From Watch to Warning, and Everything After: Unpacking the Essex August 2023 Flood Event

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Presentation Outline

CA PROGRAMMING

Flood Forecasting & Warning (FFW) Program

WATCH

Weather Forecasts

Essex Region IDFs

WARNING

Storm Details

Response

Field Activities

EVERYTHING AFTER

Extra Field Work

Flood Mapping

Structure Impact Assessment

DRAO Program

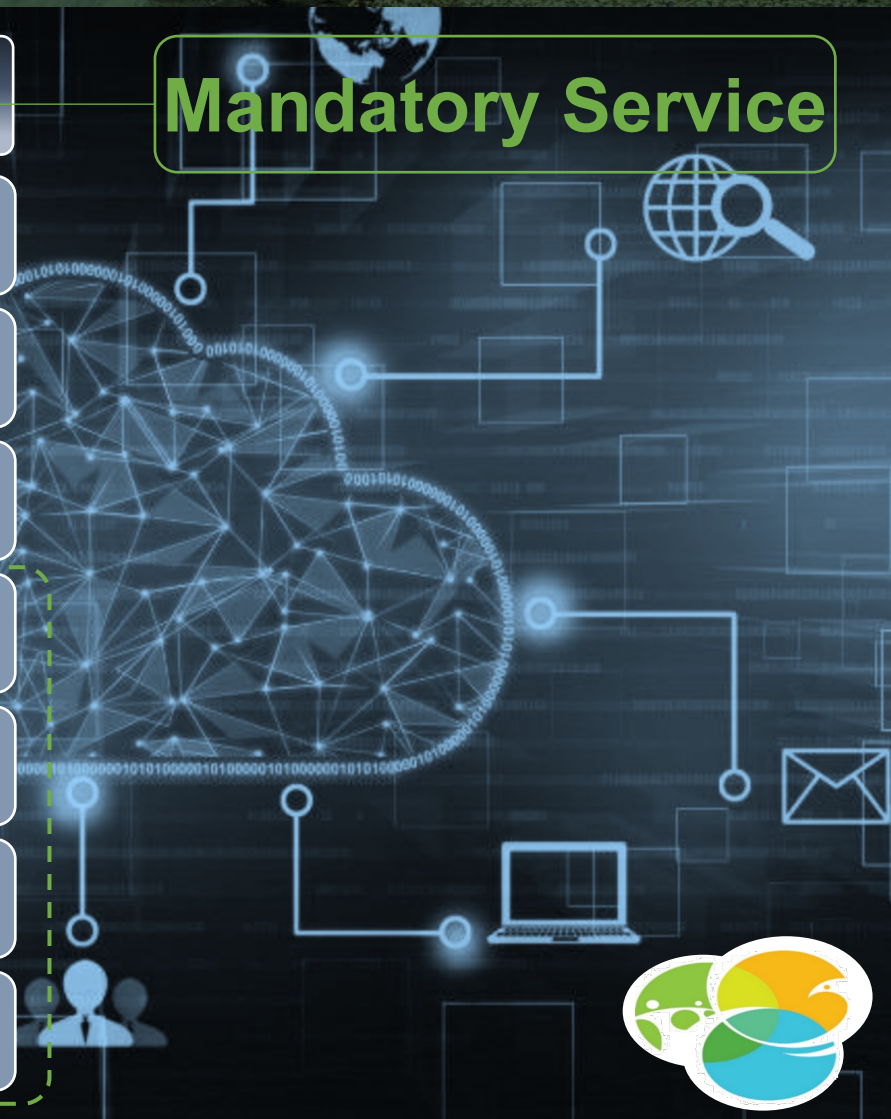
Lessons Learned

Flood Forecasting & Warning (FWW) Program

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

Mandatory Service

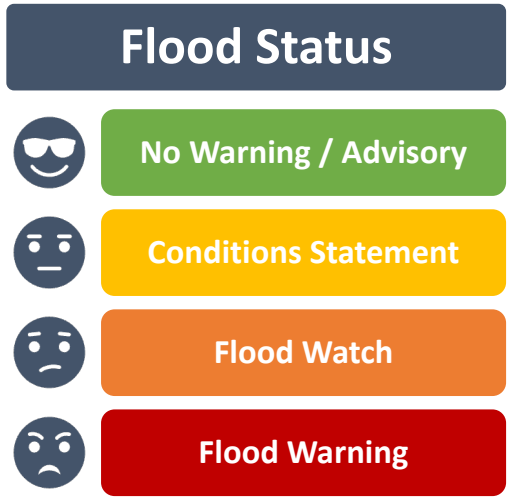
1. Maintain information on surface water hydrology.
2. Develop a FFW Operating and flood contingency procedures.
3. Maintain stream gauge network as part of Prov-Fed hydrometric network and, where advisable, local stream flow gauges.
4. Monitor weather, climate, and watershed conditions w/ local, provincial, 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.



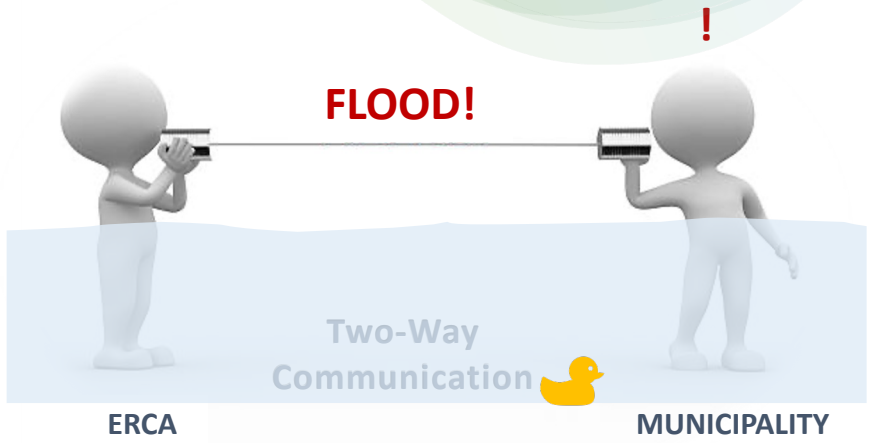
Flood Forecasting & Warning (FWW) Program

- Administers Flood Advisory Program on behalf of the Province of Ontario (Ministry of Natural Resources (MNR) & Ministry of Environment, Conservation and Parks (MECP)

- 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



Flood Forecasting & Warning (FWW) Program

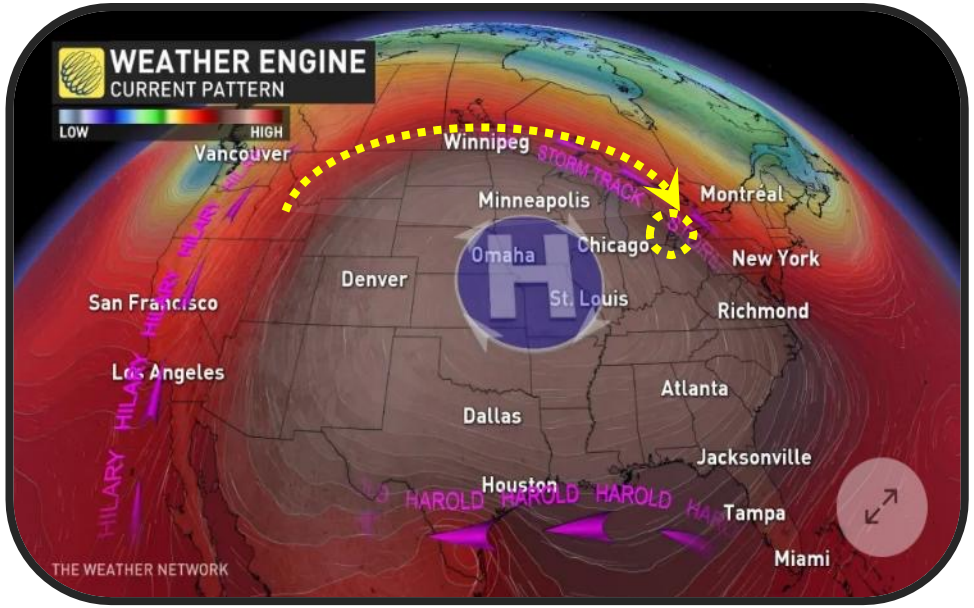
Flood Duty Officer monitors weather forecast + field conditions, and issues Flood Advisory: **Conditions Statement** **Flood Watch**

ERCA **Flood Warning** issued based on field conditions or changes in forecast (e.g., flooding is imminent or occurring)

Staff deployed in the field to monitor, document, and advise municipal flood coordinators and public works departments through ERCA Flood Duty Officer.

