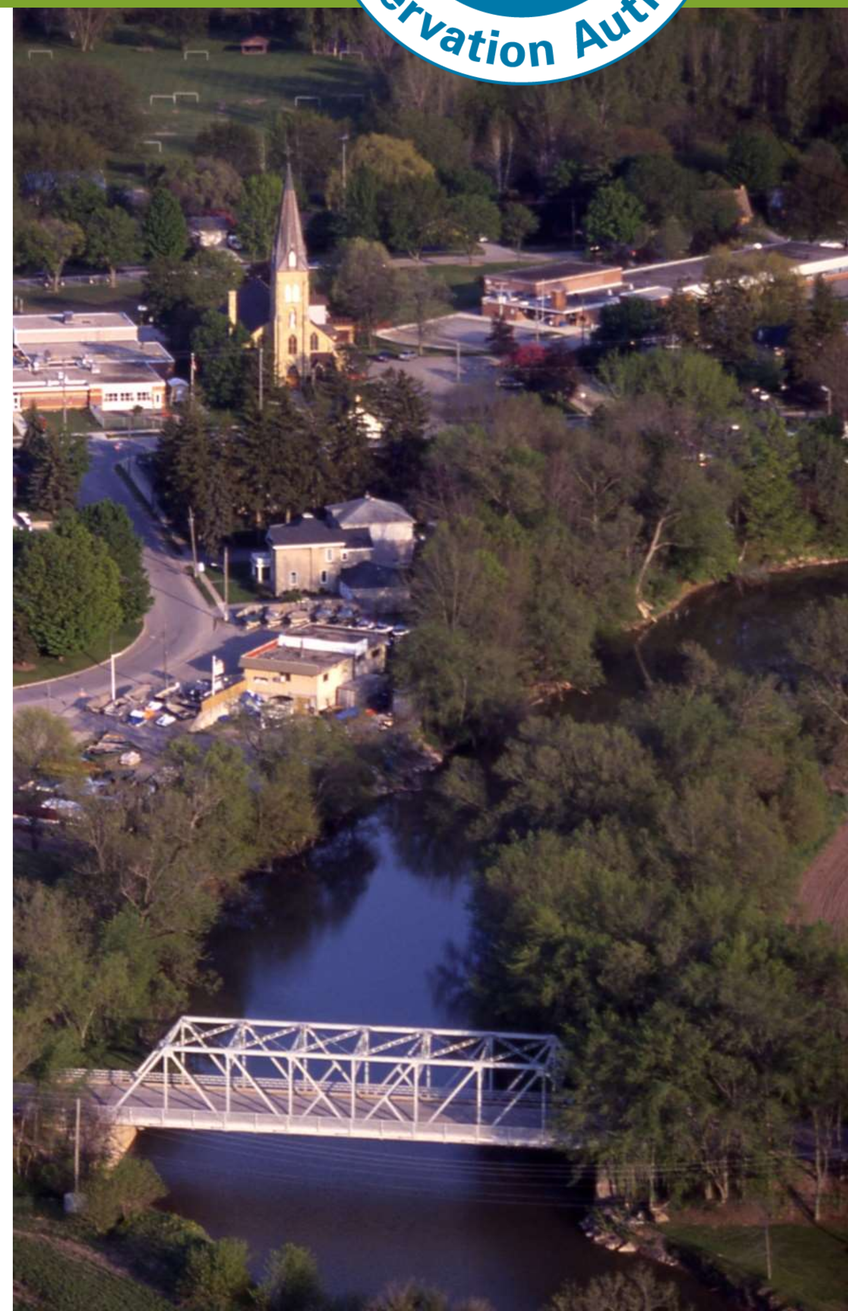
New Hamburg

Flood Mitigation Study

Welcome to the Public Information Centre

- Please sign in and join our project email list
- Review the posters and displays
- The presentation starts at 6:30pm
- You are encouraged to share your experiences and fill out a comment sheet
- GRCA and Matrix staff are here to listen and answer your questions about this study
- Draft proposed Regulatory Floodplain Mapping is available for review



New Hamburg

Flood Mitigation Study

Background

- New Hamburg is one of 17 Flood Damage Centres in the Grand River watershed
- Flooding in February 2018 was caused by snowmelt and rainfall and reached levels not seen since 2008
- In September 2018, GRCA applied for funding under the federal National Disaster Mitigation Program (NDMP) to undertake the New Hamburg Flood Mitigation Study
- GRCA's funding application was approved in Spring 2019

