



Niagara Peninsula
CONSERVATION
nature for all

Oswego Creek
Floodplain Mapping

Second Public Engagement Meeting
November 14, 2023

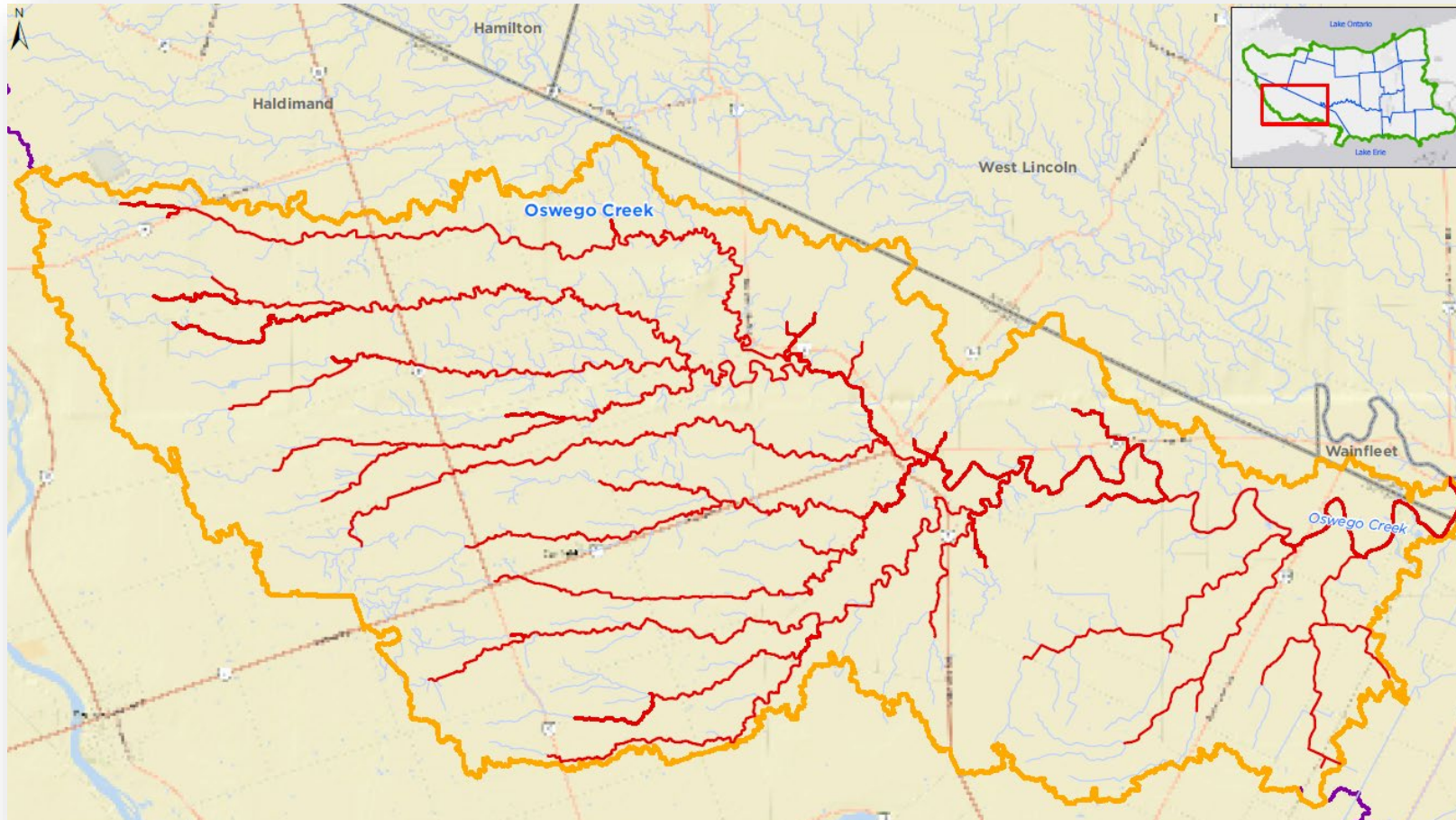
Oswego Creek Floodplain Mapping

Second Public Engagement Meeting

Speakers

- Leilani Lee-Yates, Director, Planning and Development, NPCA
- Tim Mereu, Project Manager, NPCA
- Brian Greck, Project Director, Greck and Associates Limited
- David Deluce, Senior Manager, Environmental Planning & Policy, NPCA

Oswego Creek Study Area



Flooding Does Happen – It is serious and it is costly



In 1954, Hurricane Hazel pounded the Toronto region with 270 mm of rain over approximately 12 hours. 81 people were killed.

Recent Examples of Flooding

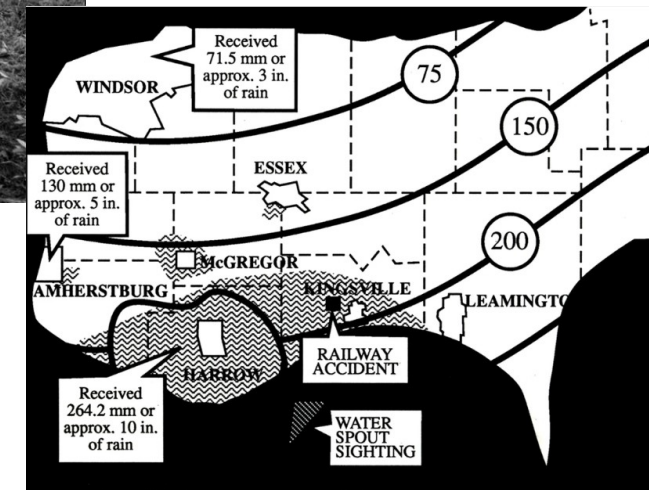
Reg. Road 45 – Wainfleet



Bartlett Creek – Beamsville



Flooding Does Happen – It is serious and it is costly



In 1989, up to 260 mm of rain fell on Harrow in Essex County causing wide-spread flooding and damage. (storm much greater than the 1:100-yr)

Oswego Creek Floodplain Mapping

It is almost impossible to stop a river from flooding, but we can reduce the consequence of flooding

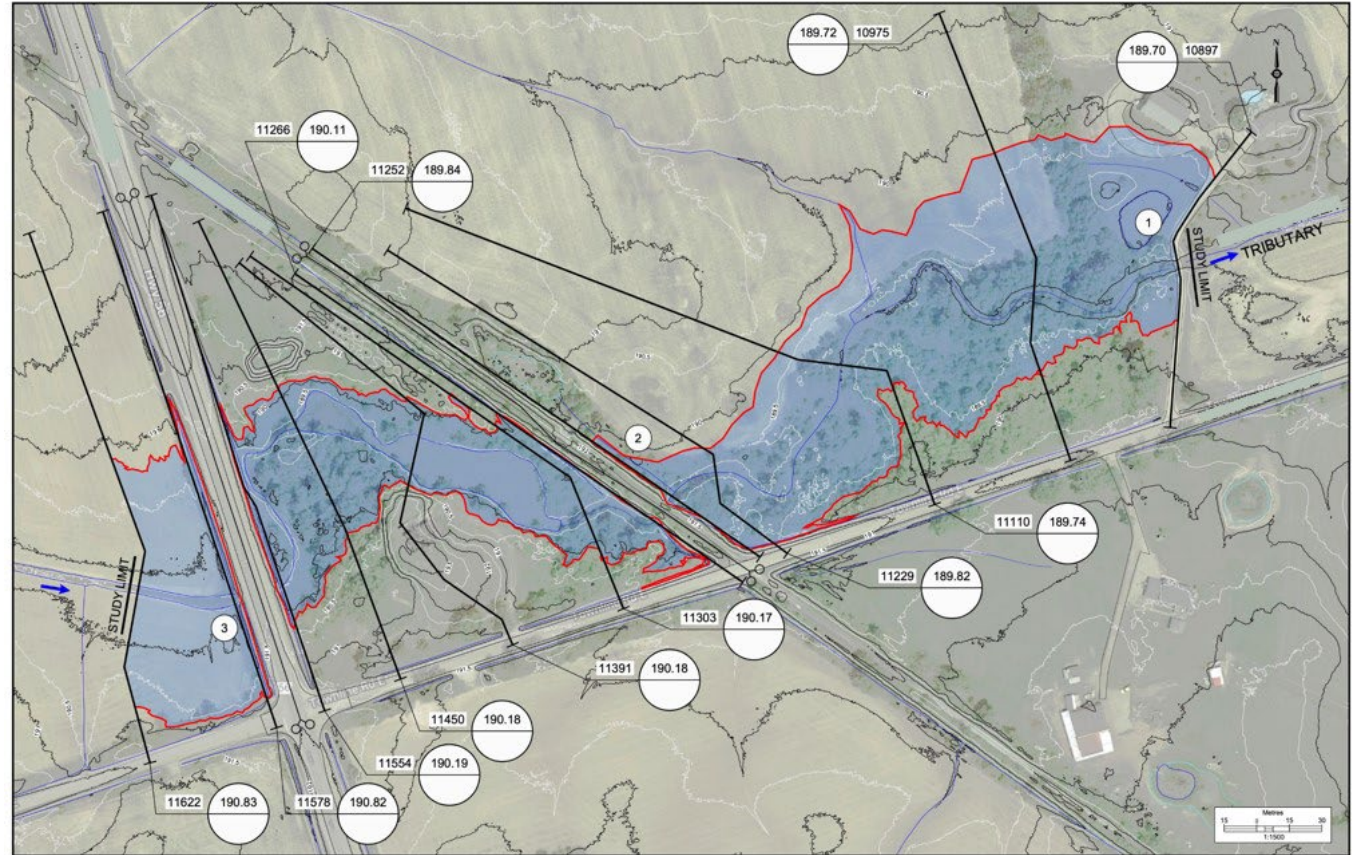
- Create floodplain maps that illustrate the frequency and depth of flooding
- Manage development in the floodplain



Typical Floodplain Map

The first step to reduce the cost of flood damage within a community is to have mapping that accurately shows the flood hazard.

These maps help people prepare for and respond to potential flooding.