Administration reviews observed data and may deploy technical staff to survey and obtain level logger information in coordination with other ERCA departments.

Forecast and Early Warning



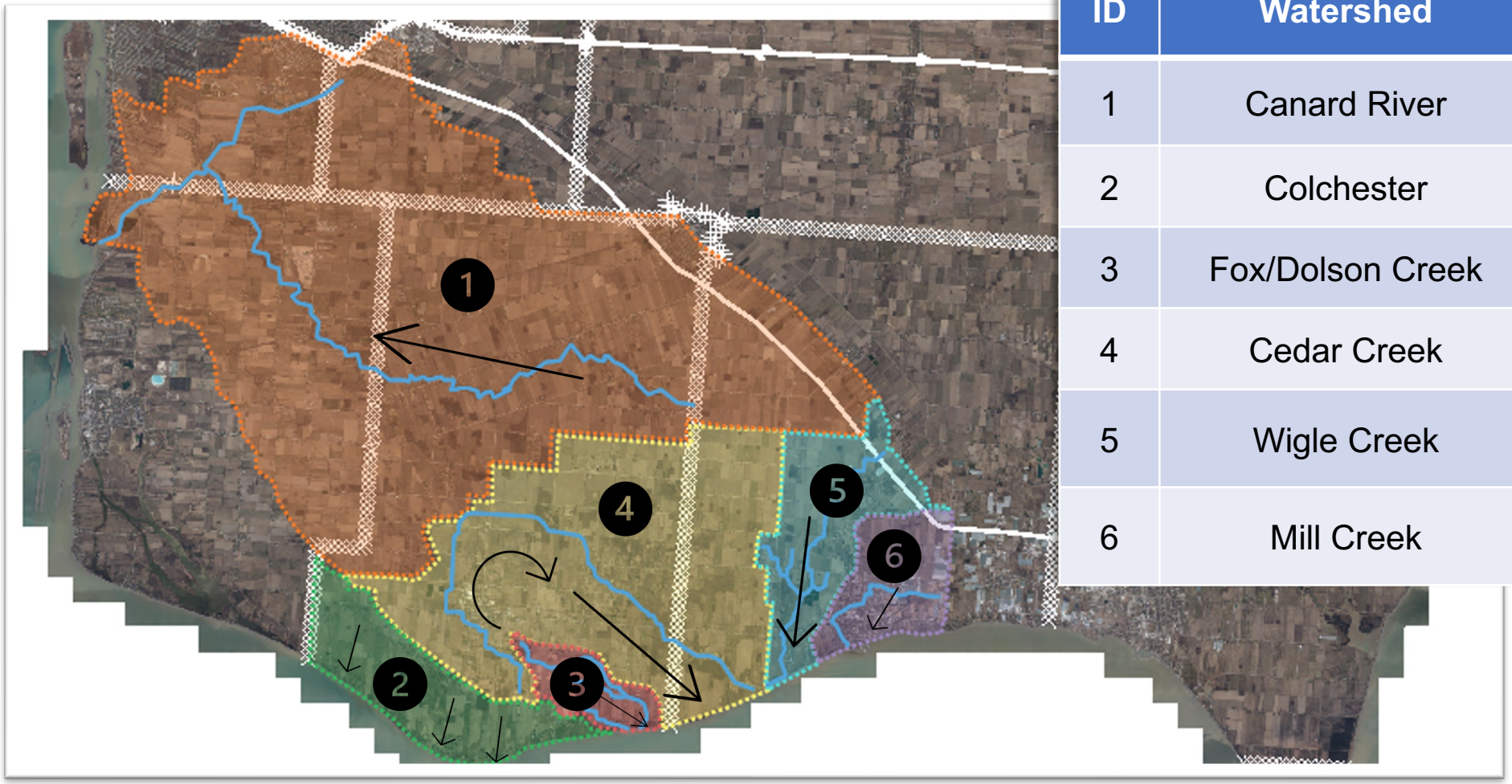
- Significant moisture pushed easterly, originating from Hurricane Hilary
- AccuWeather Skyguard Notification was for moderate rainfall/storm on Aug. 23, 2023
- Pre-wetting rain of 25-35 mm on Aug. 23, 2023
- **ERCA issued Flood Watch based on predicted rainfall and wet ground conditions.**

One-Pager Event Summary for Councillors etc.

August 23 – 25, 2023 Rainfall and Flood Event Summary

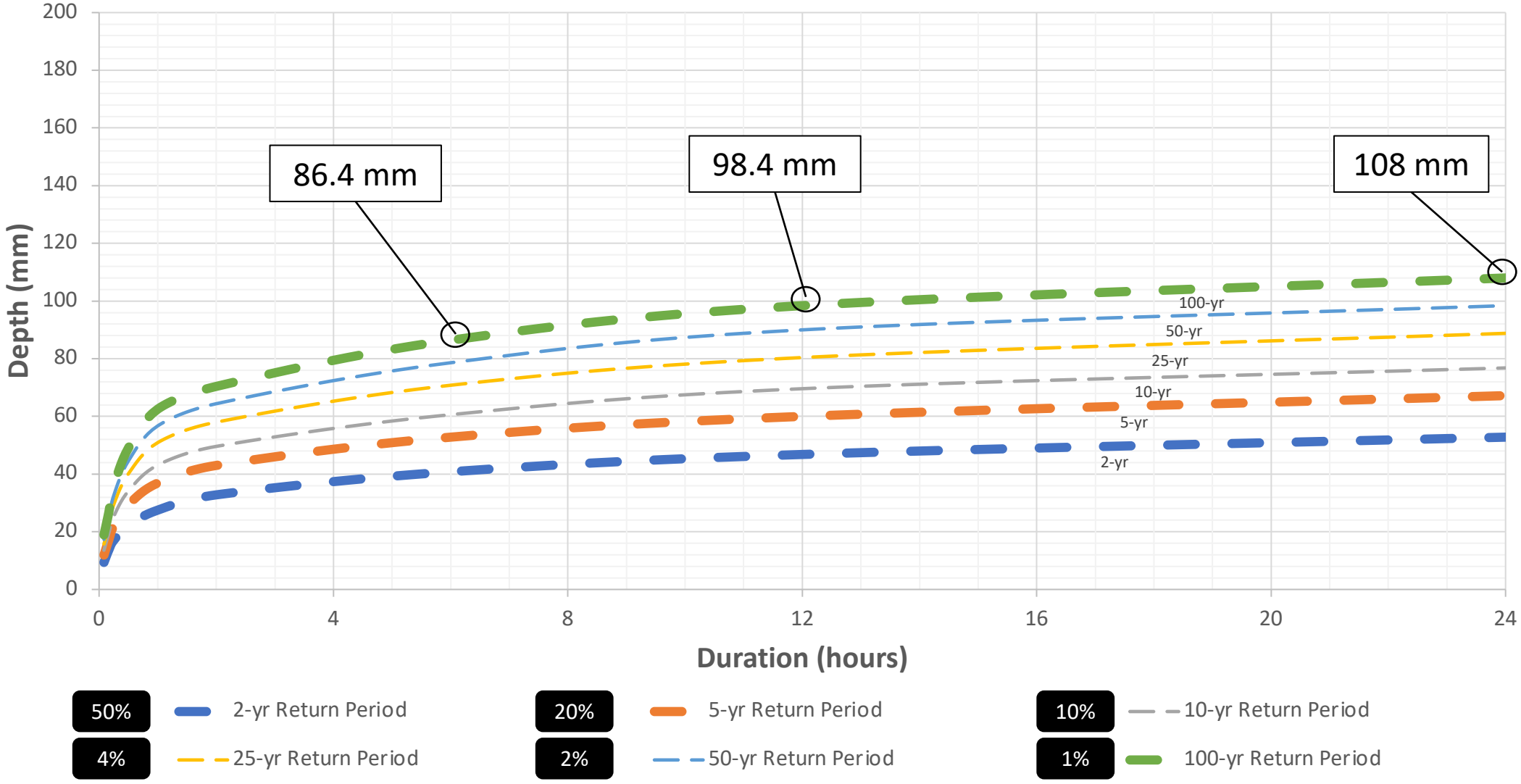
- Significant rainfall occurred over the Essex Region varying in amounts from 100mm (4 inches) to over 200mm (8 inches) over a 37-hour period.
- Storm occurred starting on August 23rd and ended by August 25th, with the most intense portion of the storm occurring overnight in the early hours of August 24th.
- Widespread flooding occurred with the most impacted areas being the southern portions of Essex County (primarily the towns of Essex and Kingsville) and the Township of Pelee.
- Road washouts occurred in some locations, with significant length of roadways closed due to water overtopping the road surface, pavement instability, and shoulders washed out.
- Significant number of homes affected by both sewer backup and overland flooding, farmland inundated, and public infrastructure stressed.