New Hamburg

Flood Mitigation Study

Study Objectives

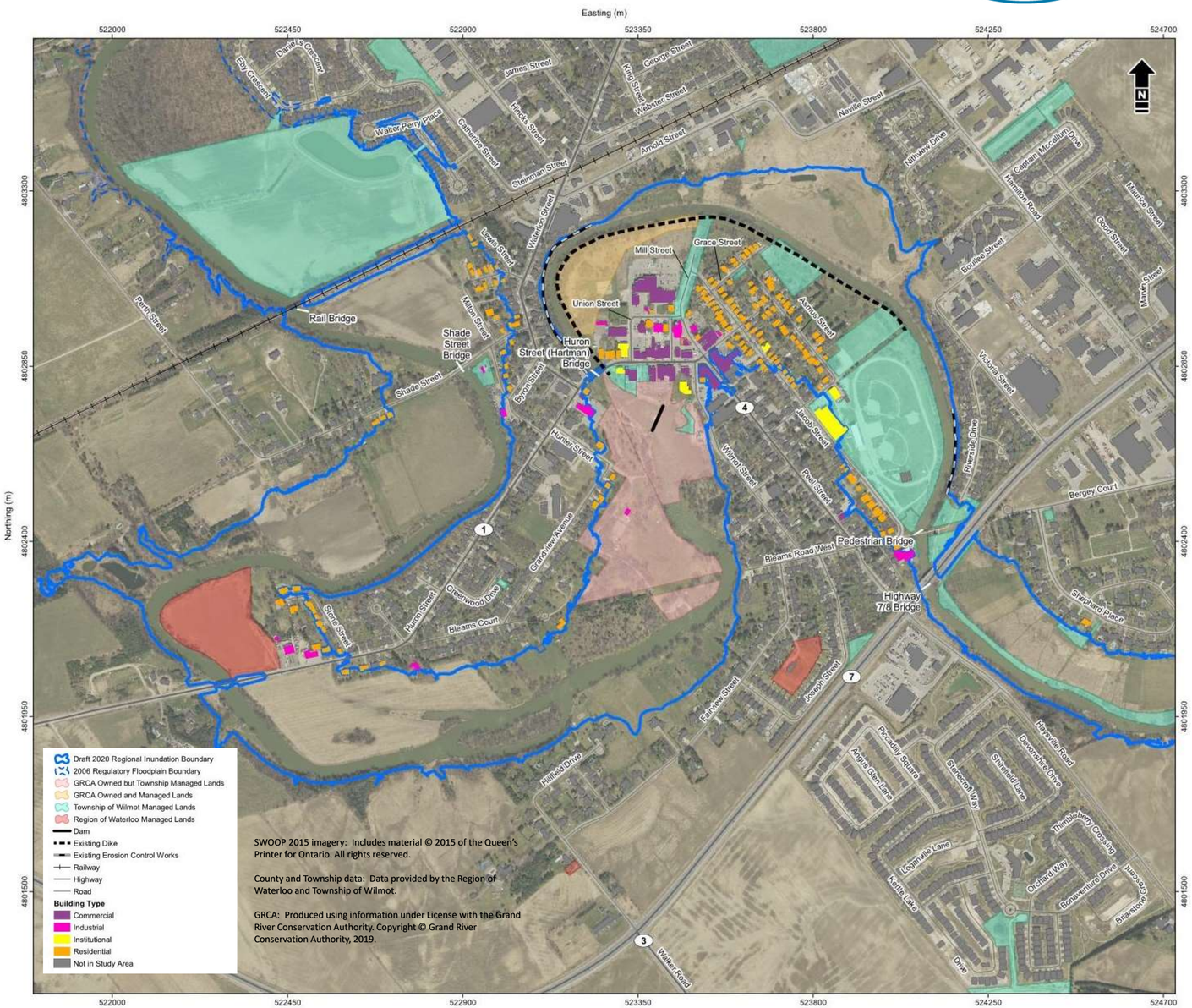
- Update flood mapping
- Estimate annual average flood damage costs
- Identify potential options for flood damage reduction, assess technical aspects, complete preliminary cost-benefit analysis

New Hamburg

Flood Mitigation Study

Study Area

- Annual average flood damages have been assessed for areas at risk of flooding in New Hamburg
- Potential mitigation options and impacts considered by the study were located within New Hamburg or the broader Nith River watershed