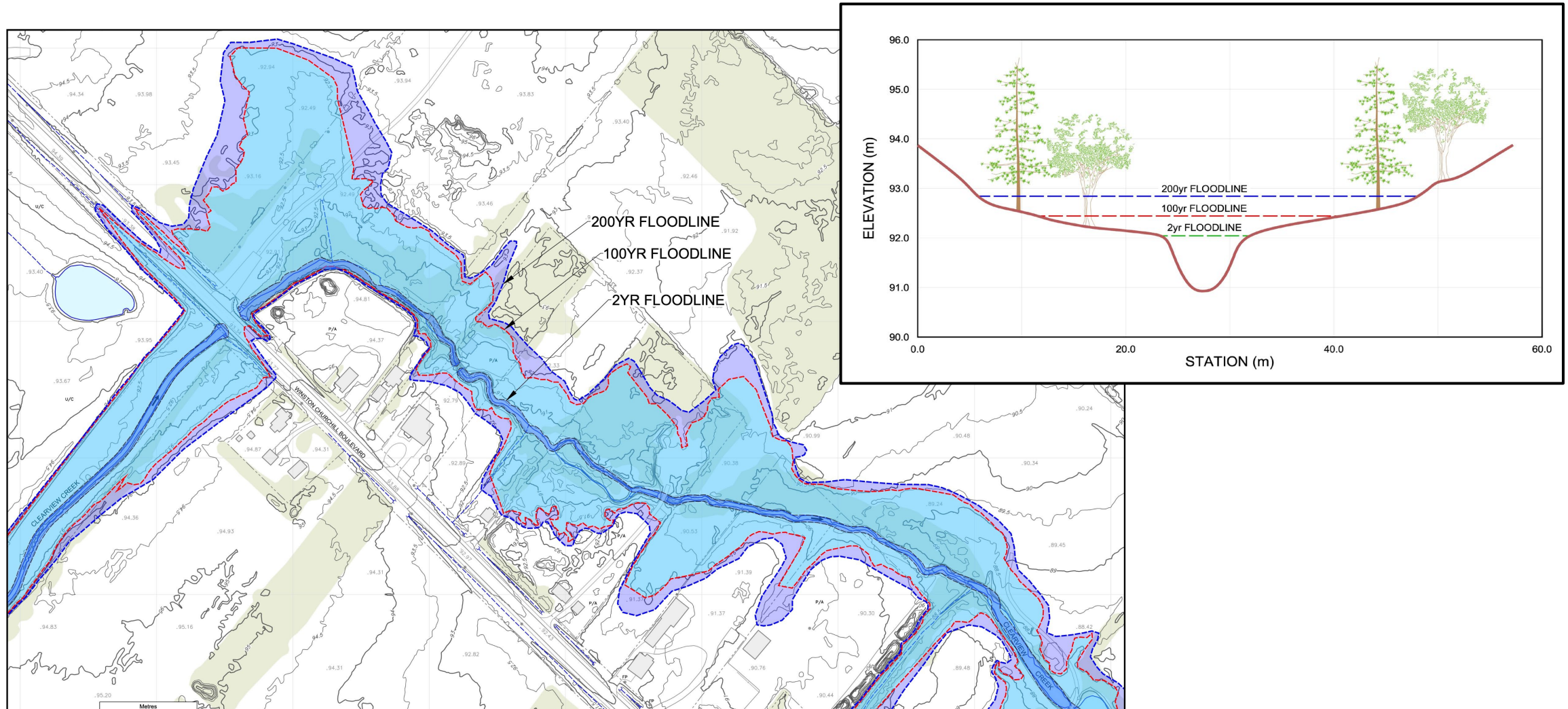


What is the 1:100 year flood and why is it used to map and regulate floodplains?

- 1% chance of happening in any given year
- The Province requires the 1:100-year flood to be mapped and the lands in the floodplain to be regulated
- To illustrate more severe flooding associated with climate change, also map floodplain with 20% increase in flows



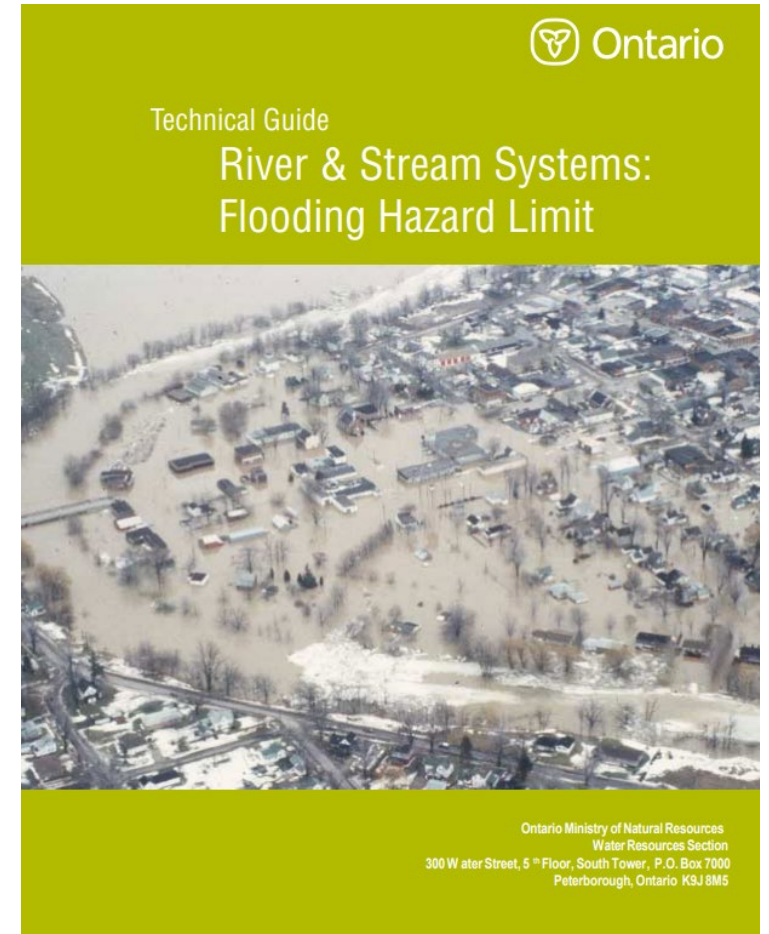
Floodplain Map: 1:2 year, 1:100 year; 1:200 year



Oswego Creek Floodplain Mapping

Guidelines for Creating Floodplain Maps

- Floodplain mapping must be undertaken in a manner consistent with the Provincial Technical Guide for River and Stream Systems.
- This guide is used by all Conservation Authorities undertaking floodplain mapping projects.



Oswego Creek Floodplain Mapping

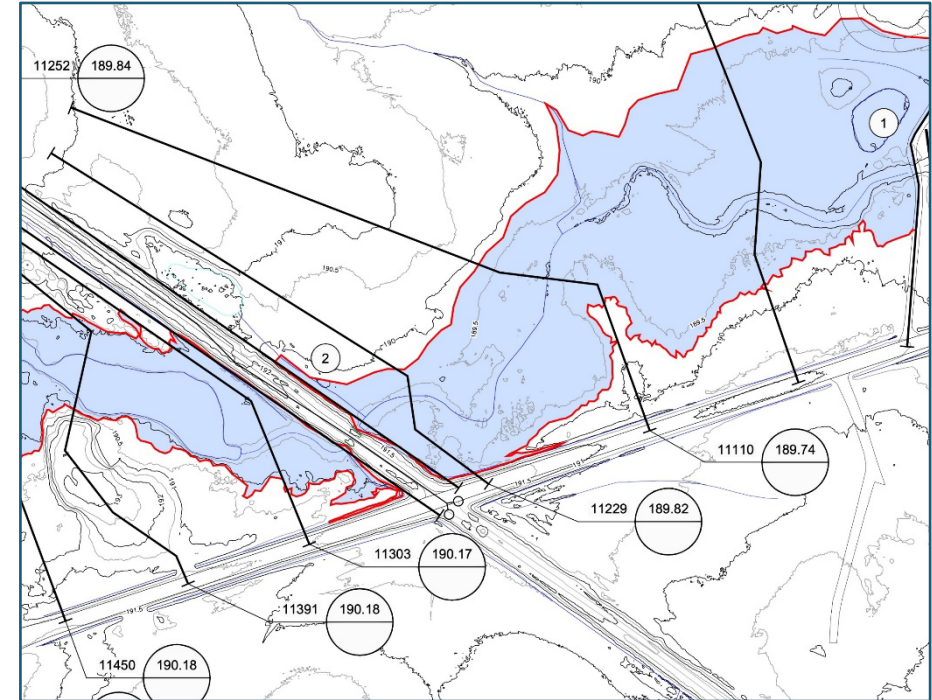
What are the key steps in preparing a floodplain map?

- **Base Mapping**
- **Survey bridges and culverts**
- **Calculate the 1:100 year flow rate**

PIC No. 2

- **Develop a computer model that combines all of the above to estimate flood elevations**
- **Prepare the floodplain maps**

PIC No. 3



Greck and Associates Limited (GRECK)- Who We Are



**SENIOR DESIGN REVIEW
ENGINEER**
BRIAN GRECK, P.ENG
Greck and Associates Limited



**WATER RESOURCES
ENGINEER (HYDRAULICS
LEAD & FIELD SURVEYING)**
JENNIFER CHAN, P.ENG.
Greck and Associates Limited



**TECHNICAL SUPPORT, CAD,
MAPPING AND FIELD
SURVEYING**
PAUL GRECK, B.E.S., CAN-
CIESC
Greck and Associates Limited



**WATER RESOURCES
ENGINEER (HYDROLOGY
LEAD & FIELD SURVEYING)**
ELLIOT PAI, P.ENG.
Greck and Associates Limited

Tasks Completed

- Review Background Studies (100%)
- Public Consultation (60%)
- Data Collection (100%)
- Field Surveys (100%)
- Hydrologic Model setup (80%)
- Draft Hydrology Report (100%)
- Hydraulic Model setup (50%)
- Floodplain Mapping (0%)

Review Background works

Watershed Flood Damage Assessment Study 1988,
Cumming Cockburn Limited

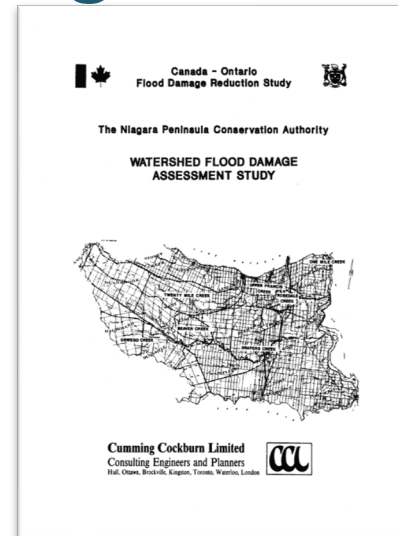
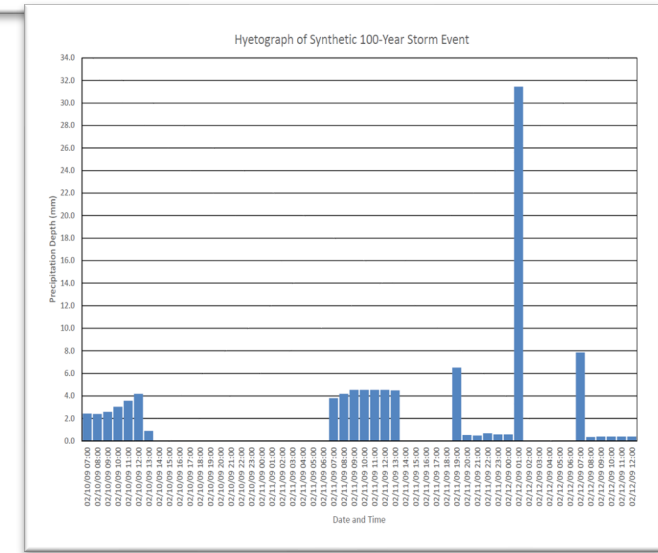
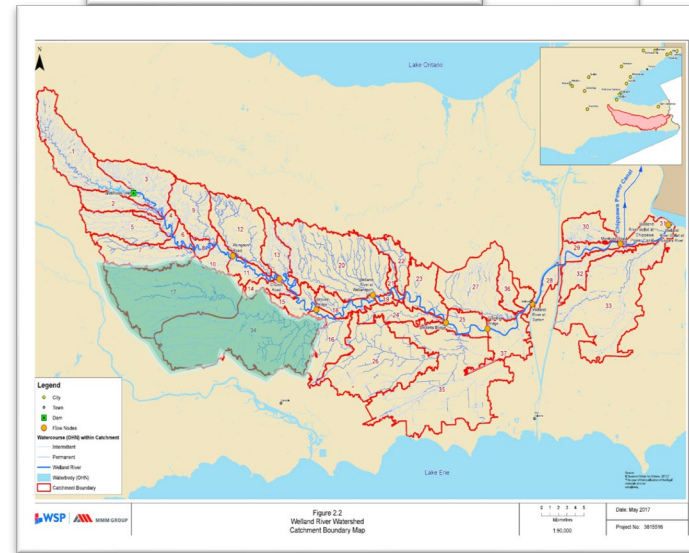


TABLE 3.3
Summary of Statistical Peak Flow Estimates

Flood Estimate (m³/s)

