Huron Shores Floodplain Mapping Study

Presentation to Public Open House Meeting



March 14, 2024

Presented By: S. Thapa and S. Lawal

Agenda

- Presentation based on the Final Report and Maps (Hatch)
- Q & A and Discussion

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Floodplain Mapping Study Scope

- Bathymetric data collection (by Tulloch)
- Hydrology Study – Review/Update
- Hydraulic Modeling
- Prepare Technical Report and Floodplain Maps

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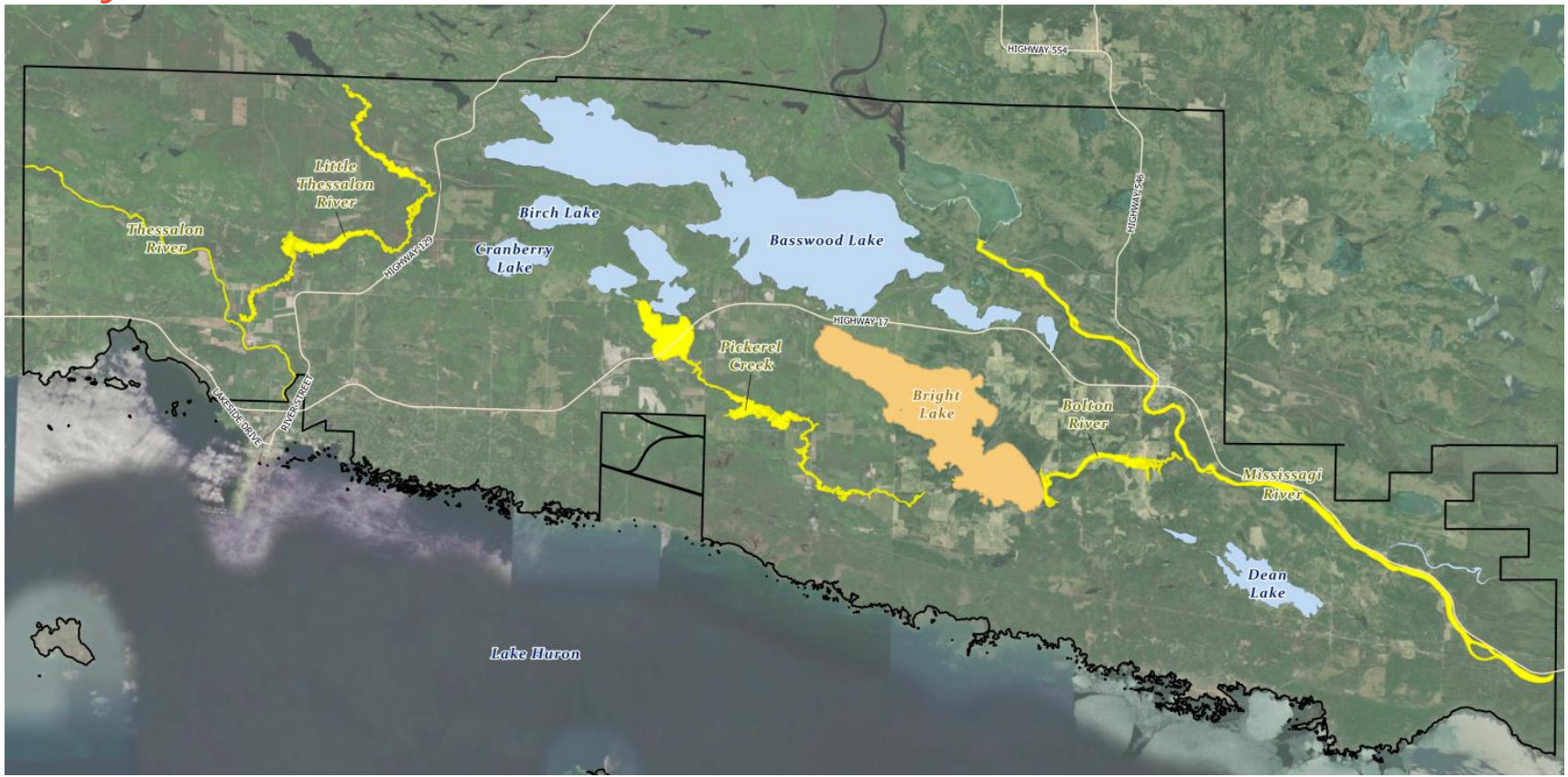
Study Area