Most Impacted Watersheds in Essex County

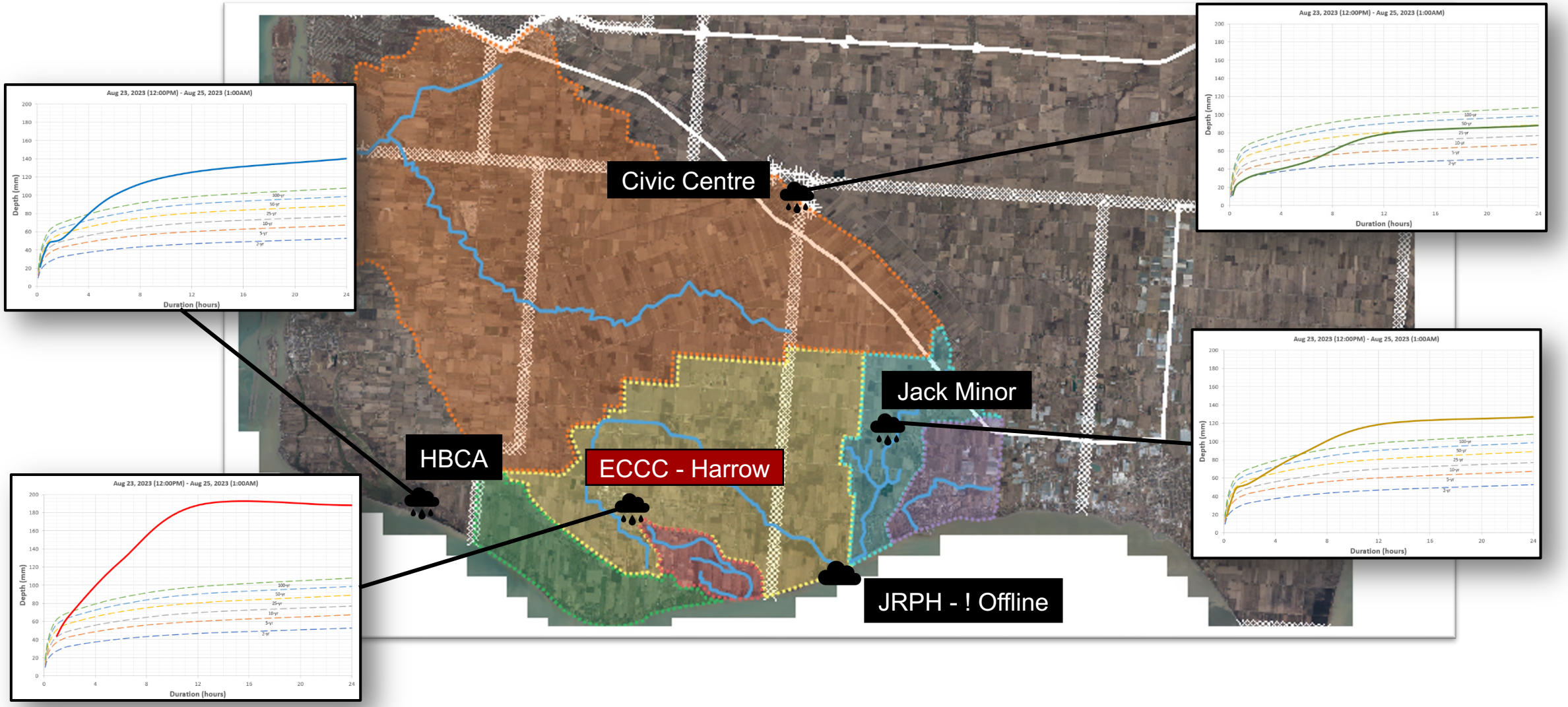


ID	Watershed	Approx. Drainage Area (Sq. Km)
1	Canard River	342.76
2	Colchester	35.46
3	Fox/Dolson Creek	12.12
4	Cedar Creek	128.04
5	Wigle Creek	35.30
6	Mill Creek	21.62