Watershed/ Location	Flood Estimating Technique	Urban ** (QP20)	Rural	Urban ** (QP100)	Rural
**One Mile Creek @ Outlet	* 1) Regional Equation	12.6	5.4	16.7	7.6
	* 2) Index Method	13.3	5.8	16.4	7.4
	* 3) Multiple Regression	10.7	4.4	15.8	7.1
	*4a) Single Station : Max Inst.	14.1	6.2	16.6	7.6
	*4b) Single Station : Daily	15.6	7.0	19.2	9.0
Twenty Mile Creek @ Outlet	1) Regional Equation	98.6	98.6	135.5	135.5
	2) Index Method	97.0	97.0	124.4	124.4
	3) Multiple Regression	80.3	80.3	118.9	118.9
	4a) Single Station : Max Inst.	114.0	114.0	135.0	135.0
	4b) Single Station : Daily	129.1	129.1	160.3	160.3
Oswego Creek @ Outlet	1) Regional Equation	62.6	62.6	86.7	86.7
	2) Index Method	69.3	69.3	88.9	88.9
	3) Multiple Regression	47.6	47.6	77.3	77.3
	4a) Single Station : Max Inst.	72.3	72.3	86.4	86.4
	4b) Single Station : Daily	81.9	81.9	102.6	102.6
**Upper Francis Creek @ Outlet	* 1) Regional Equation	12.3	6.6	16.8	9.4
	* 2) Index Method	13.3	7.3	16.8	9.4
	* 3) Multiple Regression	10.0	5.1	14.0	7.6
	*4a) Single Station : Max Inst.	13.8	7.7	16.7	9.4
	*4b) Single Station : Daily	15.3	8.7	19.1	11.1

Phase I Hydrology Report
Welland River Regulatory
Flood Plain Mapping 2017,
WSP & MMM Group

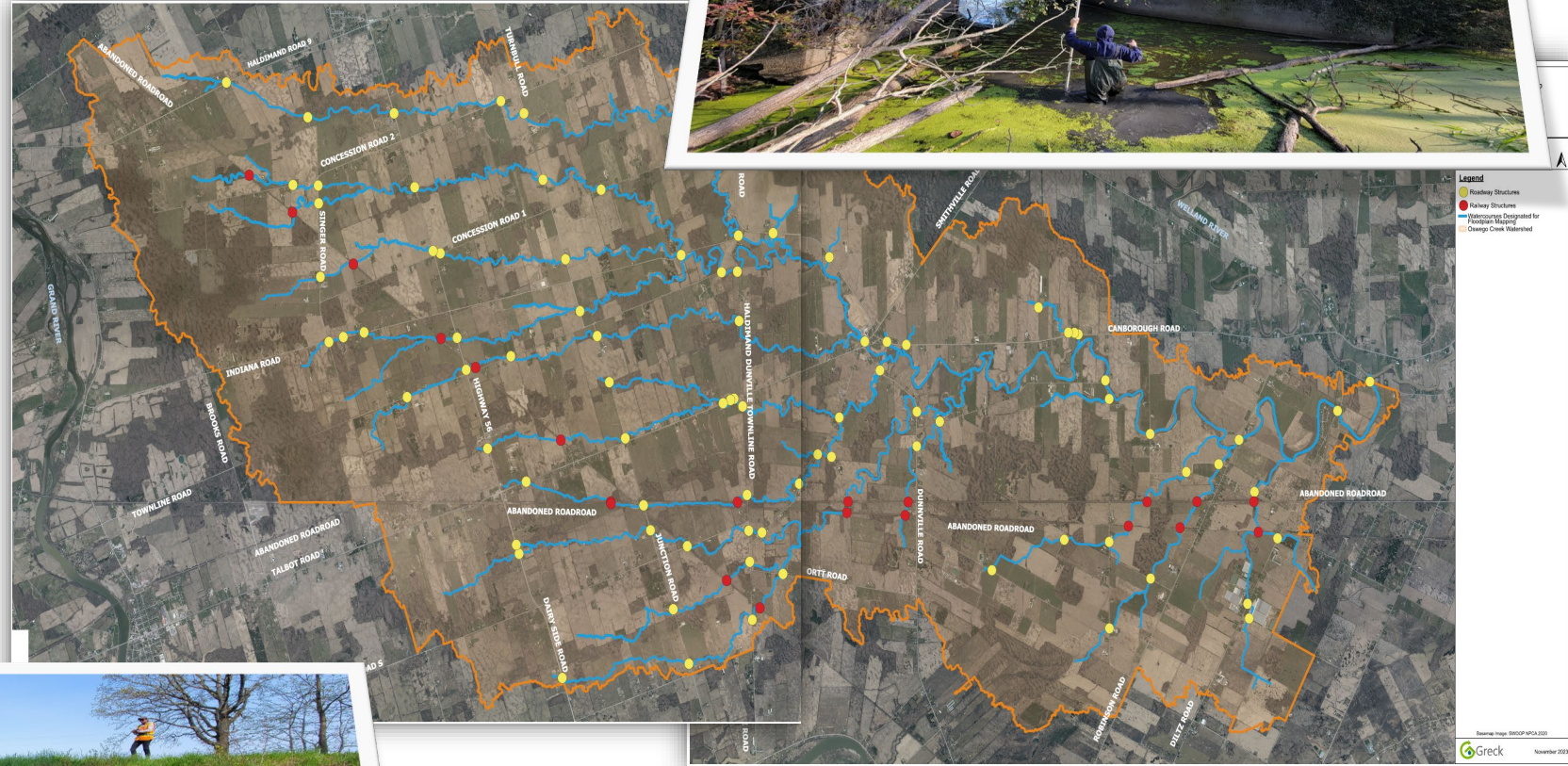


Data Collection

- NPCA - Land Use, Background Studies
- Environment Canada – Precipitation Data
- Water Survey of Canada – Historical Flow Data
- Land Information Ontario – Lidar, Topography
- Ontario Ministry of Agriculture and Food, Agriculture Canada - Soils

Field Surveys

110 Structures surveyed including 90 culverts and bridges and 20 Railway crossings (all abandoned structures).



Location:	Concession 1 Rd	Inspected By:	Paul Greck & Keiran Doak
Northing:	4763361.14 N	Date:	26-Jul-23
Easting:	602413.89 E	Weather:	23°C, Cloudy
		Crossing ID:	81
Inlet Type:	Box Culvert	Material:	Concrete
# of Spans:	1	Open Footing:	Yes
Span or Diameter (m):	6.0	Skew Angle:	No
Rise (m):	2.68	Sediment Depth (mm):	N/A
Length (m):	23.3	Road Barrier:	No
US Invert Elevation (m):	180.16	US Obvert Elevation (m):	182.84
DS Invert Elevation (m):	180.26	DS Obvert Elevation (m):	182.78
Inlet/Outlet Type:	Projecting from Slope	Low Point in Road Elevation (m):	183.5
High Water Mark Depth (m):	Not Observed	Water Depth (m):	0.71
Number of Piers:	No		
Pier Width:	N/A		

Additional Notes/Notable Obstructions:

Thickness of concrete is 0.38m

Upstream Photo:



Downstream Photo:



Location:	Singer Rd	Inspected By:	Paul Greck & Keiran Doak
Northing:	4762984.457 N	Date:	September 26, 2023
Easting:	596262.163 E	Weather:	22°C, Sunny
		Crossing ID:	RR20
Inlet Type:	Circular Pipe	Material:	Currugated Steel
# of Spans:	1	Open Footing:	No
Span or Diameter (m):	1.2	Skew Angle:	0
Rise (m):	1.20	Sediment Depth (mm):	N/A
Length (m):	12.9	Road Barrier:	No
US Invert Elevation (m):	191.11	US Obvert Elevation (m):	192.31
DS Invert Elevation (m):	191.21	DS Obvert Elevation (m):	192.38
Inlet/Outlet Type:	Projecting from slope	Low Point in Road Elevation (m):	Roadway washed out
High Water Mark Depth (m):	Not Observed	Water Depth (m):	0.27
Number of Piers:	0		
Pier Width:	0		

Additional Notes/Notable Obstructions:

Pipe bottom completely corroded out. Roadway completely washed out above Pipe.

Upstream Photo:

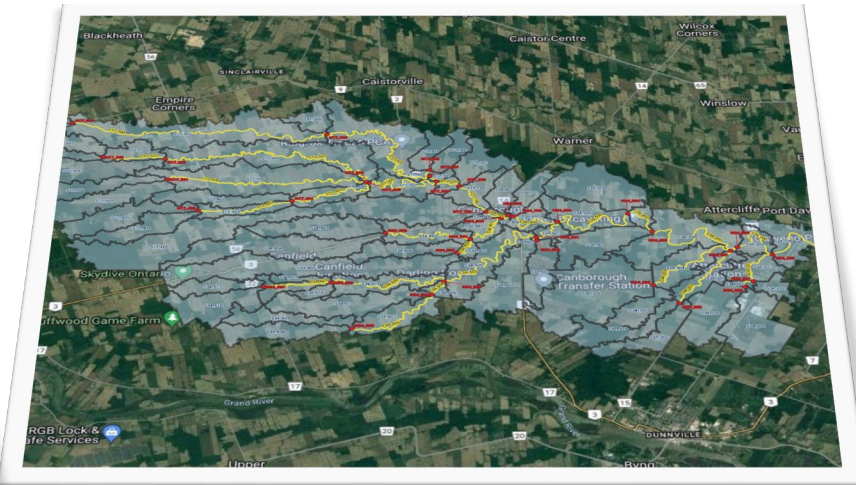
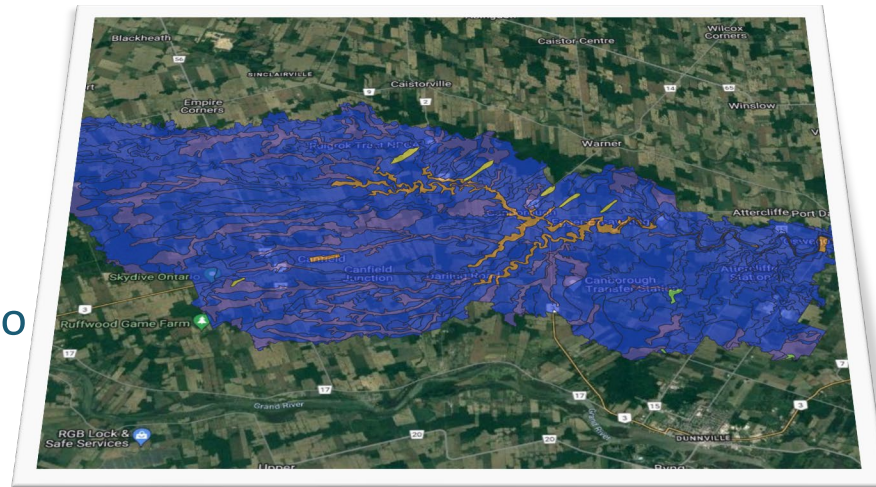
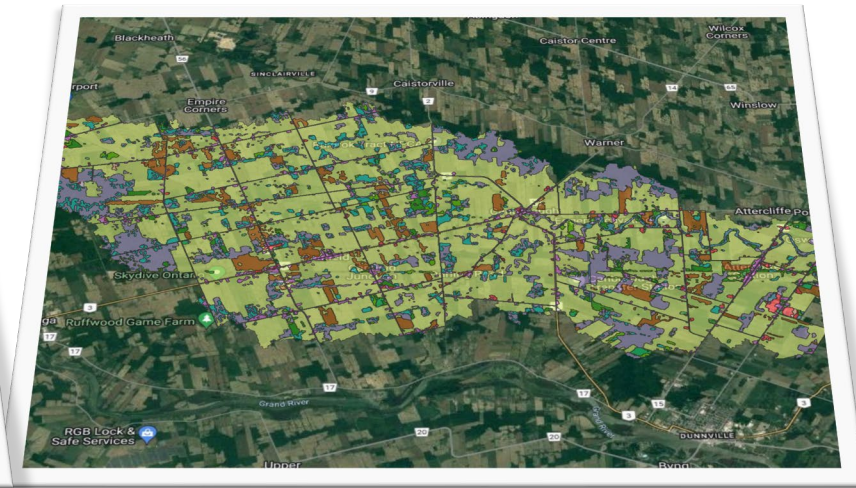
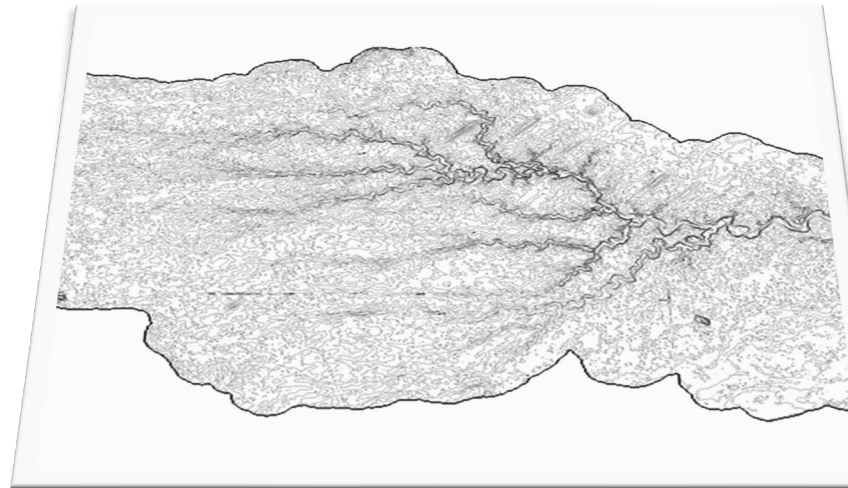