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Available Data and New Data Collection

- Available Data
  - LiDAR imaging, 2021 (Tulloch)
  - Bathymetric survey, 2021 (Tulloch)
- New Data Collection
  - Site visit by SThapa (May 10-12, 2023)
  - Bathymetric survey 2023 (Tulloch)

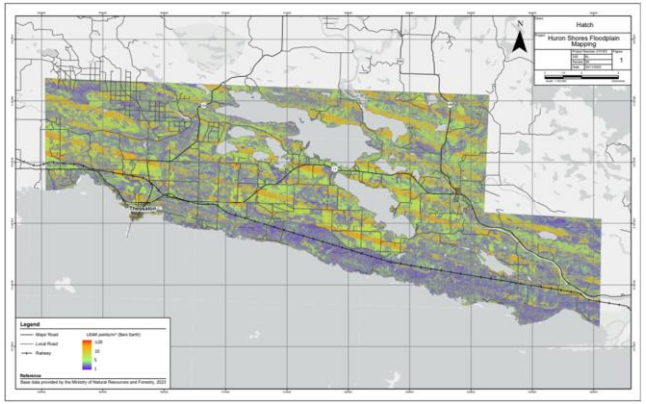

Figure 2-1: 2021 LiDAR Collection and Point Density

Table 3-1: Summary of Bathymetric Surveys

River Name	Number of Cross-Sections	Data Collection Dates
Mississagi River	48	October 6-7, 13-14, and 29, 2021
Thessalon River	46	October 15, and 25-27, 2021
Little Thessalon River	44	July 31, 2023 August 1, 3, 9-10, and 21, 2023 September 6, 2023
Pickerel Creek	38	August 11, 14-15, and 21-22, 2023 September 6, 2023
Bolton River	18	August 22, and 24-25, 2023

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Hydrology Study

- Establish Regulatory Flood for the study areas
- Regulatory Flood for the study area (Zone 3, MNRF Flood Hazard Criteria) must be the greater of
  - a flood resulting from the Timmins storm
  - the 100-yr flood, and
  - the flood of record
- Methodology
  - Hydrologic models setup, calibration (July 2013) and Validation (July 2008) using historical data ; The calibrated model is then used to simulate flood flows corresponding to the Timmins storm (typically found critical for smaller watersheds)
  - 50-yr and 100-yr flood for Mississagi River based on a single station flood frequency analysis (WSC Gauge 02CC008, 1940 to 2022)
  - 50- yr and 100-yr flood for Thessalon, Little Thessalon, Pickerel Creek, Bolton River and Bright Lake estimated using regional flood frequency analysis (14 number of WSC gauges from around the study area)
  - Flood of Record (Mississagi River 1979, Thessalon River 2013)