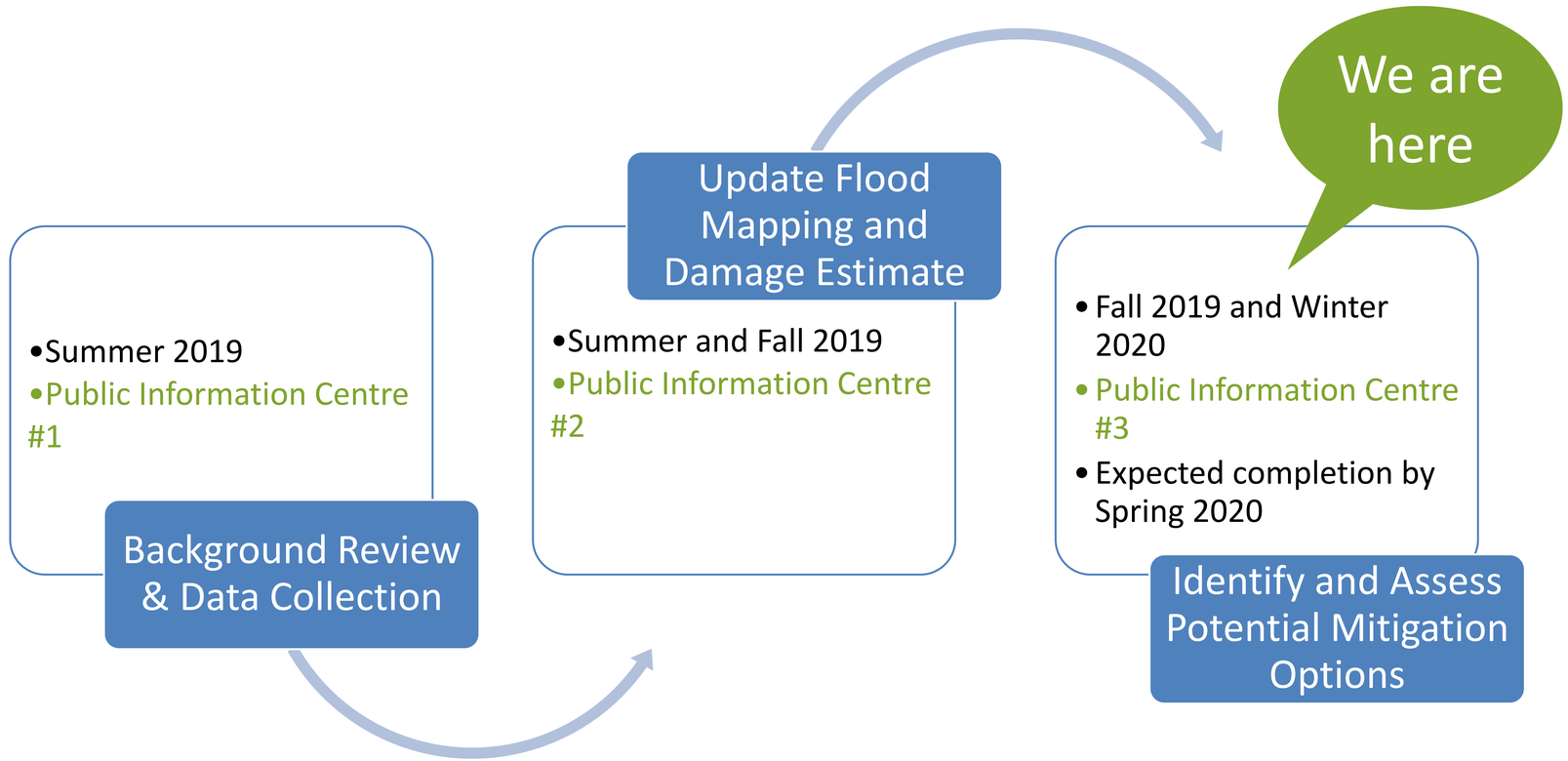


New Hamburg

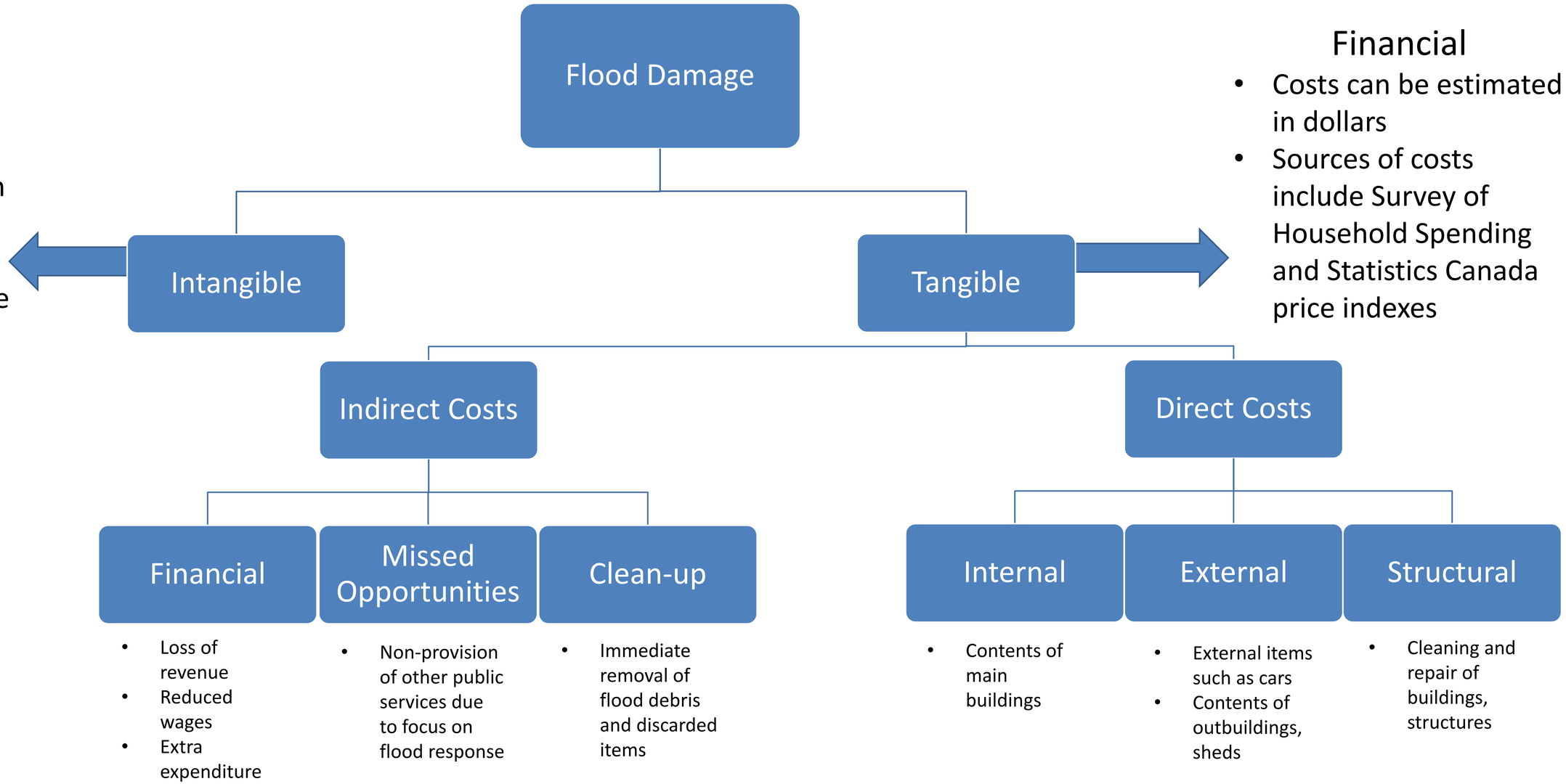
Flood Mitigation Study

What's New?

- Results of GRCA's survey of landowners in flood prone areas
- Estimate of Average Annual Flood Damages presented in November 2019 has been updated with survey results
- Potential flood mitigation strategies have been developed and evaluated



What is included in flood damage estimates?