Downstream Photo:



Hydrologic Model Setup

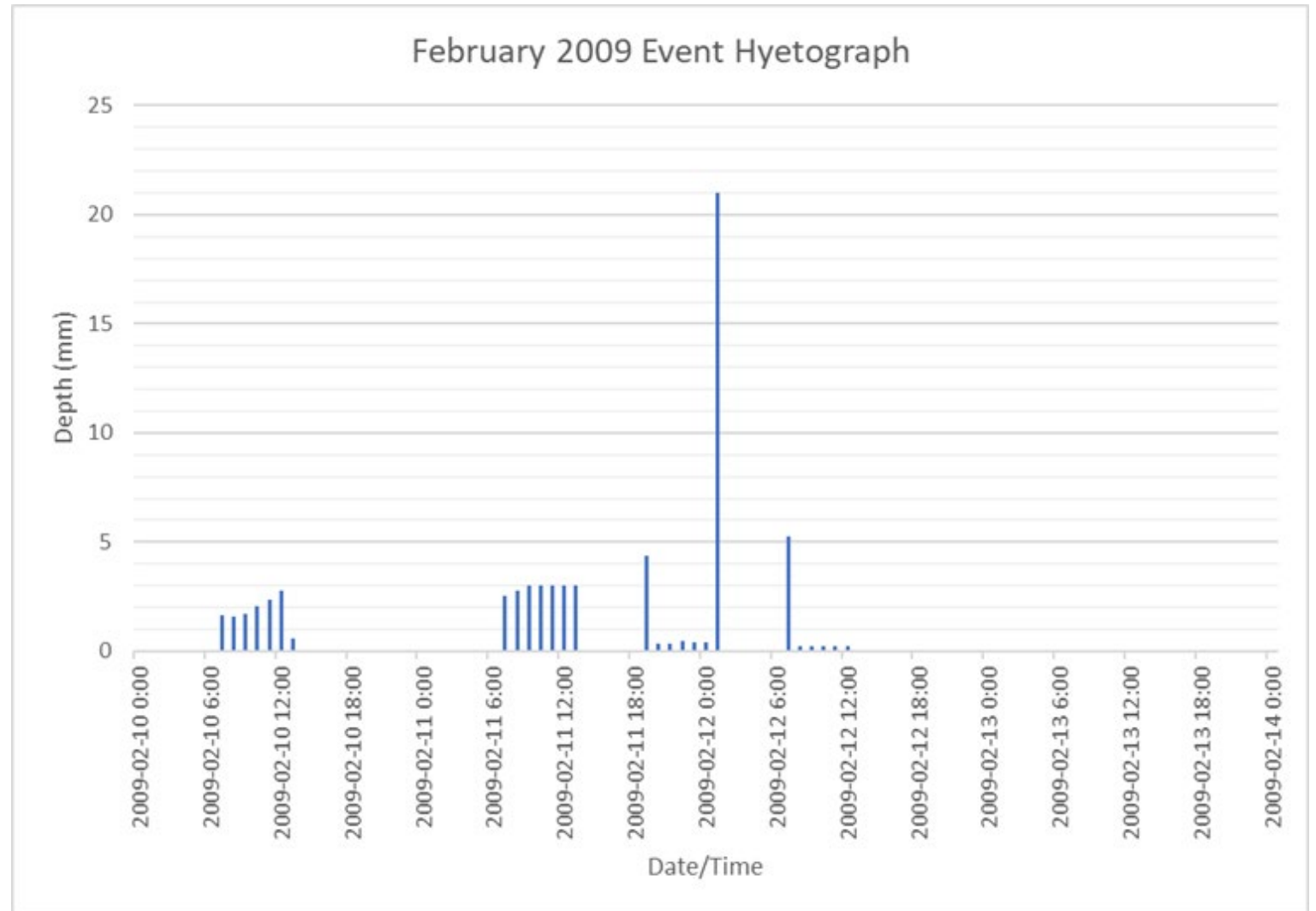
- Generate topography from LiDAR
- Burn-in channel system
- Delineate subcatchments
- Overlay soils data
- Overlay Land Use or Cover
- Add watershed parameters
- Add flow routing channels to connect subcatchments
- Apply rainfall data