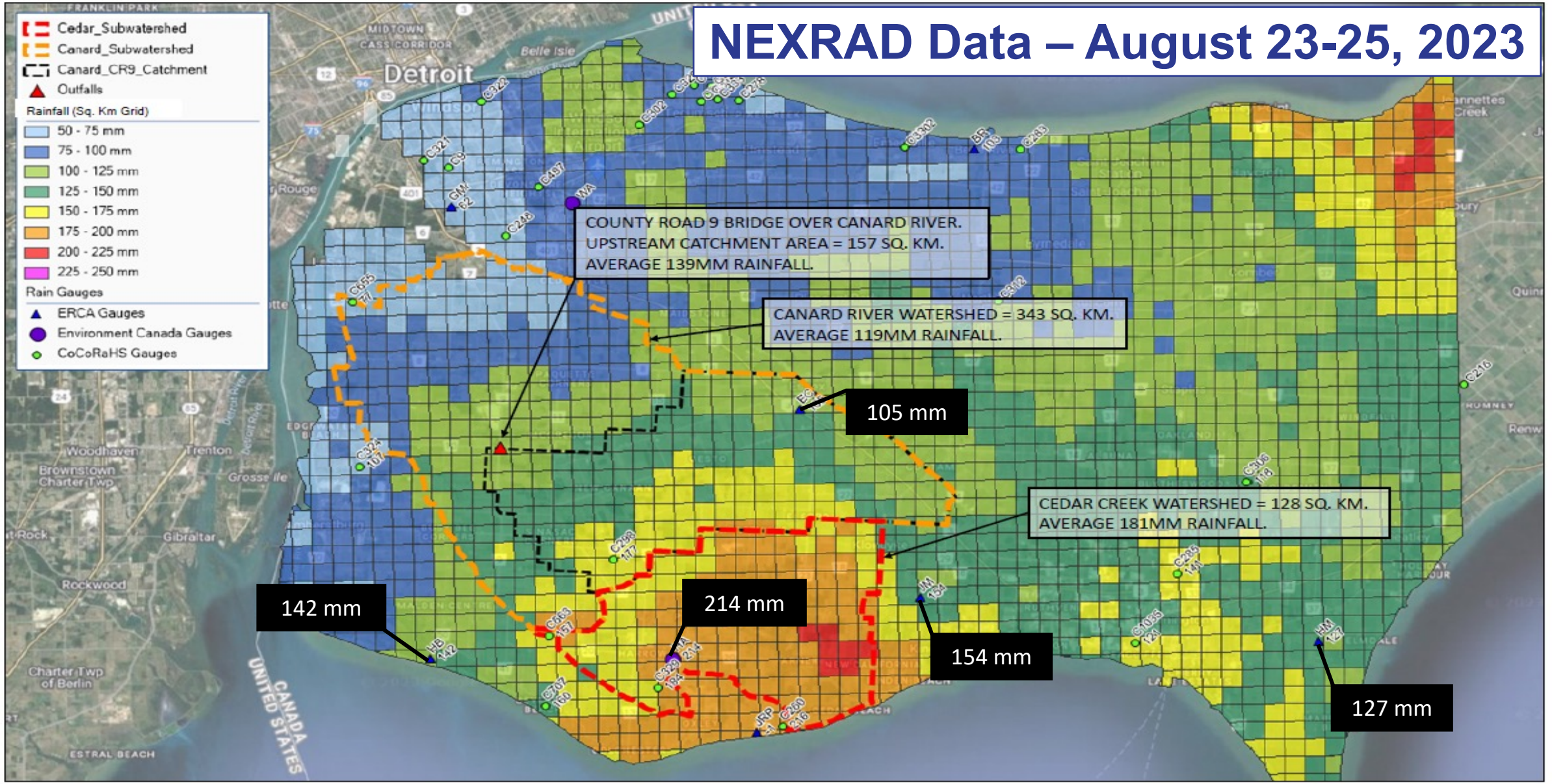
Windsor Airport Gauge – IDF Curve



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



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
Project	AUGUST 2023 RAINFALL
Date	AUG 2023
Scale	NTS
Project No.	

FIGURE 1

NEXRAD Data – August 23-25, 2023

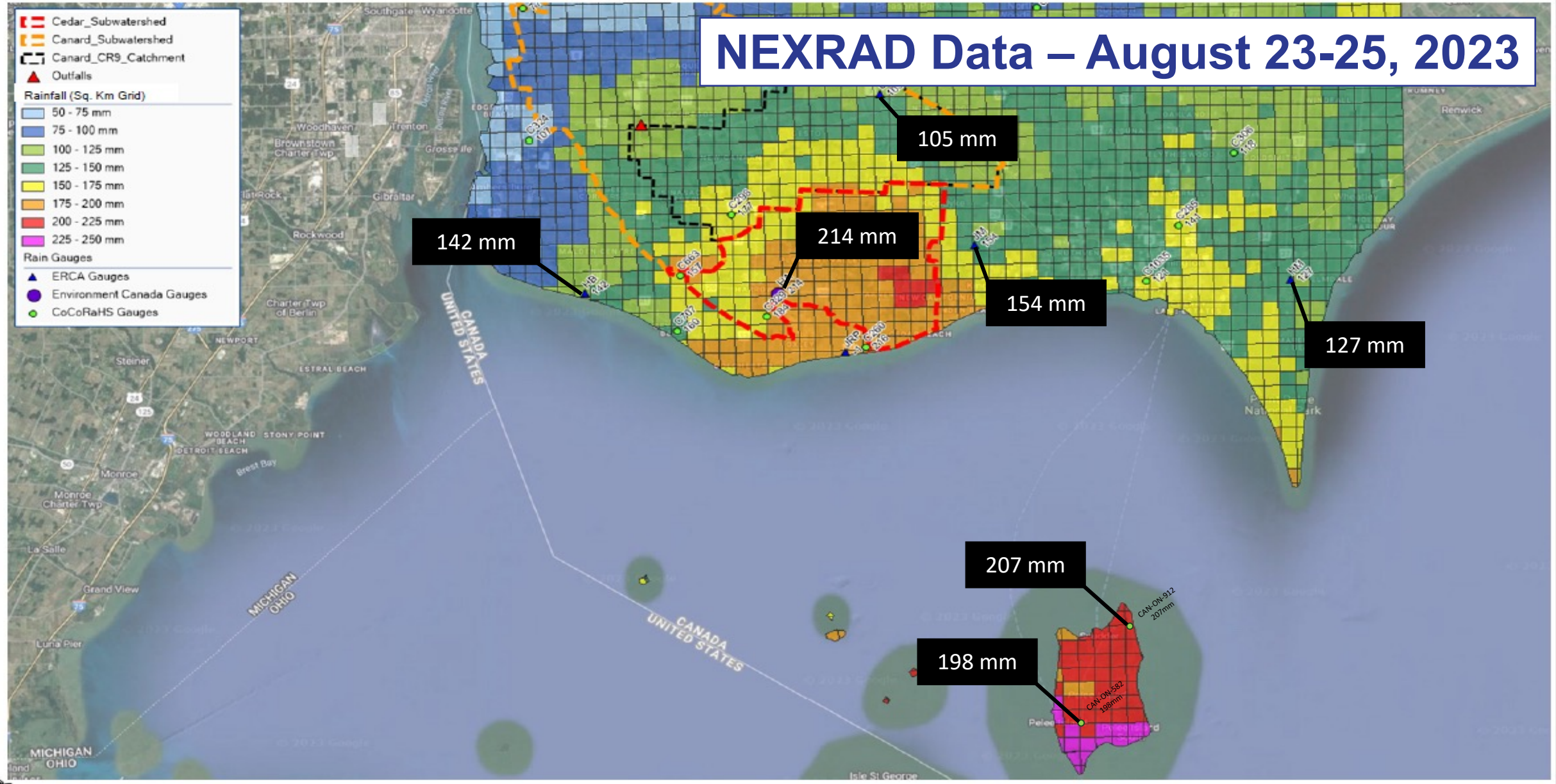


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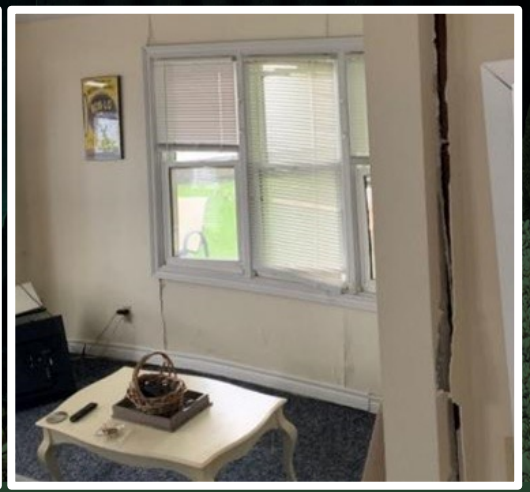
FIGURE 1.1


1
2
3
4
5
6

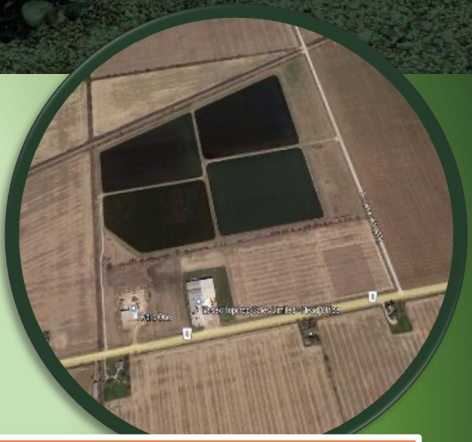
Unplanned Overland Flow Routes

- Eroded properties
- Damaged shoreline structures
- Destroyed homes
- Created dangerous circumstances for landowners and the public
- Caused significant financial impacts