Social

- Mental health impacts
- General inconvenience in post flood phase

Financial

- Costs can be estimated in dollars
- Sources of costs include Survey of Household Spending and Statistics Canada price indexes

- Loss of revenue
- Reduced wages
- Extra expenditure

- Non-provision of other public services due to focus on flood response

- Immediate removal of flood debris and discarded items

- Contents of main buildings

- External items such as cars
- Contents of outbuildings, sheds

- Cleaning and repair of buildings, structures

This study estimates tangible damages only

Source: IBI Group/Golder Associates Ltd. Report: Flood Damage Assessment Study City of Calgary: Assessment of Flood Damages

Estimating Direct & Indirect Flood Damages to Buildings

Data Inputs

Buildings

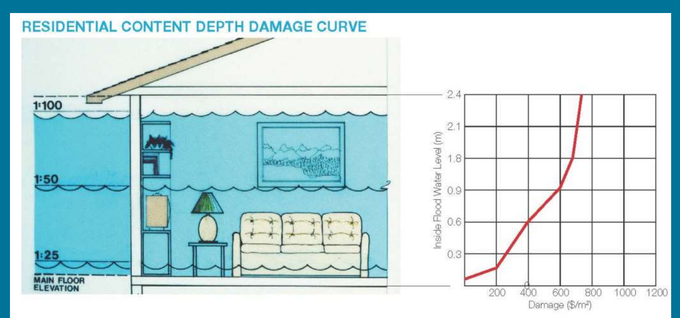
- Buildings are classified according to type:
  - Residential
  - Industrial
  - Commercial
  - Institutional
- Building characteristics are defined

Water Elevations

- Water surface elevations from flood events are output from the hydraulic model

Flood Depth & Damage Relationships

- Damages are based on flood levels in buildings, using the most up-to-date flood **depth-damage relationships** for building contents and structure



Natural Resources Canada (NRCAN). 2017. "Canadian Guidelines and Database of Flood Vulnerability Functions." Addendum to Canadian Floodplain Mapping Guidelines Series. March 2017.

Flood Damage Calculations

Flood Depths

- **Flood depth** is determined for each building and each flood event

Flood Damages

- **Direct** damages are computed by adding up all content and structural damages
- **Indirect** damages are estimated as a percentage of direct damages
- **Total damages** are computed by adding direct + indirect damages

Field Visits

- We viewed all buildings in the study area from the road
- Purpose was to improve data quality and address data gaps
- Data we collected:
  - Building type (e.g., retail, grocery, industrial)
  - Presence of basement (residential)
  - Presence and size (# of cars) of attached garage
  - Presence of multi-storey and split level buildings
  - Number of risers (steps) to first floor
  - Elevation of first floor compared to ground surface surrounding the building (min/mean/max elevation)

Examples of comparing elevation of first floor to surrounding ground surface

GRCA Flood Damages Survey

Objective

- Collect information on buildings, flood damages, and property owner actions to ground-truth study assumptions

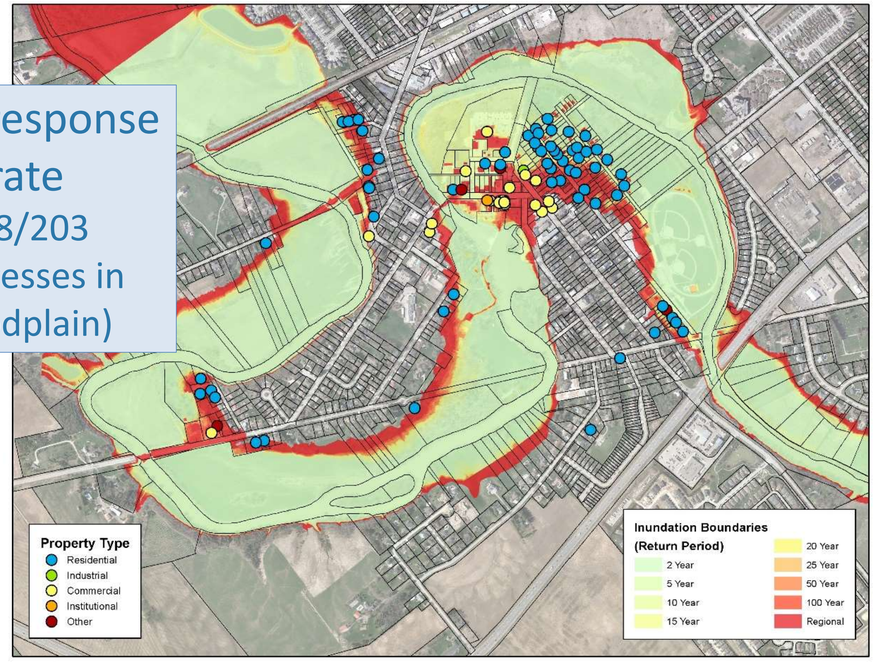
Results

- About 60% have experienced flooding
- 43% have experienced damages (mostly due to basement or garage flooding)
- Almost half of residences have unfinished basements
- 77% of respondents have taken measures to protect their property from flooding
- About 70% of respondents receive flood messages