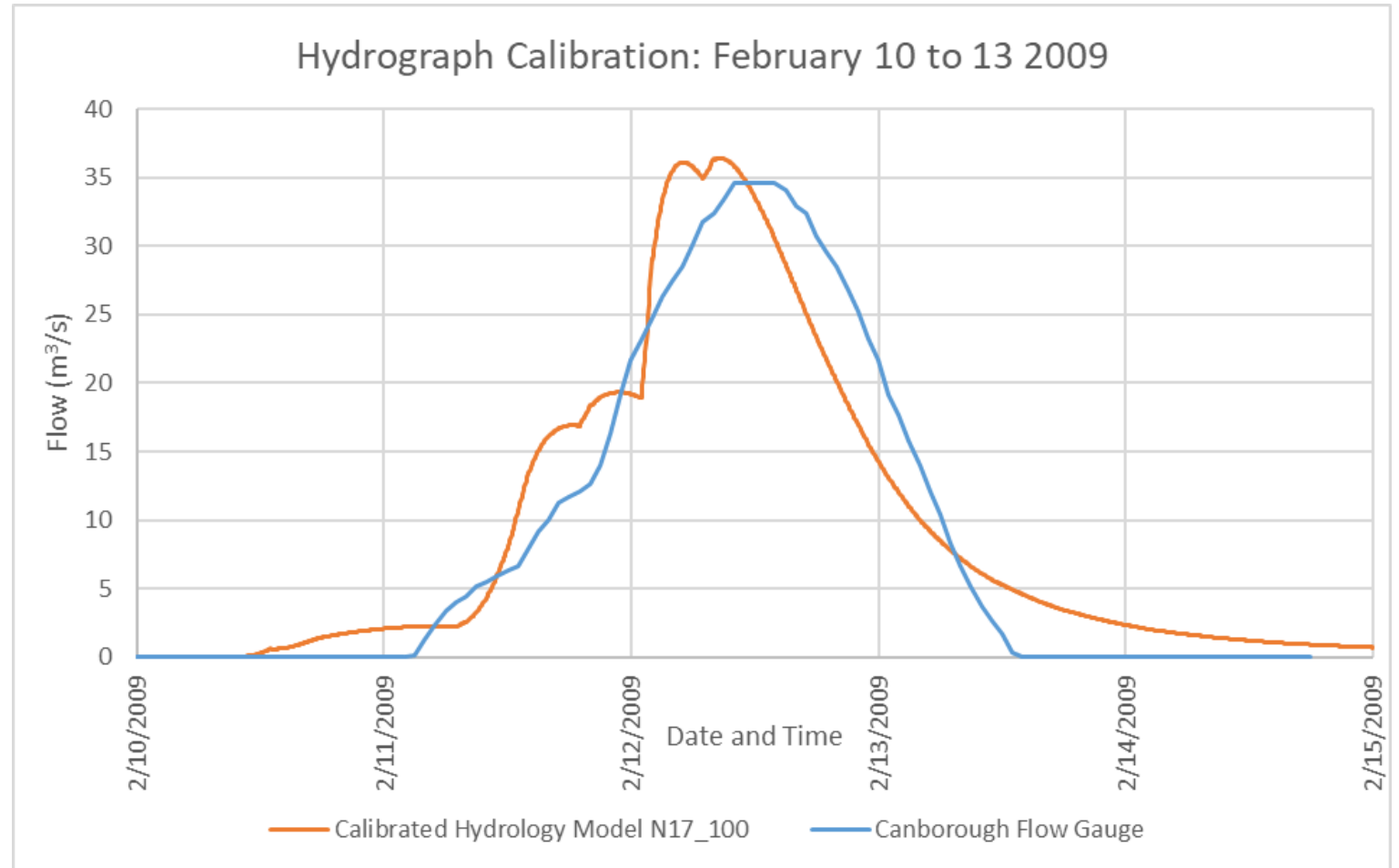
Topography from LiDAR



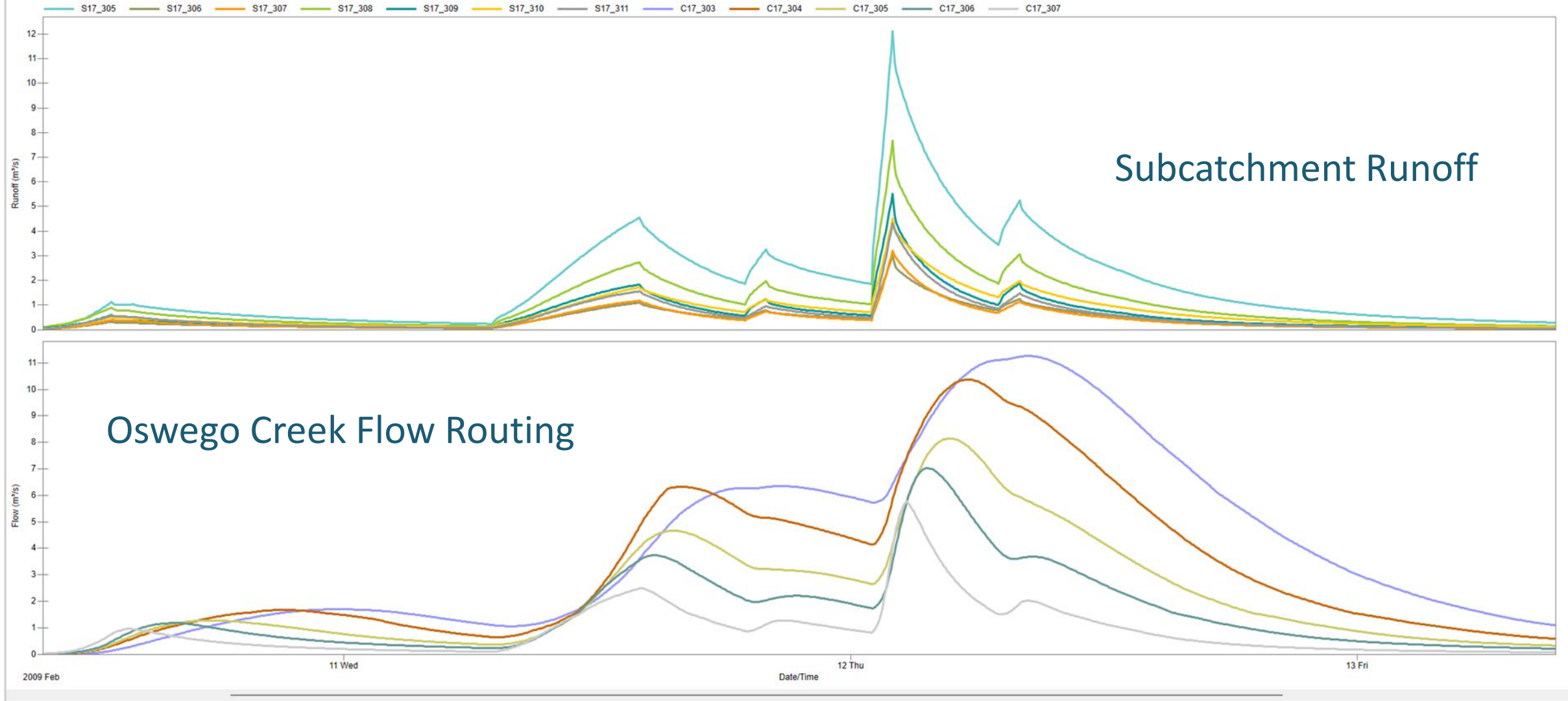
Add Rainfall and Snowmelt



Model Calibration

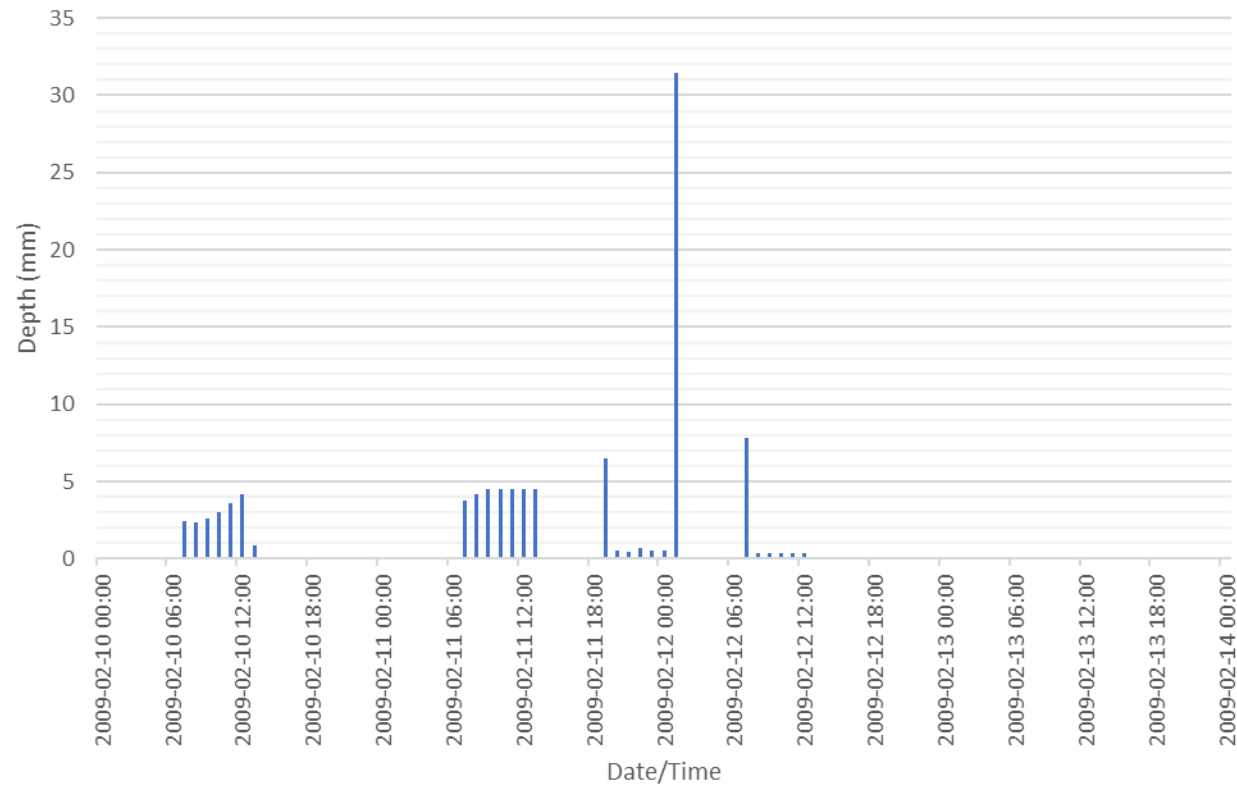


Hydrograph Generation and Flow Routing

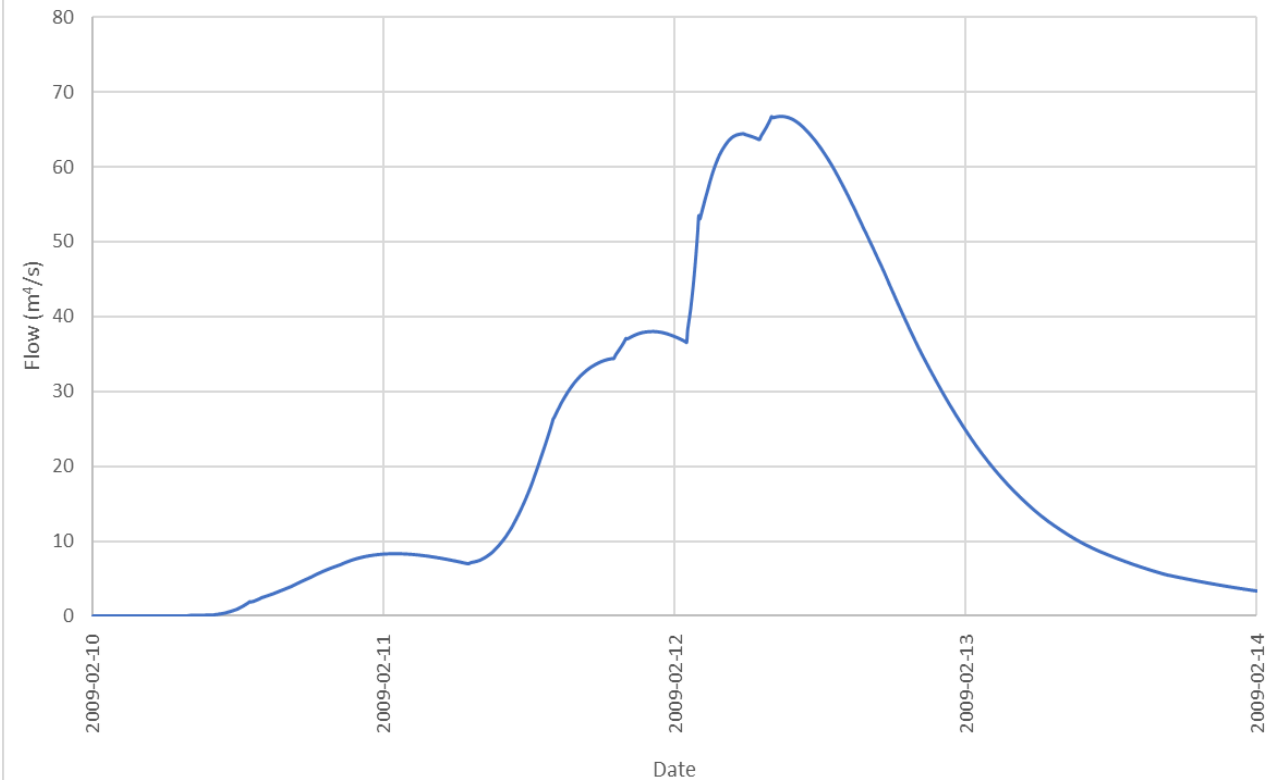


100-year Hyetograph and Hydrograph at Canborough

Synthetic 100-year Hyetograph



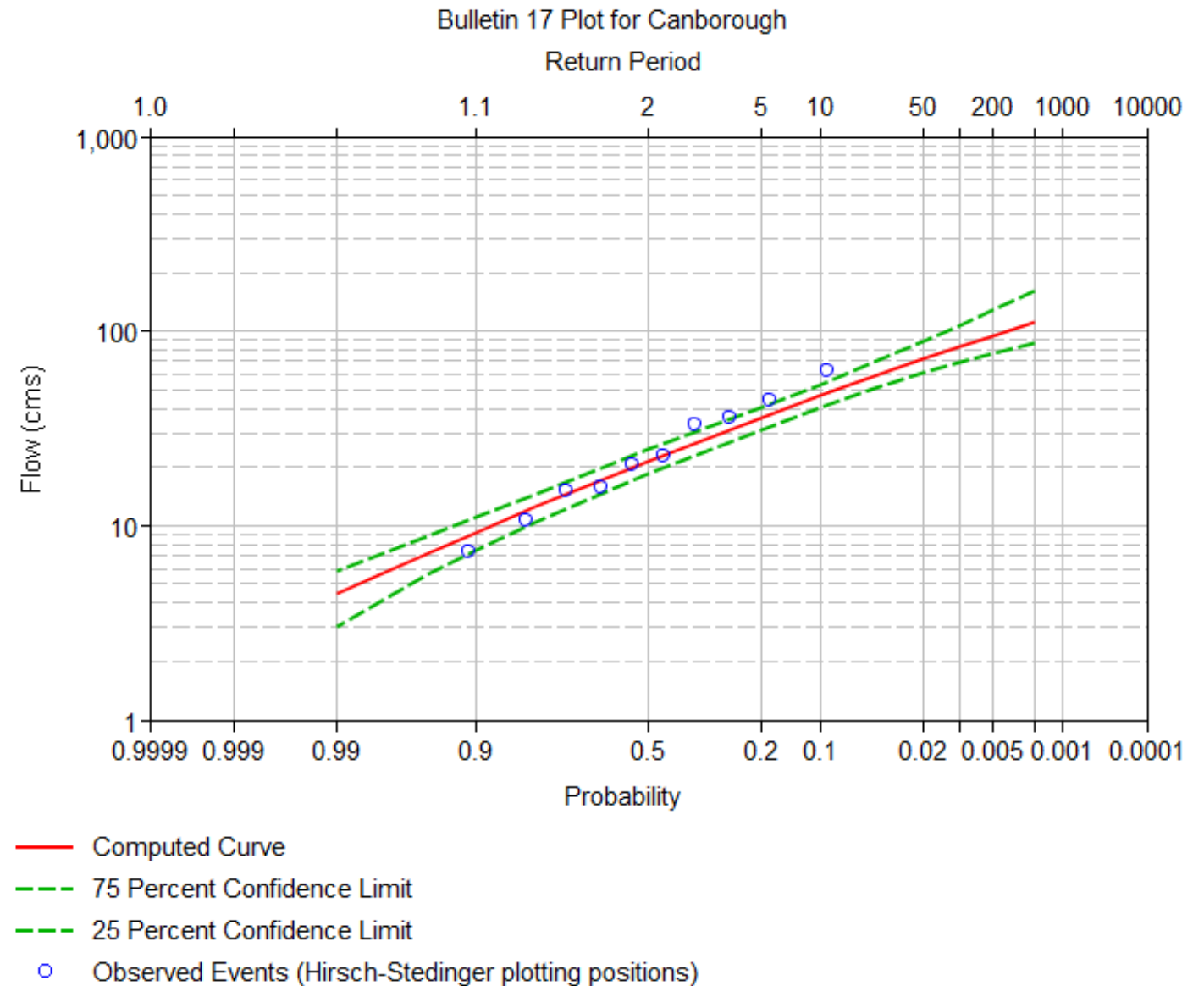
Synthetic 100-year Hydrograph at Canborough