Other Environmental Impacts – WWTP/Lagoons

8 x Daily Average



4 x Daily Average

- 14 x Daily Average Flows
- bypassed over 7,000 m^3 of raw sewage

9 x Daily Average

Select Road Closures: Aug. 24-25, 2023

Observed Flood Levels at Select Locations

Map ID	Location	100-yr Regulatory Flood Level	Aug. Rainfall Event Flood Level	Exceedance
1	CR 9 / CR 10 (Canard)	180.13 m	180.65 m	**+ 0.52 m**
2	CR 12 (Canard)	183.99 m	184.21 m	**+ 0.22 m**
3	CR 15 (Canard)	185.99 m	186.38 m	**+ 0.39 m**
4	CR 50 (Cedar)	175.90 m (Lake) 175.20 m (Creek)	175.83 m	- 0.07 m (Lake) **+ 0.63 m (Creek)**

Method to Delineate Approximate Flood Extents

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).

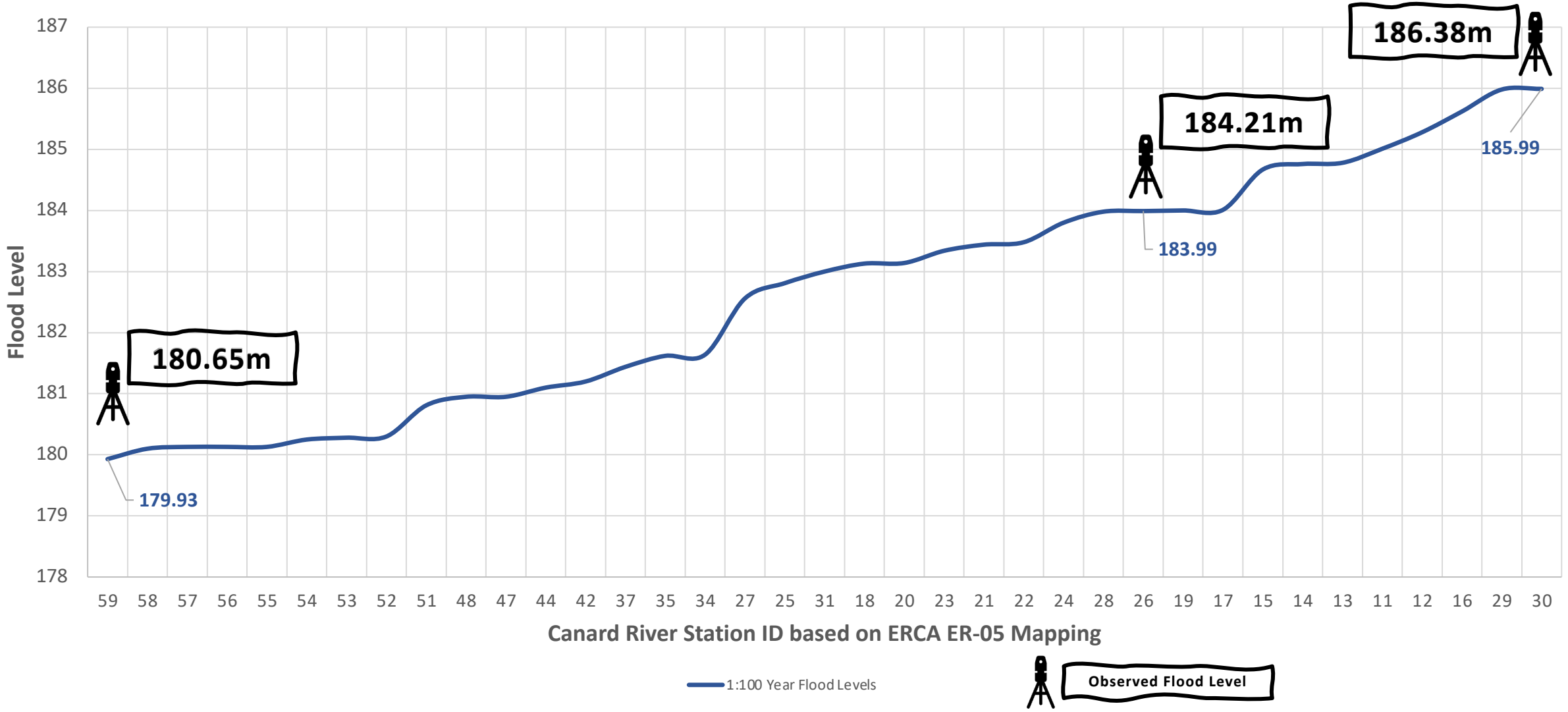
Calculate adjustment factor, which is the ratio of the differences between observed and modelled water levels to create an adjustment factor (A).

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.

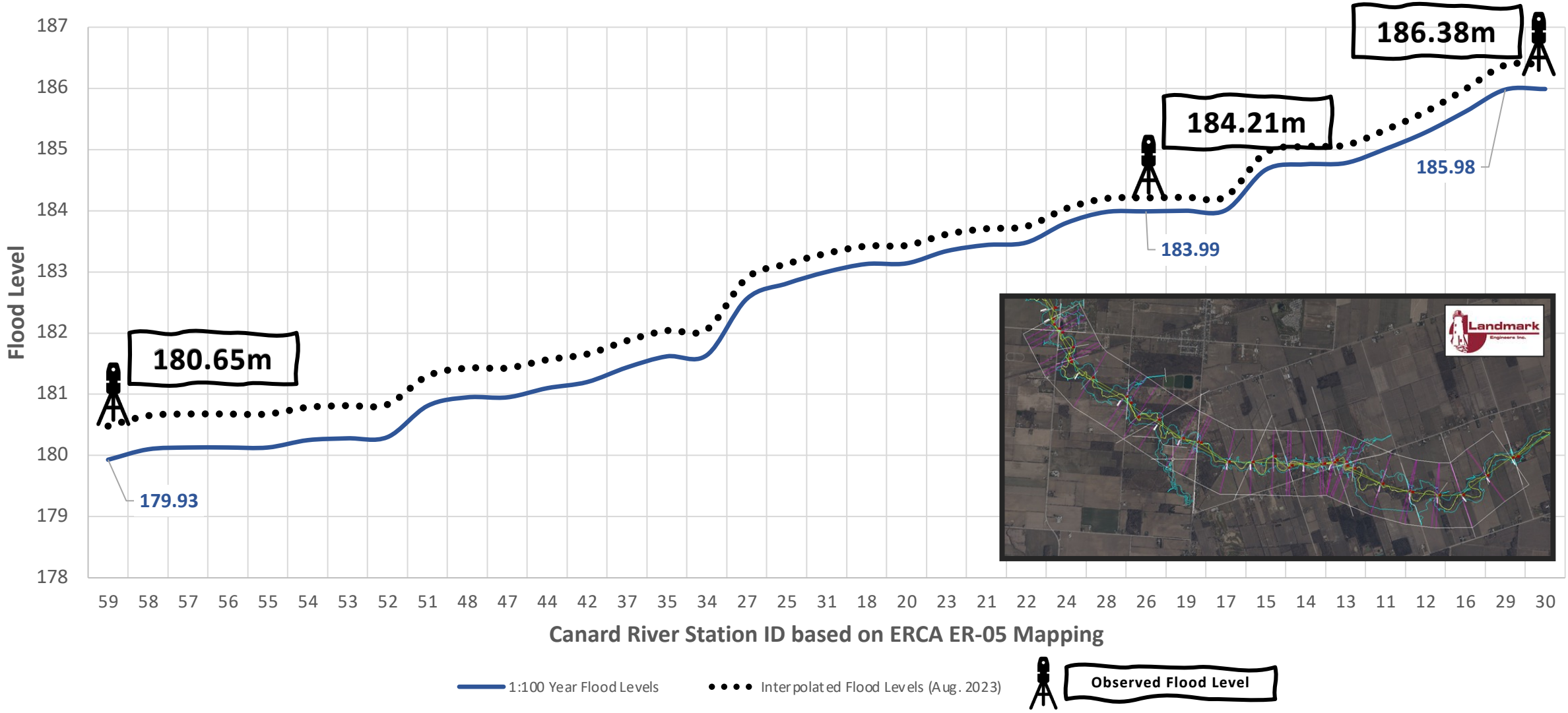
$$Interpolated\ Water\ Levels = O_{n+1} = O_n + (M_{n+1} - M_n) \times A$$