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2013 Flood Extent

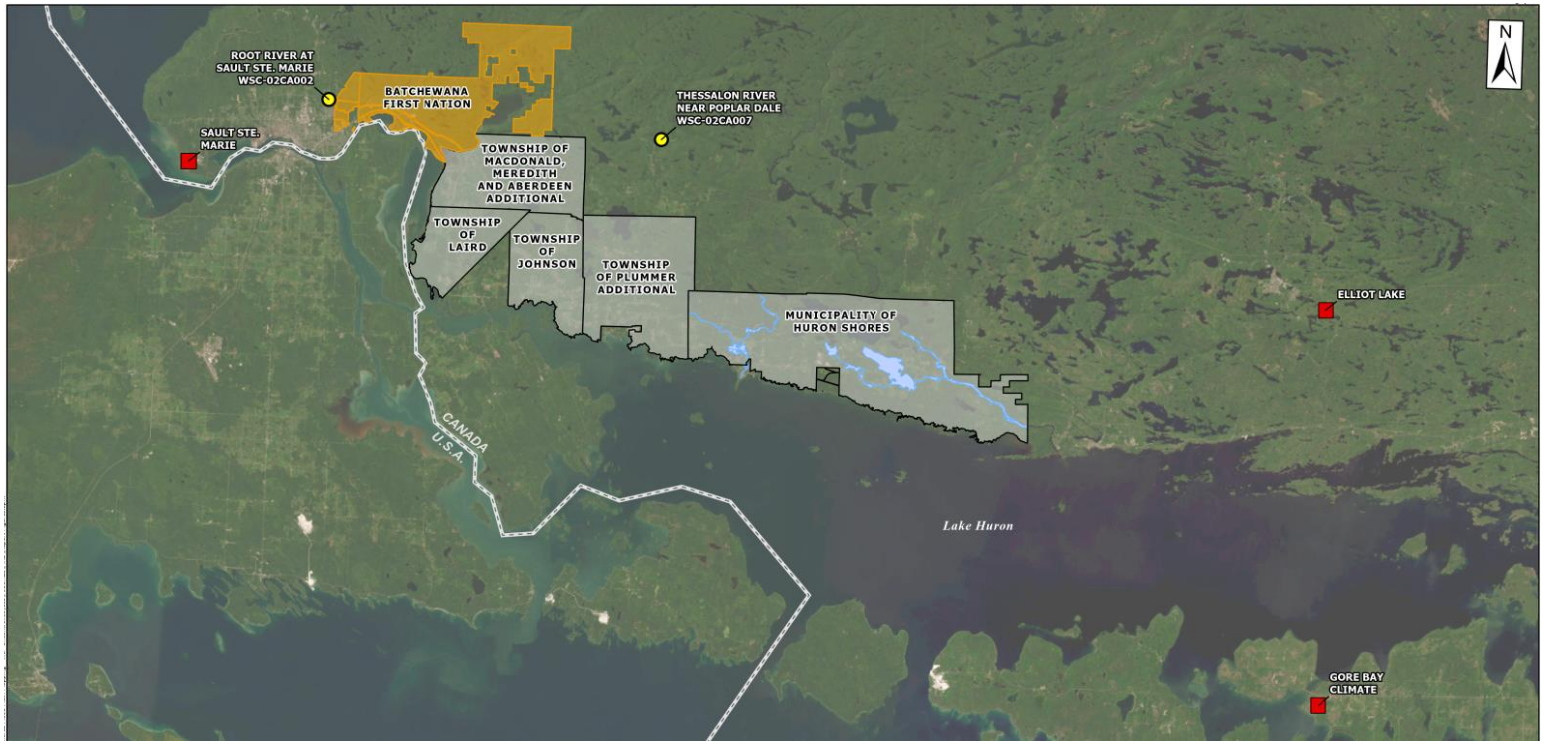

Figure showing six municipalities that declared emergencies during Sept. 10, 2013 Flood

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2013 Flood as Flood of Record

Station (Approx. distance from Huron Shores)	5-Day Rainfall	Flow	Estimated Return Period
Sault St. Marie (61 km)	+90 mm	N/A	10-yr
Gore Bay (113 km)	+107 mm	N/A	25-yr
Elliot Lake (90 km)	No Data	N/A	No Data
WSC 02CA002 (1970-2020)		60 m^3/s	55 to 60-yr
WSC 02CA007 (2007-2022)		76.4 m^3/s	10 to 20-yr

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Hydrologic Study Contd. Climate Change Proxy (Ref. FHIMP, 2023)

- **If the regulatory flood is the 100-yr event** – select a climate change proxy event equal to the 200-yr flood. The 200-yr flood is estimated either based on analysis of historical flow/level records, or by simulating the 200-yr rainfall hyetograph using the method described in Section 4.4. To implement the methodology in Section 4.4, IDF curves were extrapolated beyond their 100-yr rainfall value to yield an estimate for the 200-yr return period.
- **If the regulatory flood is the Timmins storm** – select a climate change proxy flood resulting from a scaled Timmins storm hyetograph. In this case, the Timmins storm is scaled by a factor derived from the methodology outlined in Appendix C. Using RCP4.5 scenario data from climatedata.ca for Thessalon River watershed, a factor of 1.23 was derived. The scaled Timmins storm is derived by multiplying all rainfall values by 1.23.