Model Validation Flood Frequency Analyses

Canborough Gauge

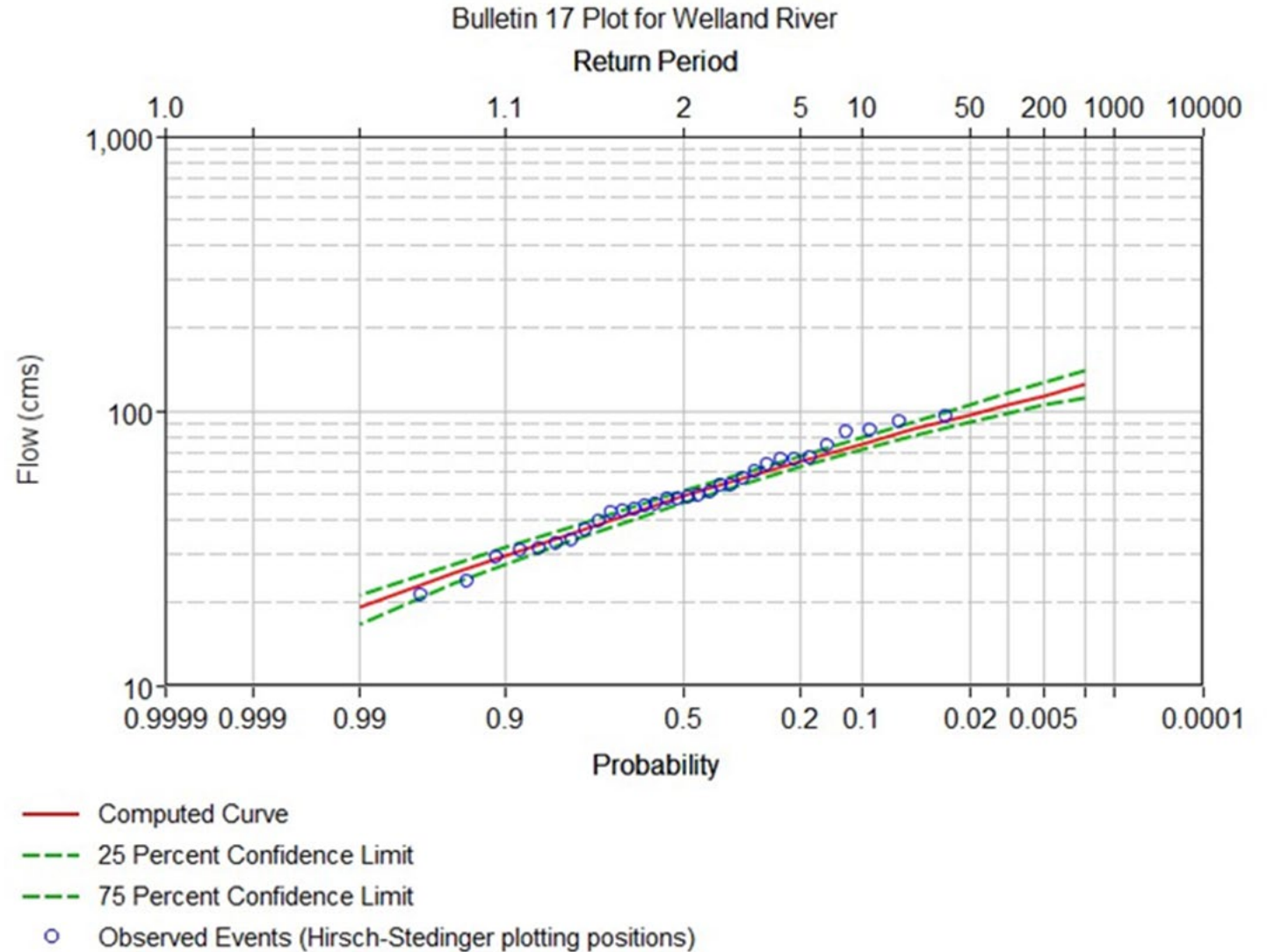
- Limited 10 years of usable record, Poor data set
- Maximum probability event just greater than 10 year



Flood Frequency Analyses

Welland River Gauge

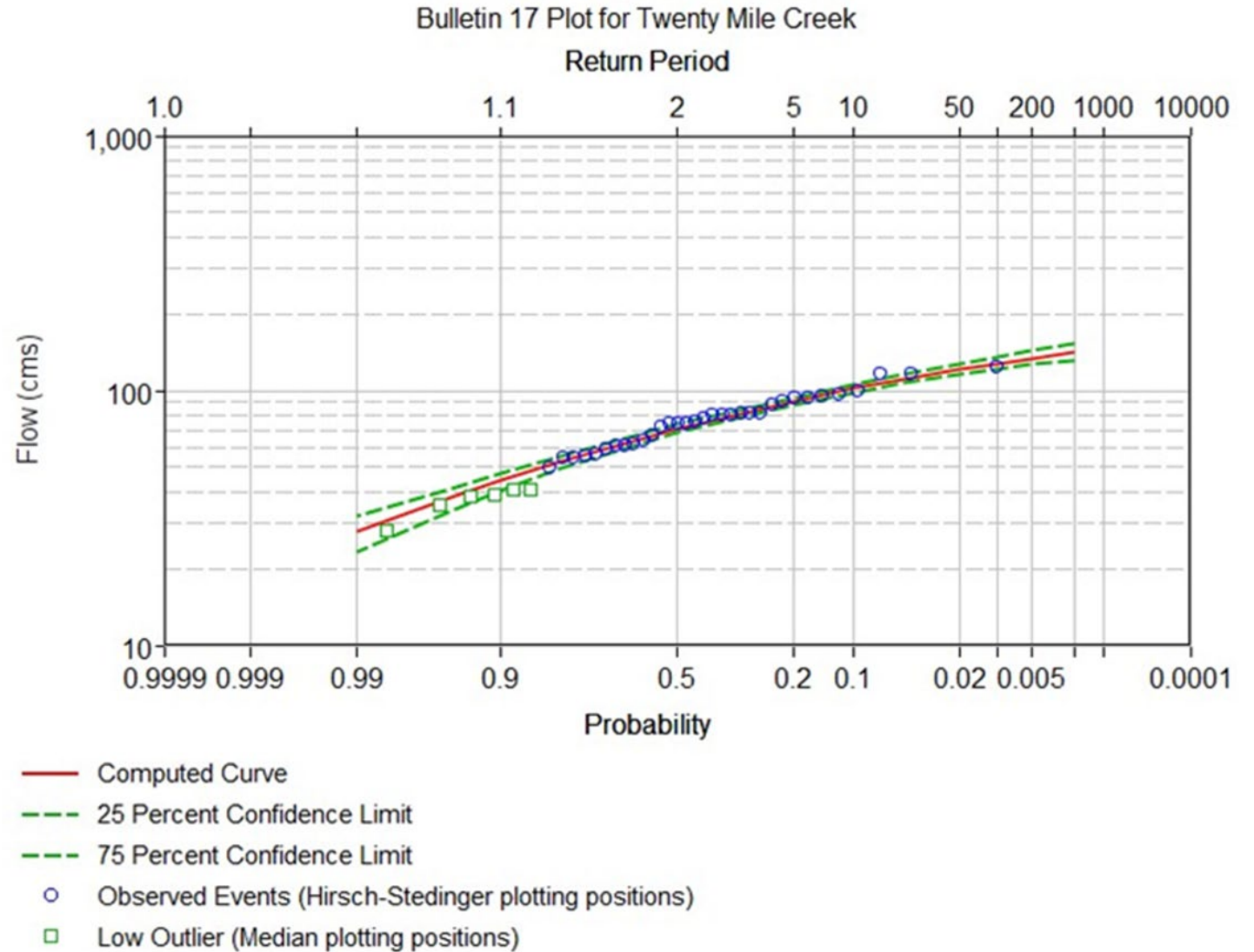
- 32 Years of usable data. Good data set
- Maximum probability event just under a 50 year



Flood Frequency Analyses

Twenty Mile Creek

- 39 Years of usable data. Good data set
- Maximum probability event observed 100 year



Model Validation

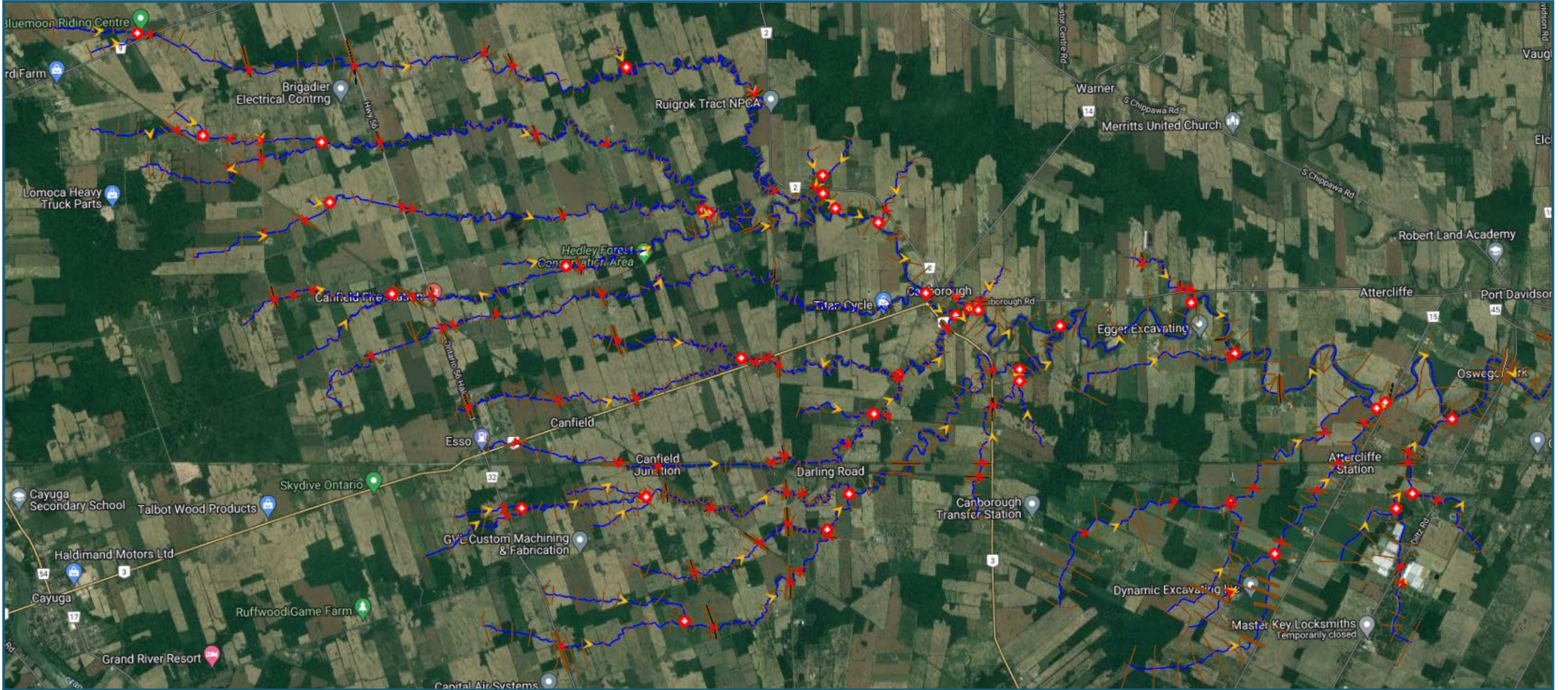
- Flood Frequency Analysis Comparison of 100-year peak flows at the Canborough Flow Gauge