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

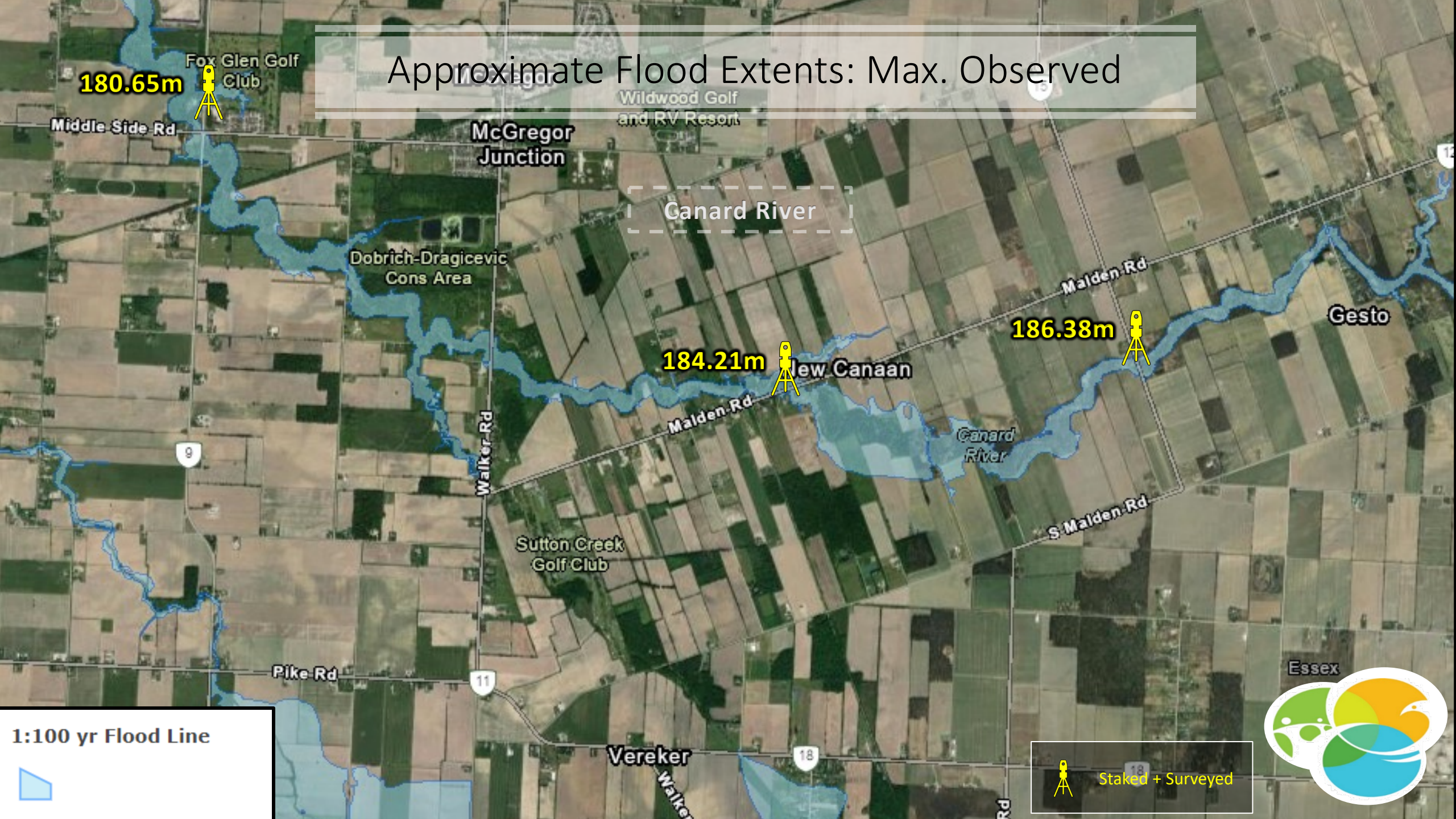
HGL - 1:100 Year Modelled Flood Levels



HGL – Interpolated Flood Levels for Aug. 2023



Approximate Flood Extents: Max. Observed



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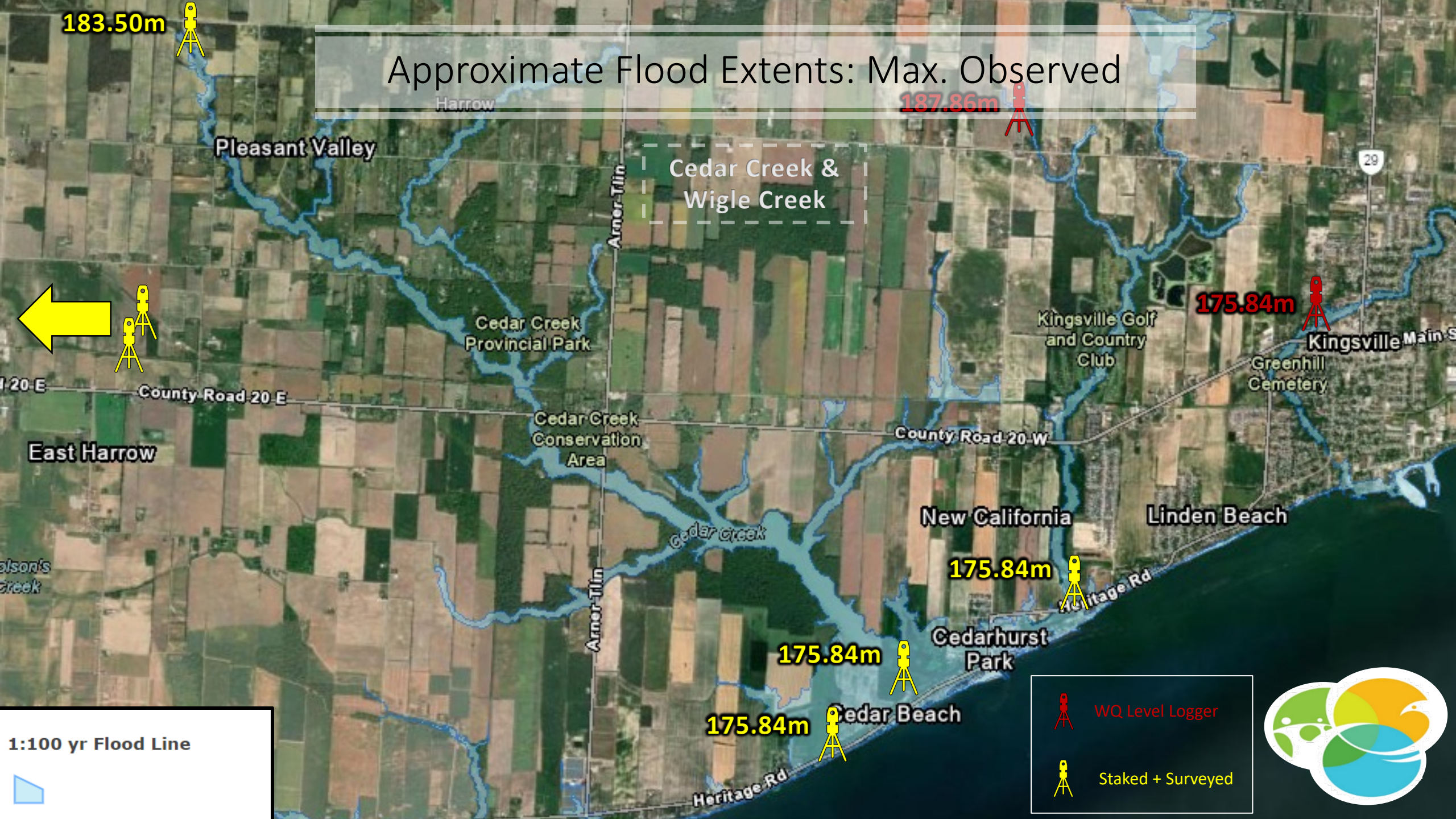
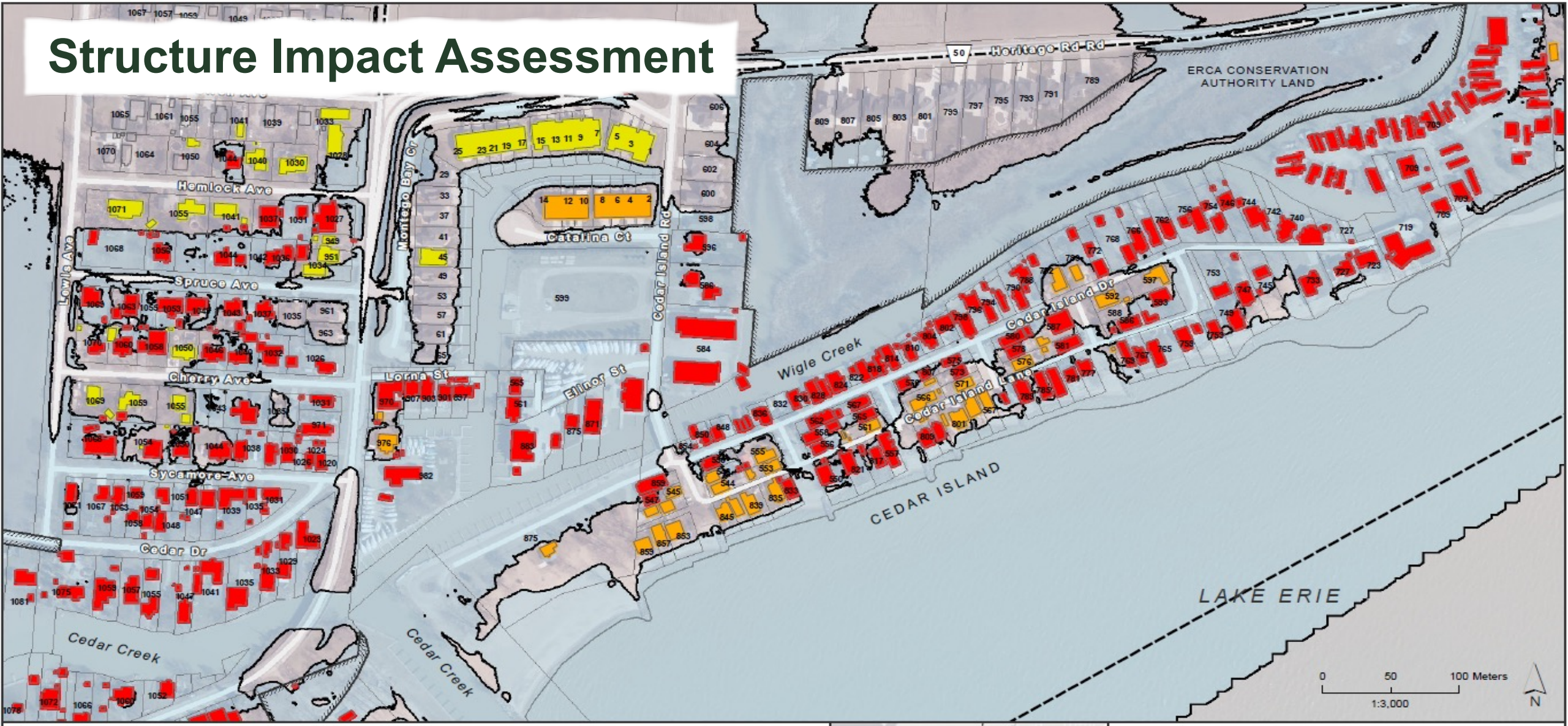

Approximate Flood Extents: Max. Observed
183.50m
187.86m
175.84m
175.84m
175.84m
175.84m
Cedar Creek & Wigle Creek
Harrow
Pleasant Valley
Arner Tlin
Cedar Creek Provincial Park
Kingsville Golf and Country Club
Kingsville
Greenhill Cemetery
Main S
29
County Road 20 E
East Harrow
Cedar Creek Conservation Area
County Road 20 W
New California
Linden Beach
Cedar Creek
Heritage Rd
Cedarhurst Park
Cedar Beach
1:100 yr Flood Line
WQ Level Logger
Staked + Surveyed


183.50m
Harrow
Pleasant Valley
Cedar Creek &
Wigle Creek
Arner Tlin
187.86m
29