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Summary of Floods

Table 4-36: Summary of Flow Estimates and the Regulatory Flood Flows

Location	Drainage Area (km^2)	Peak Flow (m^3/s)					Regulatory Event
		Timmins	50-Yr	100-Yr	200-Yr	Climate Proxy	
Bright Lake to Bolton River	188	14.49	15.7	16.8	19.1	200-yr flood	100-yr
Dean and Little Dean Lakes to Bolton River	11	5.50	3.3	3.6	4.0	7.1	Timmins
Little Basswood Lake to Pickerel Creek	23	9.10	6.7	7.4	8.1	11.9	Timmins
Brownlee Lake to Pickerel Creek	4	2.50	2.1	2.3	2.5	3.2	Timmins
Harris Creek to Bright Lake	91	22.90	21.6	23.5	24.0	200-yr flood	100-yr
Pickerel Creek to Bright Lake	55	29.80	18.1	20.0	21.9	39.0	Timmins
Little Thessalon River at Little Rapids Dam	142	62.90	88.6	98.4	109.0	200-yr flood	100-yr
Thessalon River at Rydal Bank Dam	680	138.90	227.1	256.4	301.0	200-yr flood	100-yr

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River Hydraulic Modeling

- Created in HEC-RAS 6.4.1
- Bathymetry and LiDAR combined
- Calibrated using available water levels
- Steady state simulation for the floods

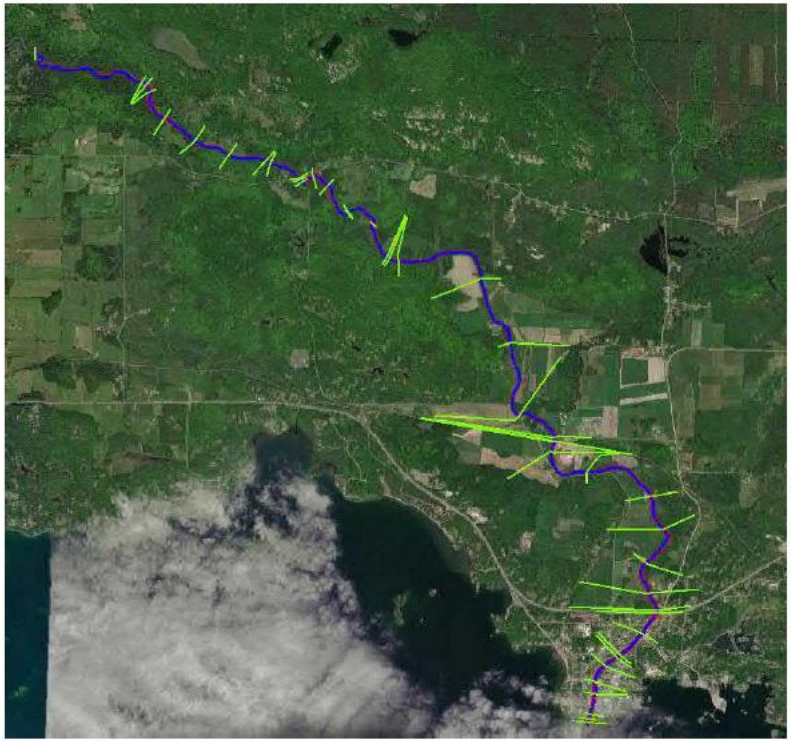

Figure 4-5: Thessalon River Hydraulic Model Schematic and Cross-Section Layout

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Bright Lake, Bolton River and Mississagi River Hydraulic Connectivity

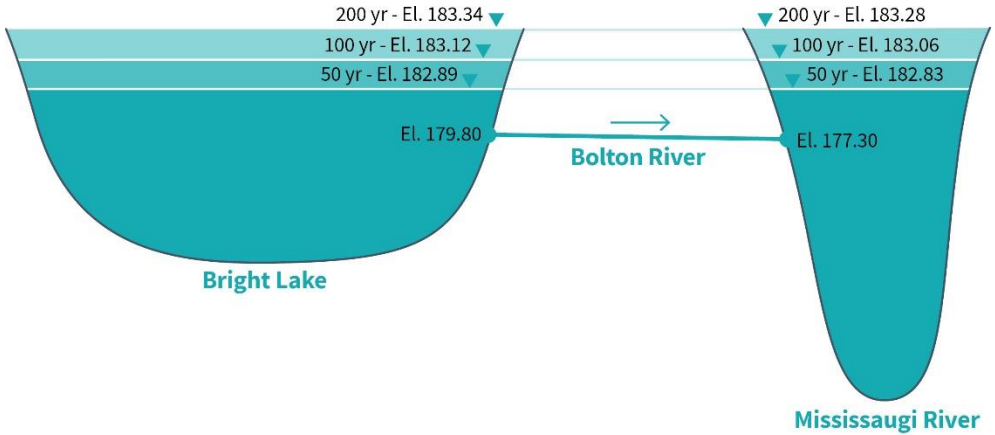

Figure 1: Water Levels in Bolton River and Bright Lake affected by the Flood Level in Mississagi River