Hydrologic Model/Flow Gauge	Calculated and Estimated 100-year peak flow (m ³ /s)	Comment
PCSWMM Node N17_100	67	Modelled flow is greater than translated flows from FFA and from Welland River study. <u>Further calibration is to be completed.</u>
MMM Group Ltd. Welland River Study (May 2017) Catchment 1017	47	Welland River study flow lower than PCSWMM model and translated flows from FFA
02HA024: Canborough FFA	83	Not suitable for comparison. Database limited for reliable statistical analysis
02HA006: Transformed flow from Twenty Mile Creek at Balls Falls FFA	50	Translated flows compare well to each other and lie within the middle of the data set but closer to the Welland River study
02HA007 Transformed flow from Welland River below Caistor Corners FFA	50	

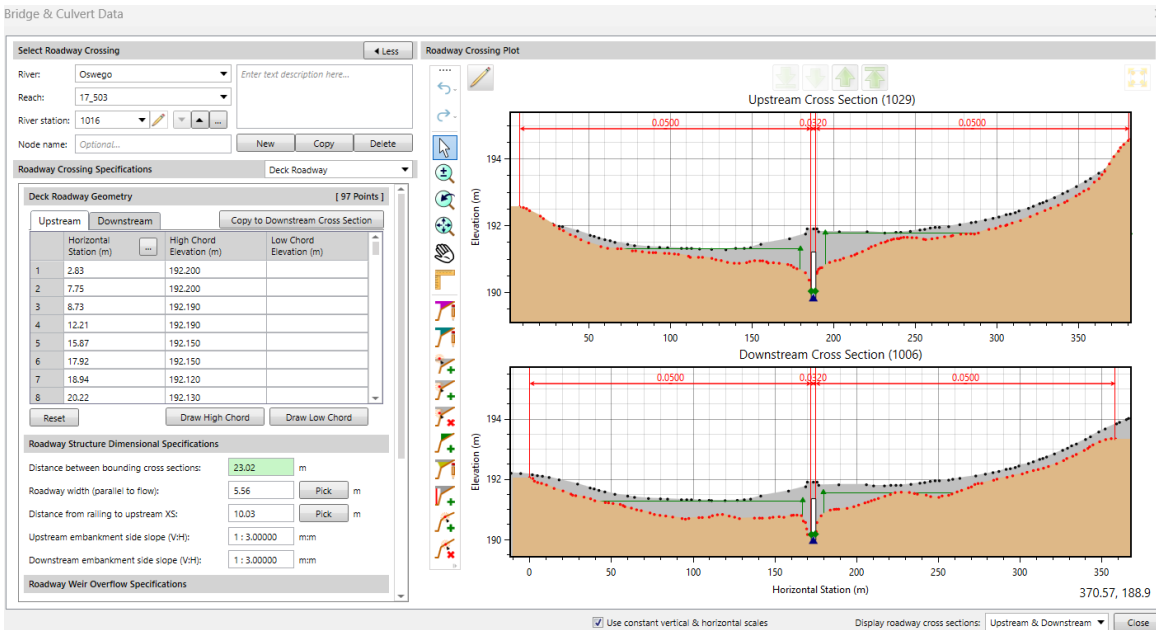
50, 100 and 200-year Peak Flows

Return Period (Year)	Canborough (m ³ /s)	Oswego Creek Outlet (m ³ /s)
50	63	108
100	67	114
200	72	120

