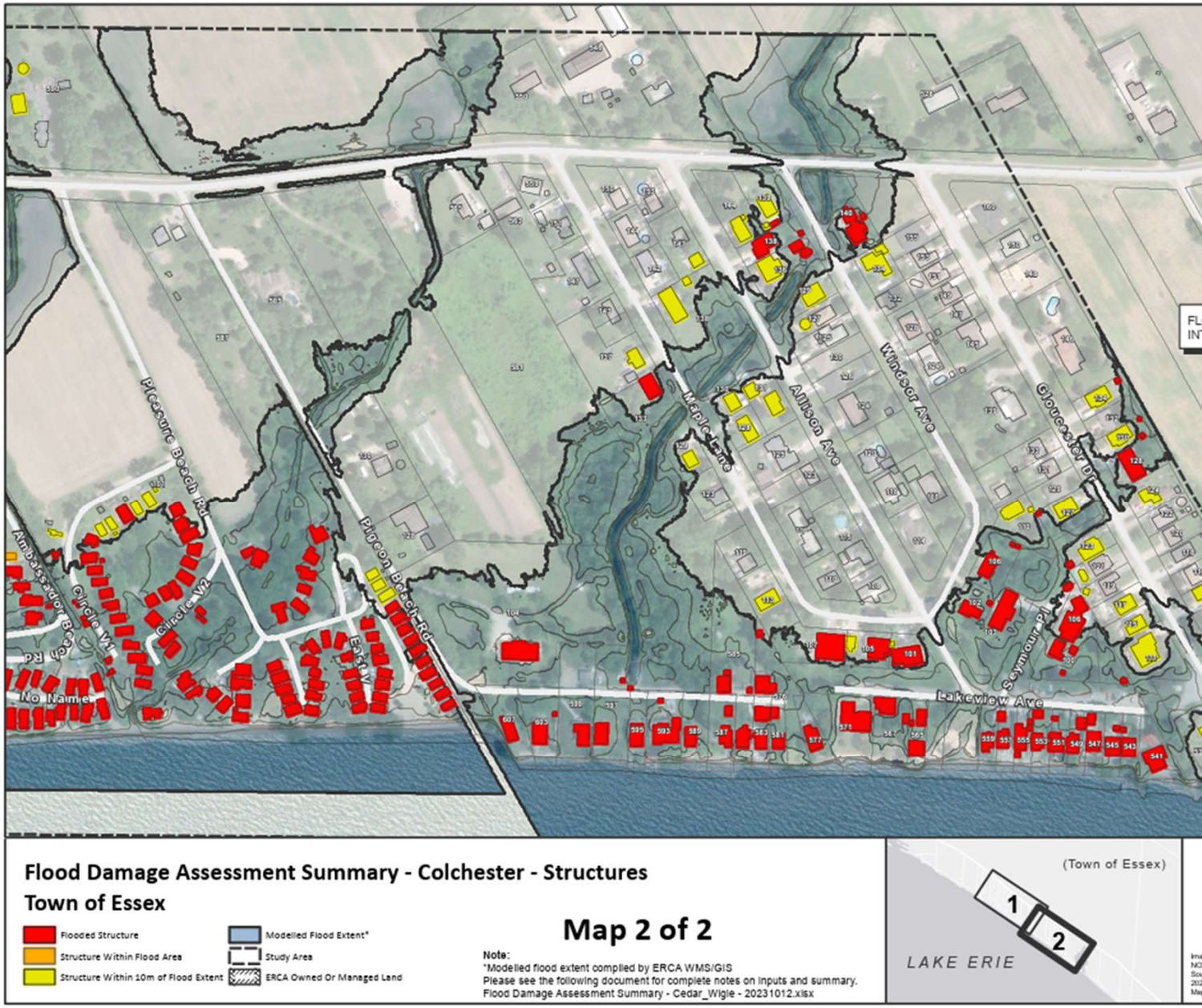


$$A = \frac{Observed\ Difference}{Modelled\ Difference}$$

Approximate Flood Extents: Max. Observed

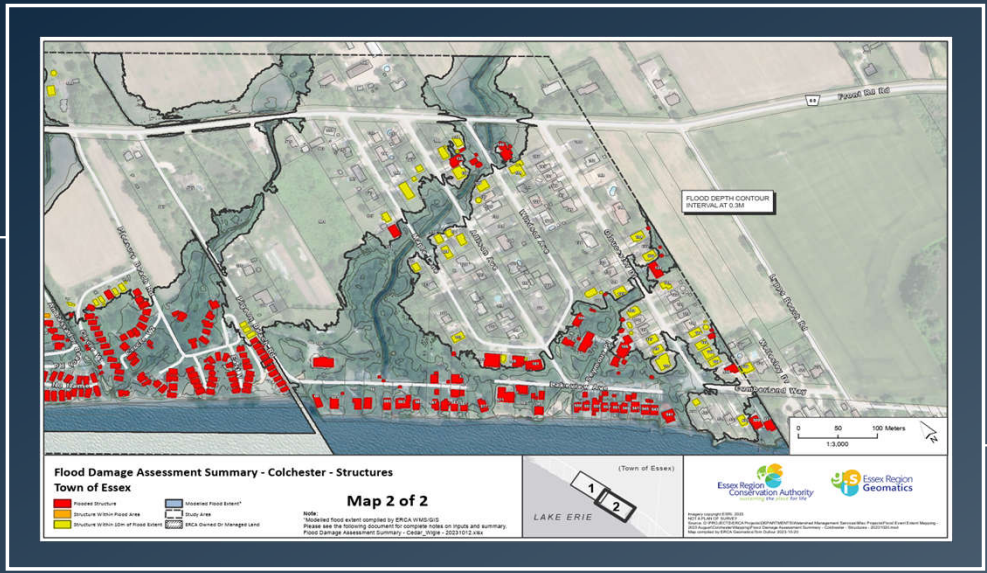


Structure Impact Assessment



DRAO Program

- Flood Impact Assessment (graphics and tabulated data of impacted structures and parcels) supported municipal applications to the Disaster Recovery Assistance for Ontarians (DRAO) Program.
- MMAH activated the following DRAO Program Areas:
  - ✓ Town of Amherstburg (entire area)
  - ✓ **Town of Essex (entire area)**
  - ✓ Town of Kingsville (partial area)
  - ✓ Municipality of Lakeshore (partial area)



DRAO – Expectations vs. Results

From MMAH/ DRAO Website	The program is not intended to replace insurance coverage. (Insurance coverage is deducted from eligible costs)
	Homeowners with > $250K in insurance coverage are not likely to be eligible under the program.
	Total $ per application may be up to $250K subject to a deductible.
	Limitations on total eligible costs for emergency expenses, household appliances, and furnishings.

Town of Essex (unofficial info.)

- **Only 22 applicants received a payment**
- **~$90,000 paid in total**
  - Avg Payment < $4,100
- **Other applicants:**
  - Waiting for payment
  - Additional documents needed for application
  - Deemed ineligible (insurance, ineligible costs, damage caused by sewer back-up)

Lessons Learned (ERCA)

Planning ≠ Preparing

ERCA "Preparedness" was tested

Essex "Preparedness" was tested

Actions to Improve Readiness:

1. Prepared 3 "Flood Kits" with wooden stakes, 4 lb. sledge, flagging tape, tape measure reel, laminated map of main roads. Two kits remain in specific vehicles and the 3rd is a spare kit.