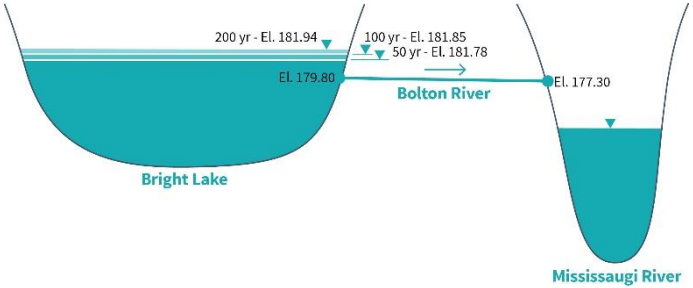

Figure 2: Water Level in Bolton River and Bright Lake NOT affected by the Flood Level in Mississagi River (Hypothetical)

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Thessalon River Typical Cross-Sections

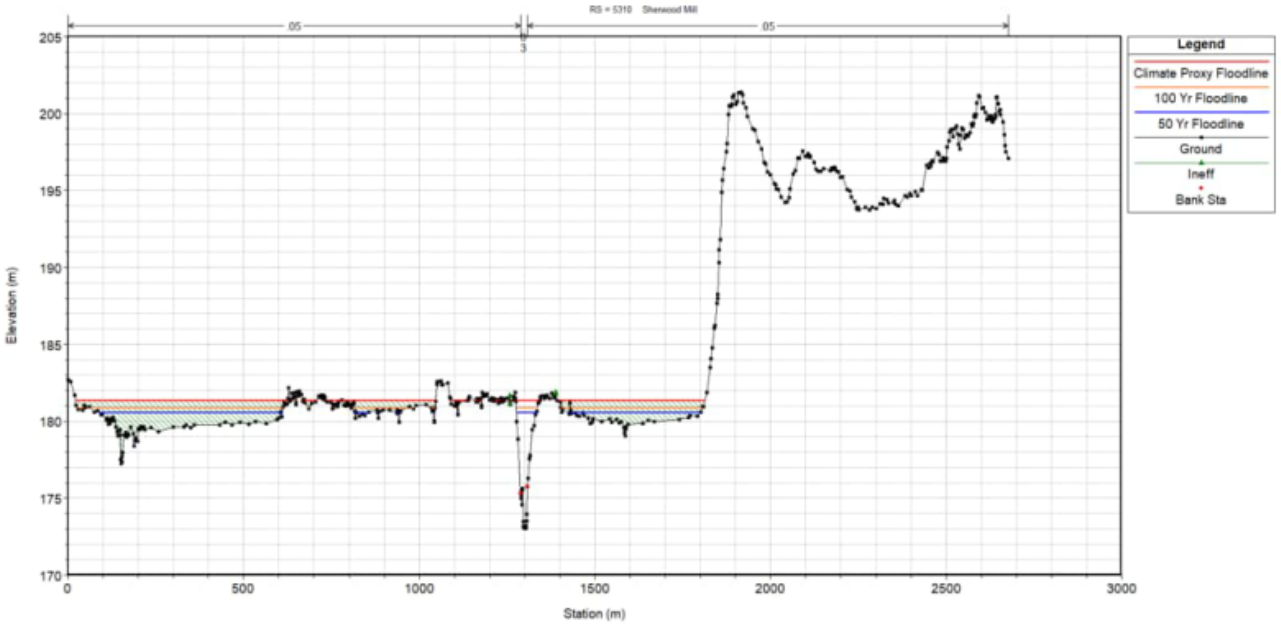

Figure 5-14: Cross-Section Nearby Sherwood Road Showing Water Levels for Three Different Flood Scenarios

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Thessalon River Typical Cross-Sections