Cedar Creek
Provincial Park
Kingsville Golf
and Country
Club
175.84m
Kingsville
Main S
Greenhill
Cemetery
County Road 20 E
County Road 20 W
East Harrow
Cedar Creek
Conservation
Area
New California
Linden Beach
Cedar Creek
175.84m
Heritage Rd
Arner Tlin
Cedarhurst
Park
175.84m
Cedar Beach
175.84m
Heritage Rd
Wigle/Cedar Creek Flood
Boundary
1:100 yr Flood Line
WQ Level Logger
Staked + Surveyed

Structure Impact Assessment

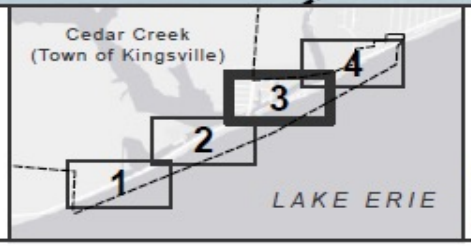


Flood Damage Assessment Summary - Town of Kingsville - Lower Cedar Creek

- Flooded Structure
- Structure Within Flood Area
- Structure Within 10m of Flood Extent
- Approximate Flood Extent due to August 23-25, 2023 storm (175.840 m)
- Study Area
- ERCA Owned Or Managed Land - Extent

Map 3 of 4

Note:
Please see the following document for complete notes on inputs and summary.
Flood Damage Assessment - Cedar Creek - 20230922.xlsx