2. Update "House Accounts" more regularly to ensure staff in the field can obtain necessary tools and equipment quickly.
3. Budget item now included for engineering and/or field support during and after an event. This can bolster field data which can support DRAO and other needs of municipalities.
4. Ensure staff are familiar with the field (know what it looks like before it floods and know where to go during a flood).
5. Engage colleagues within own CA who may have expertise and equipment that is useful to you. (e.g. WQ Stations tied into BMs to obtain flood elevation)
6. Engage with new municipal staff early to lessen the knowledge gap for everyone (damage centres, unique features within a subwatershed).

Lessons Learned (Essex)

Planning ≠ Preparing

ERCA "Preparedness" was tested

Essex "Preparedness" was tested

Actions to Improve Readiness:

1. Educate Town Council and the public about municipal drains and the Drainage Act.
a) Annual Drainage Report b) Drainage Open House

2. Emergency training arranged for operational staff

3. Modifications and reviews of pump stations and other infrastructure (e.g. alarms installed, maintenance frequency increased, etc.)

4. Subsidies increased or created:
a) Investigative Pipe Camera work
b) Backwater valve installation c) Sump pump installation

5. Observed how systems reacted during these events and modifications made where possible

6. Personal Preparedness
(e.g. access to PPE, change of clothes, waders, etc.)

Contact Information

Lindsay Dean
Drainage Superintendent
Town of Essex
Ldean@essex.ca

James Bryant, P.Eng.
Director, Watershed Management Services
Essex Region Conservation Authority
Jbryant@erca.org

Thank you