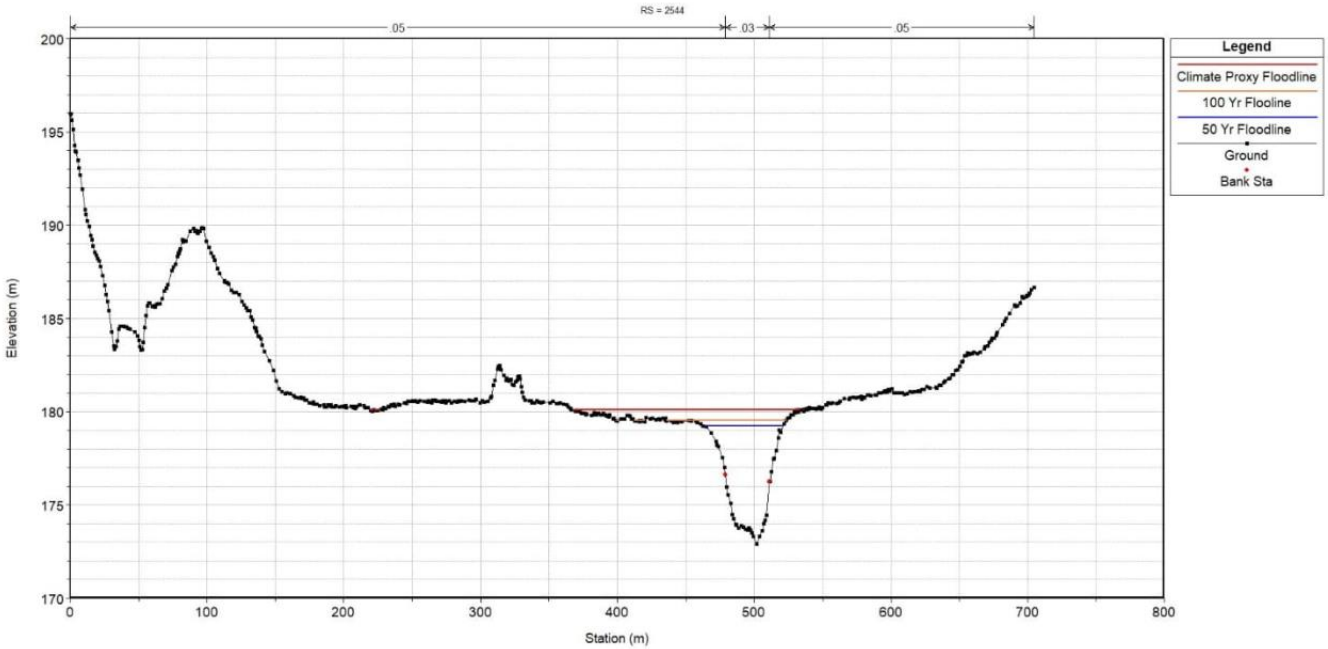

Figure 5-15: Cross-Section Nearby Yates Lane (as referred on Google Map) Showing Water Levels for Three Different Flood Scenarios

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Thessalon River Profile Near Lake Huron Shores