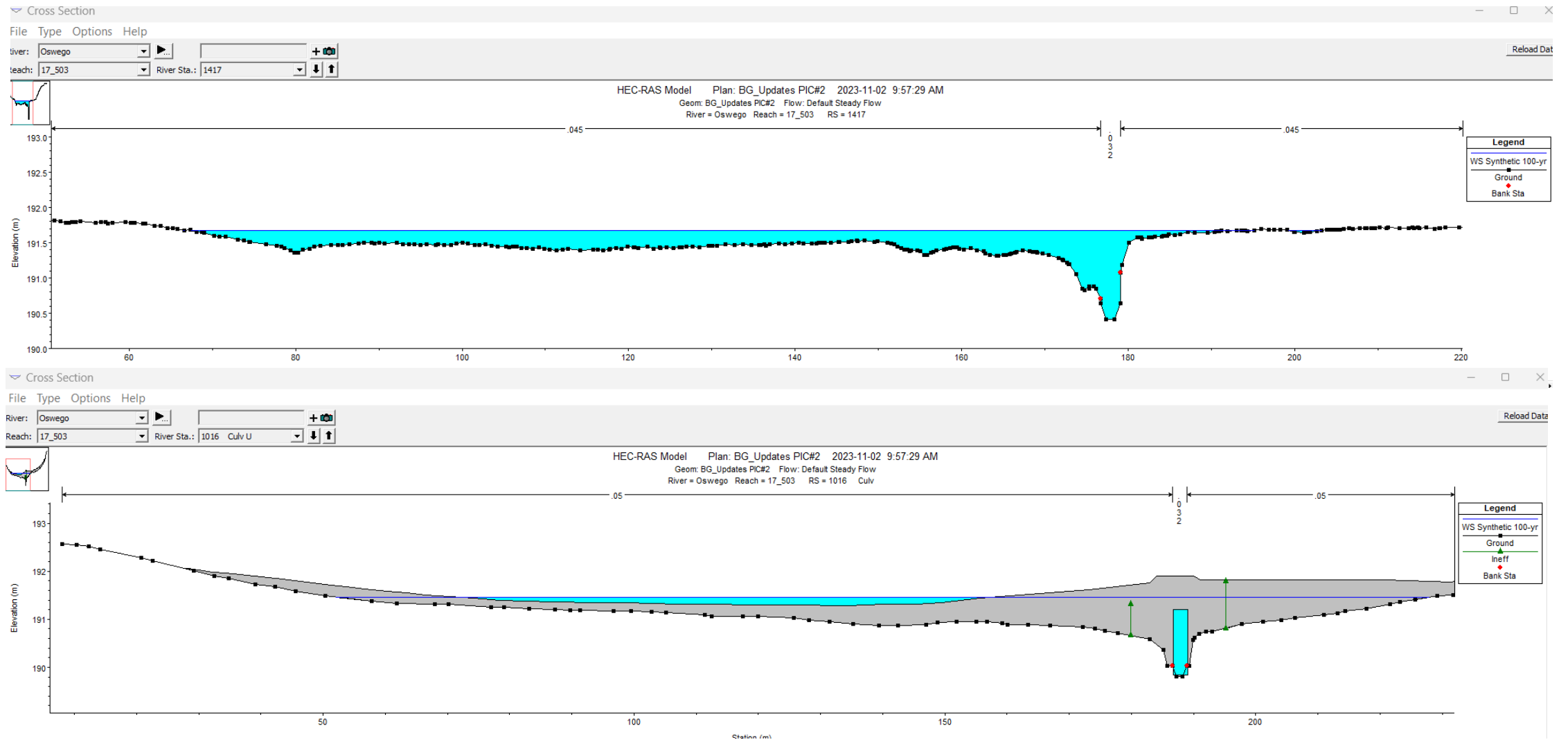
Hydraulic Model



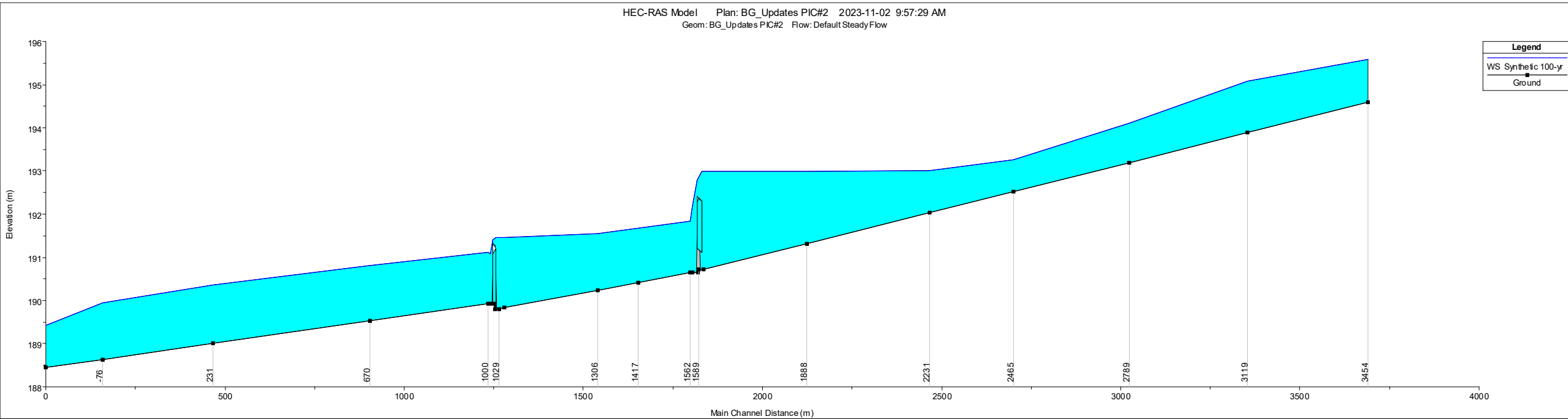
Channel and Floodplain



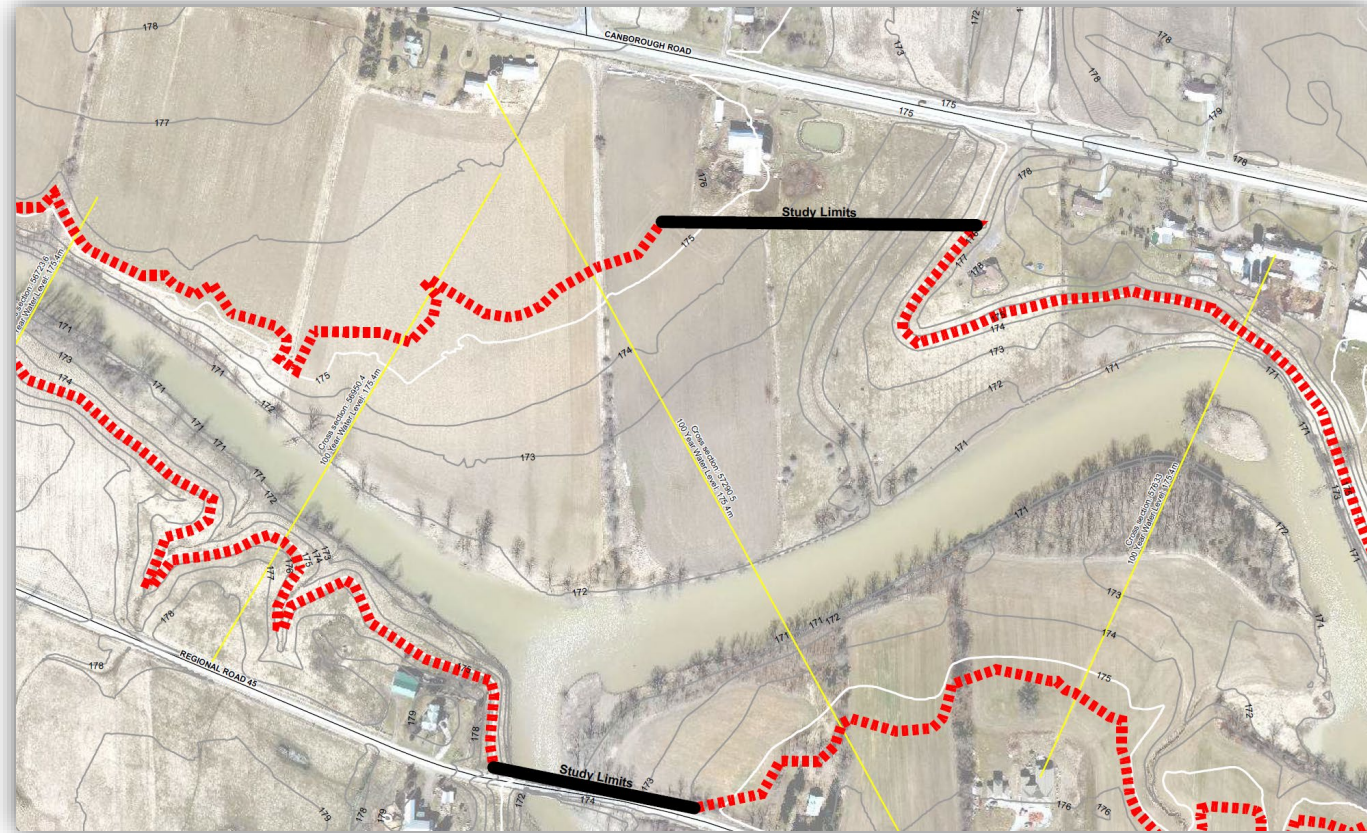
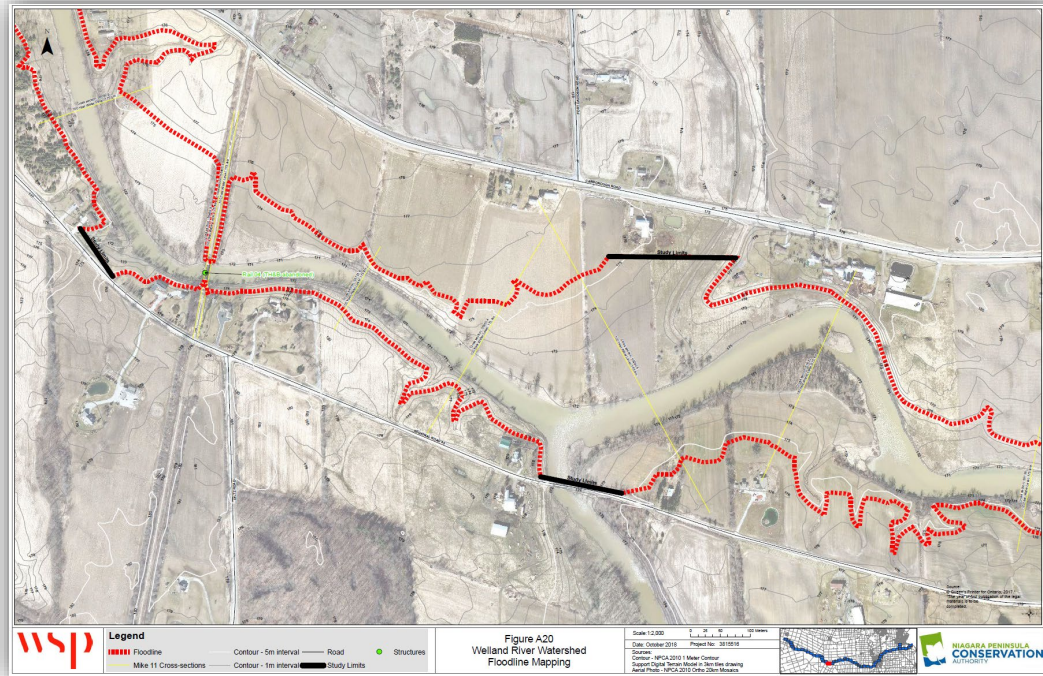
Example Model Results



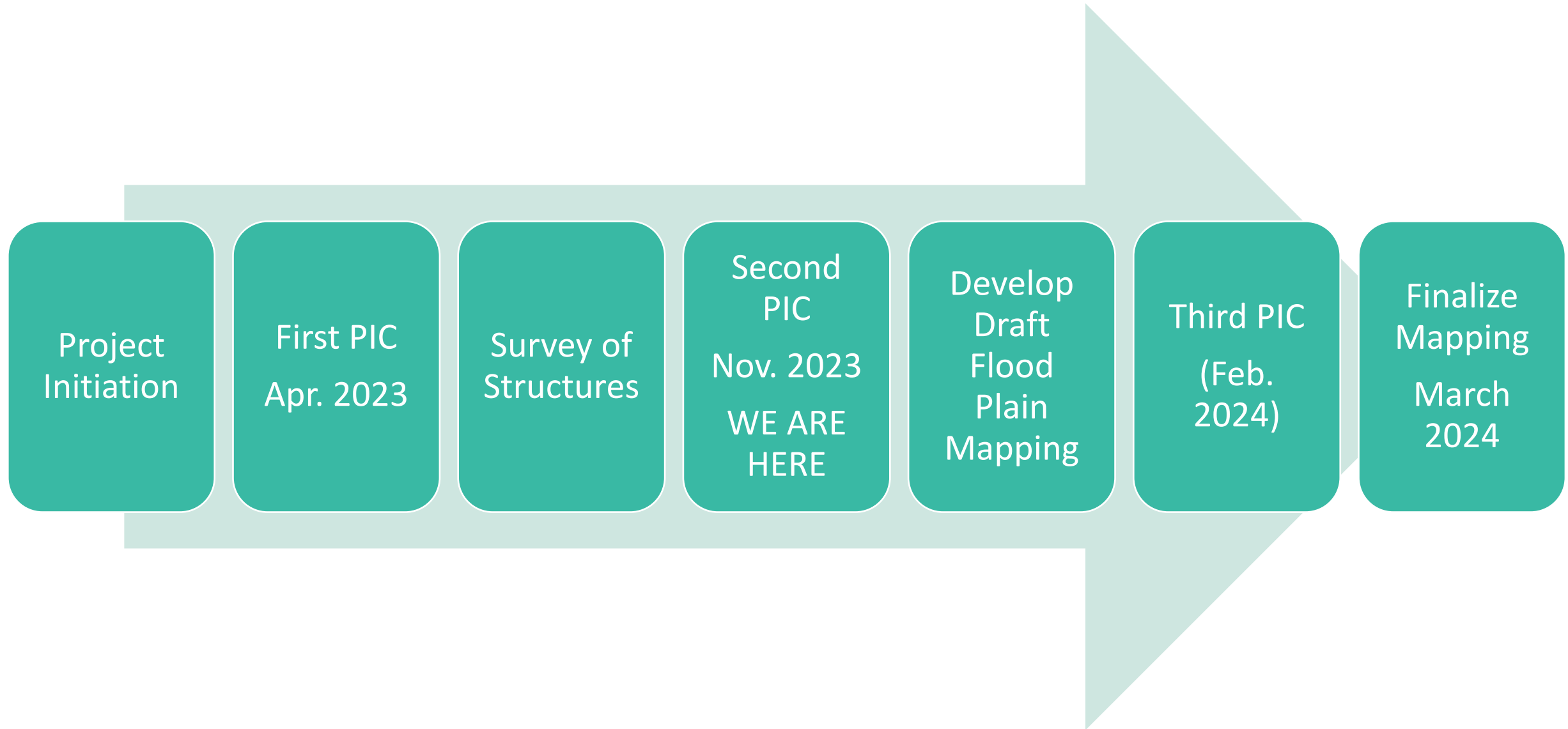
Example Model Results



Example Floodplain Map Sheet



Project Milestones



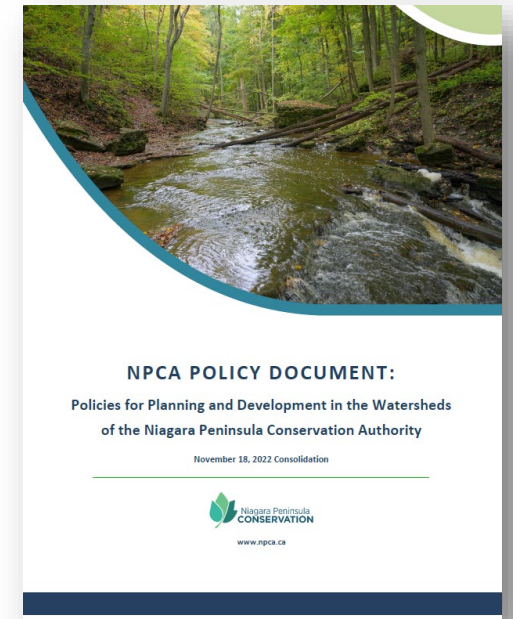


Niagara Peninsula
CONSERVATION
nature for all

NPCA FLOODPLAIN POLICIES

November 14, 2023

David Deluce, MCIP, RPP
Senior Manager, Environmental Planning and Policy



Legislative Context

- *Conservation Authorities Act* – Section 28
- *Ontario Regulation 155/06*
 - Subsection 2(1) – Development prohibited; and
 - Subsection 3(1) – Permission to Develop
 - New Regulation expected in the future
- *Planning Act*
 - Section 3 – Provincial Policy Statement, Natural Hazards



NPCA Policies

- Current policies approved November 2022
- Policies guide NPCA decision making
- Policies will need to be updated following Provincial approval of a new Conservation Authorities Act s.28 Regulation



What is Allowed?

- Passive open space uses
- Accessory structures (subject to criteria)
- Additions to existing buildings (up to 46.5 square metres)
- New agricultural buildings (subject to criteria)
- Up to 50 cubic metres of clean fill
- Balanced cut and fill
- Other uses not likely to incur damage from floodwaters



What is Not Allowed?

- Sensitive uses, such as hospitals, nursing homes, day-cares/pre-schools and schools
- Emergency services facilities
- Uses associated with the disposal, treatment, manufacturing/processing or storage of hazardous substances
- Any other use or development deemed to be inappropriate based on the following objectives:
 - Prevent loss of life;
 - Minimize property damage and social disruption;
 - Reduce the potential for incurring public costs associated with the impacts of flooding hazards;
 - Manage existing risks and reduce the potential for future risks;
 - Promote the conservation of land and a coordinated approach to the management of water.



NPCA Role in Planning Applications

- Conservation Authorities required by Province to review applications for:
 - Consistency with Natural Hazards Policies of the Provincial Policy Statement
 - Conformity with Natural Hazards Policies of any applicable Provincial Plan
- NPCA seeks to avoid situations where a Planning approval is given but an NPCA Permit cannot be supported

Stay Informed and Have Your Say

www.npca.ca



GET INVOLVED, NPCA

Welcome to Get Involved, the Niagara Peninsula Conservation Authority's online engagement platform, where you can contribute your feedback and ideas on issues and projects that are important to you.

We want to empower you, the people of our watershed, to be more active in shaping your community and future.

We will listen to what you say, take your opinions into account, and report back on how community input contributes to NPCA projects.

We invite you to join the conversation and share your thoughts.

[Register / Follow the Projects](#)

Home / Oswego Creek Floodplain Mapping

Oswego Creek Floodplain Mapping

The Niagara Peninsula Conservation Authority is in the process of updating floodplain mapping for Oswego Creek in Haldimand County and portions of Wainfleet. An important part of this process is engaging our community, particularly those who live in the vicinity of the creek. This portal will house important documents that all are welcome to review, a project timeline which outlines the process for updating the floodplains, and frequently asked questions.

HOW TO GET INVOLVED & PARTICIPATE:

1. Attend the upcoming info session on Tuesday, November 14, from 6-8 p.m. at Camarborough Community Centre in Dunville.
2. Email written comment to Tim Meru, Program Manager of Floodplain Mapping Projects, at tim.meru@npca.ca
3. Mail in your written comment to NPCA head office at 250 Thorold Rd 3rd Floor, Welland, ON L3C 3W2.

STAY INFORMED
Subscribe for project updates

Your email address...

SUBSCRIBE

8 members of your community are following this project

Info Session Dates

Oswego Creek Info Session #2
November 14, 2023

More...



Thank you!

Questions?

Leilani Lee-Yates, Director, Planning and Development, NPCA

Tim Mereu, Project Manager, Floodplain Mapping, NPCA

Brian Greck, Project Director, Greck and Associates Limited

David Deluce, Senior Manager, Environmental Planning & Policy, NPCA