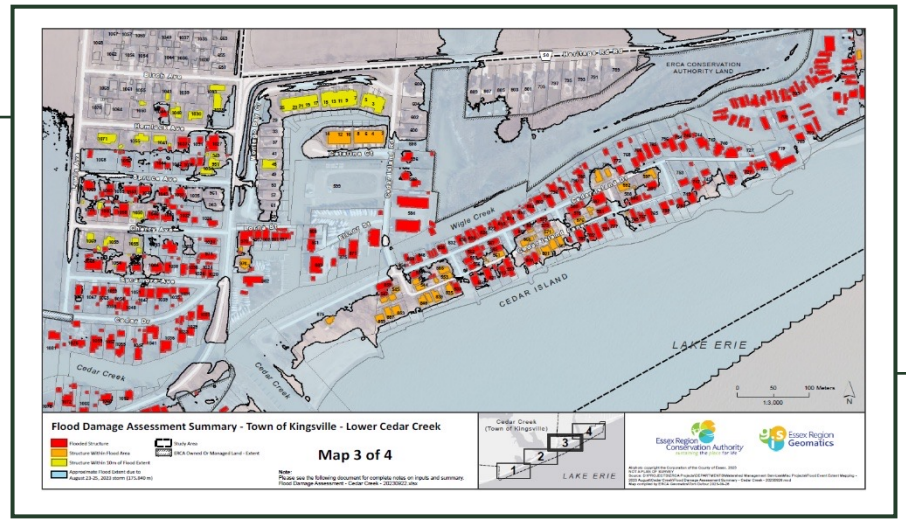
Essex Region Conservation Authority
sustaining the place for life

Essex Region Geomatics

Source: D:\PROJECTS\ERCA Projects\DEPARTMENTS\Watershed Management Services\Misc Projects\Flood Event Extent Mapping - 2023 August\Cedar Creek\Flood Damage Assessment Summary - Cedar Creek - 20230926.mxd
Map compiled by ERCA Geomatics\Tom Dufour 2023-09-26

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

- **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's "Preparedness" was tested

Municipal "Preparedness" was tested

Planning ≠ Preparing

Actions Taken 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)
6. Engage with new municipal staff early to lessen the knowledge gap for everyone (damage centres, unique features within a subwatershed).

Conservation Authorities Act

R.S.O. 1990, CHAPTER C.27

Consolidation Period: From June 6, 2024 to the e-Laws currency date.

Last amendment: 2024, c. 16, Sched. 12, s. 16.

CONTENTS

Gap in Goals?

Drainage Act

R.S.O. 1990, CHAPTER D.17

Consolidation Period: From June 30, 2021 to the e-Laws currency date.

Last amendment: 2021, c. 4, Sched. 6, s. 42.

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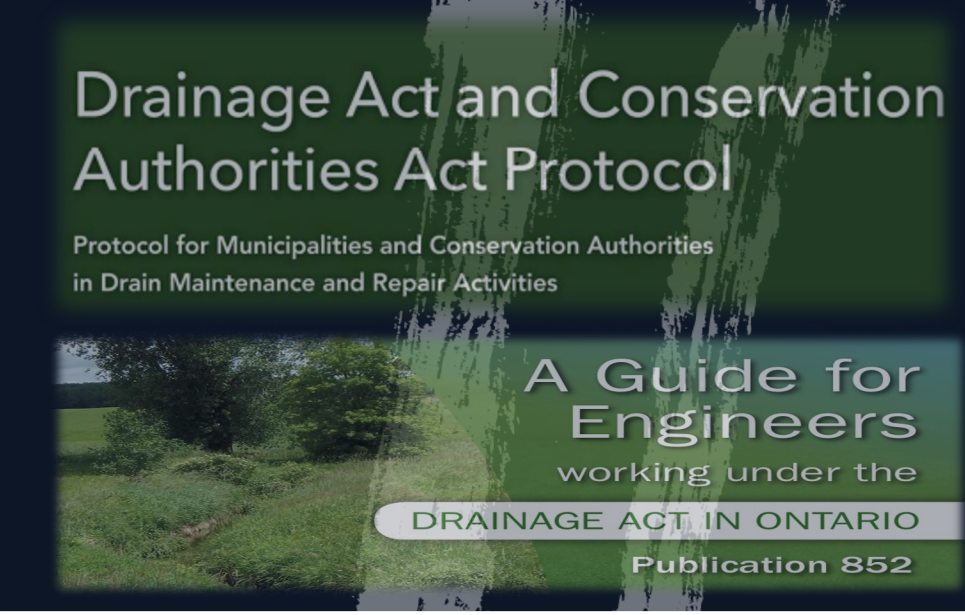

Close the Gap: TALK!!

Use Available Tools/Guidance Documents

- DART Protocol
- Guidelines for Engineers working under the Drainage Act in Ontario (Publication 852)

Solve Problems Together.

- Understand the needs of the other.
- Avoid solving problems in isolation.
- Build relationships by solving together.

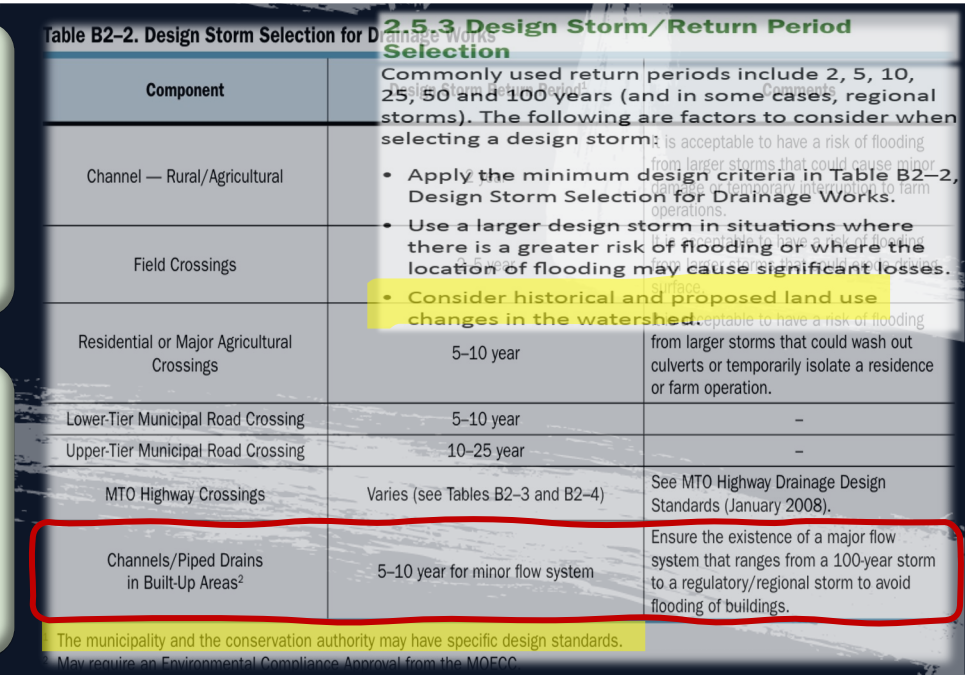

Table B2–2. Design Storm Selection for Drainage Works

Component	Design Storm/Return Period	Remarks
Channel — Rural/Agricultural		
Field Crossings		
Residential or Major Agricultural Crossings	5–10 year	from larger storms that could wash out culverts or temporarily isolate a residence or farm operation.
Lower-Tier Municipal Road Crossing	5–10 year	–
Upper-Tier Municipal Road Crossing	10–25 year	–
MTO Highway Crossings	Varies (see Tables B2–3 and B2–4)	See MTO Highway Drainage Design Standards (January 2008).
Channels/Piped Drains in Built-Up Areas[2]	5–10 year for minor flow system	Ensure the existence of a major flow system that ranges from a 100-year storm to a regulatory/regional storm to avoid flooding of buildings.

[2] The municipality and the conservation authority may have specific design standards.
May require an Environmental Compliance Approval from the MOECC

2.5.3 Design Storm/Return Period Selection

Commonly used return periods include 2, 5, 10, 25, 50 and 100 years (and in some cases, regional storms). The following are factors to consider when selecting a design storm:

- Apply the minimum design criteria in Table B2–2, Design Storm Selection for Drainage Works.
- Use a larger design storm in situations where there is a greater risk of flooding or where the location of flooding may cause significant losses.
- Consider historical and proposed land use changes in the watershed.

Land Drainage Conference 2025

Thank you!

Contact Information

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