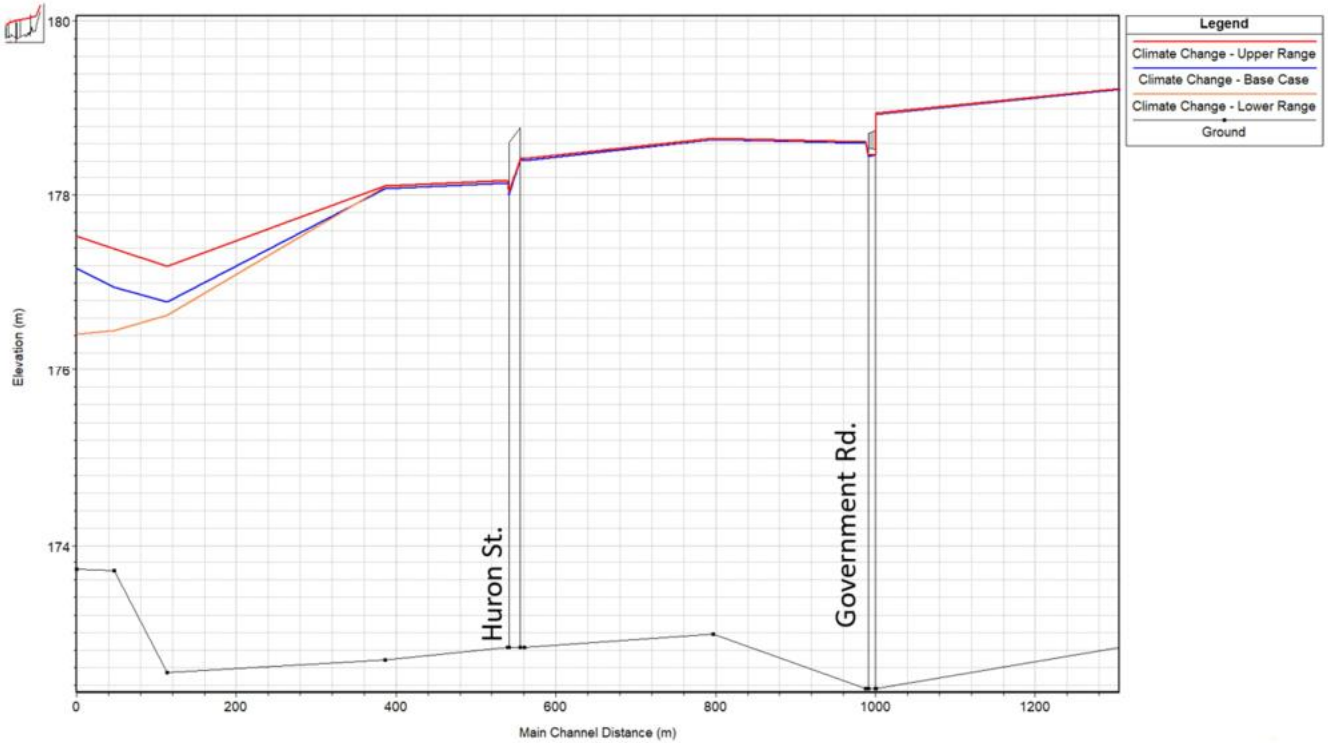

Figure 5-5: Thessalon River Channel and Water Surface Profiles Near Lake Huron Shores, Sensitivity on Lake Huron Levels

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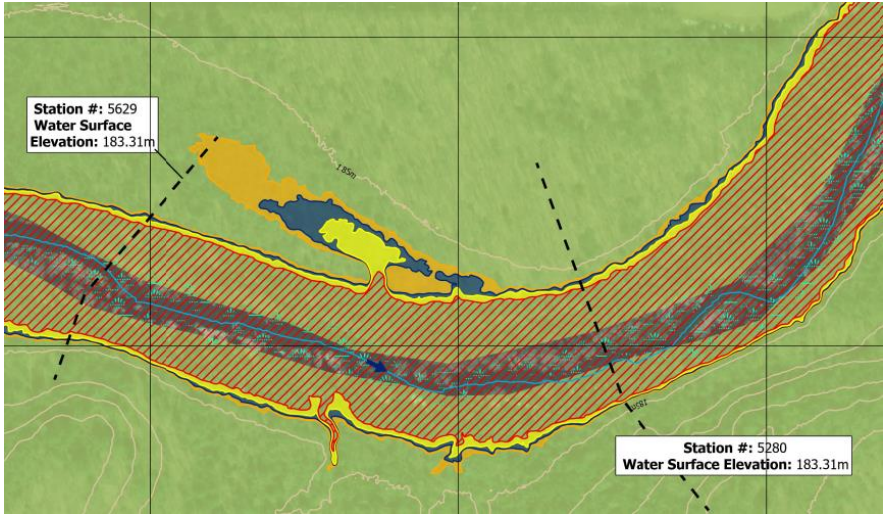
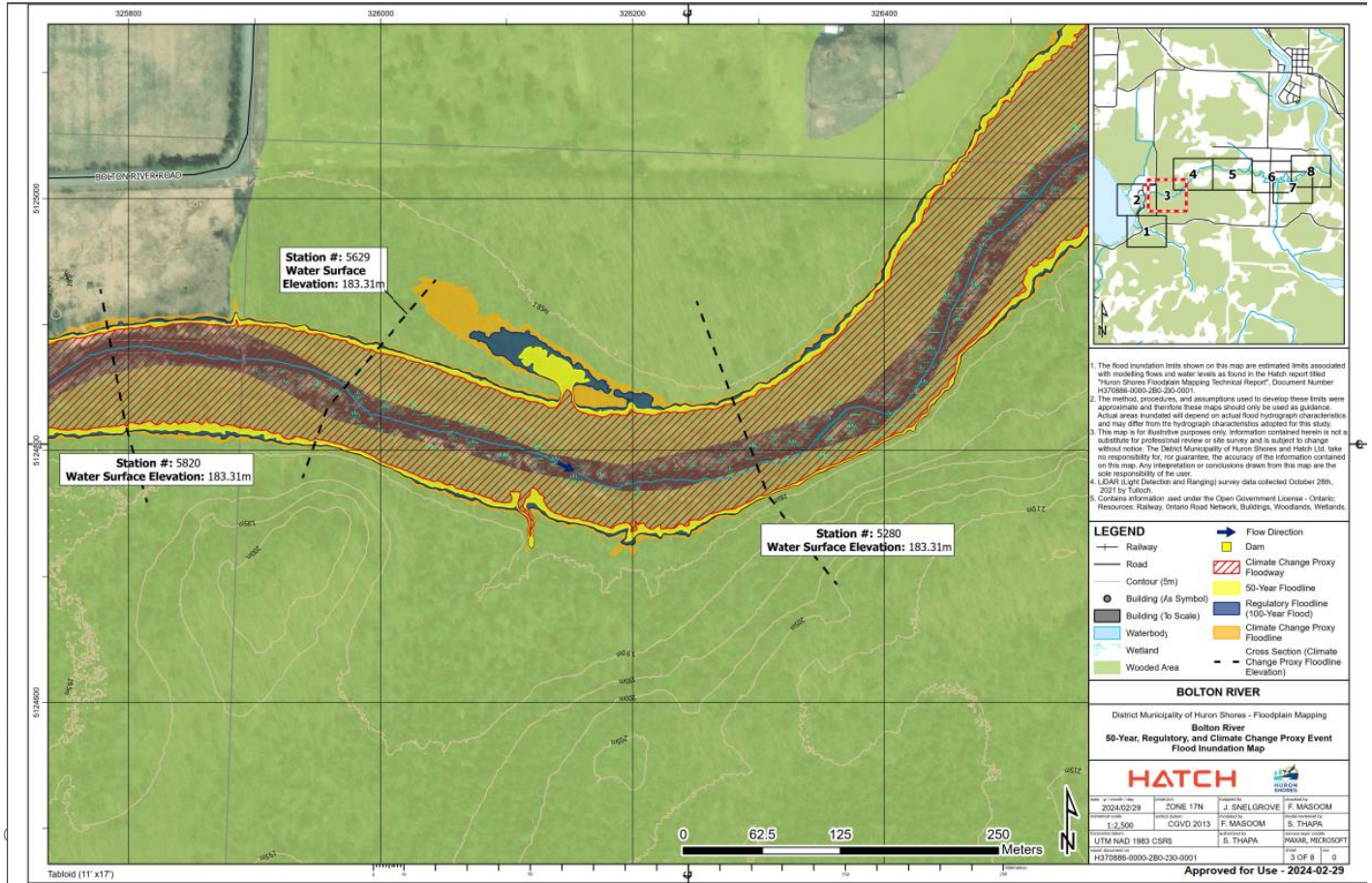
Floodplain Mapping Outcomes

- Each Map, as per FHIMP Guidelines, included:
  - 50-yr
  - Regulatory Flood
  - Climate Change Proxy with Floodway and Flood Fringe
- Floodway (*hatched area*) based on MNRF's 2X2 Rule if
  - Velocity (V) > 1.7 m/s,
  - Depth (D) > 0.8 m,
  - D X V > 0.37 m^2/s



Inundation Map Sample – Bolton River



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Suggested Recommendations

- 15-m horizontal wave allowance along Lake Huron Shoreline (MNRF 2001)
- Educate and understanding of floods within the basin
- Add a network of climate and flow gauges within the study area
- Implement a flood forecasting tool
- Implementation of mitigation measures such as flood protection and flood proofing using established standards and procedures
- Regulate future developments on hazardous lands.

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Thank you.

For more information,
please visit www.hatch.com

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