Residents and businesses are making their buildings more flood resilient by:

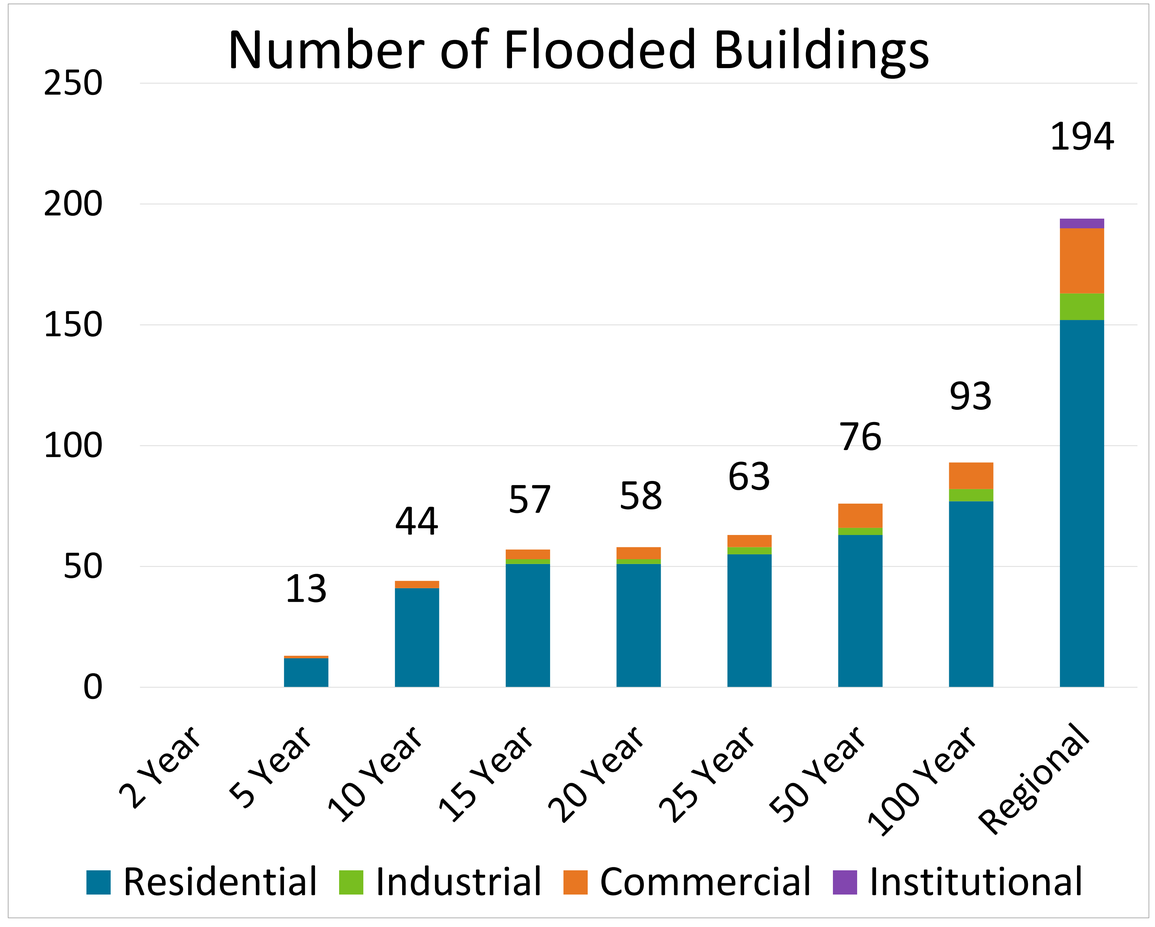
- Raising furnaces, water heaters and storage items off basement floors or out of flood prone areas (garages)
- Installing sump pumps, back-up generators, and sewer backflow prevention valves
- Waterproofing foundations
- Using sandbags and flood gates (plywood)
- Using water-resistant construction materials in basements (e.g., cement board instead of drywall, painted cement floor)

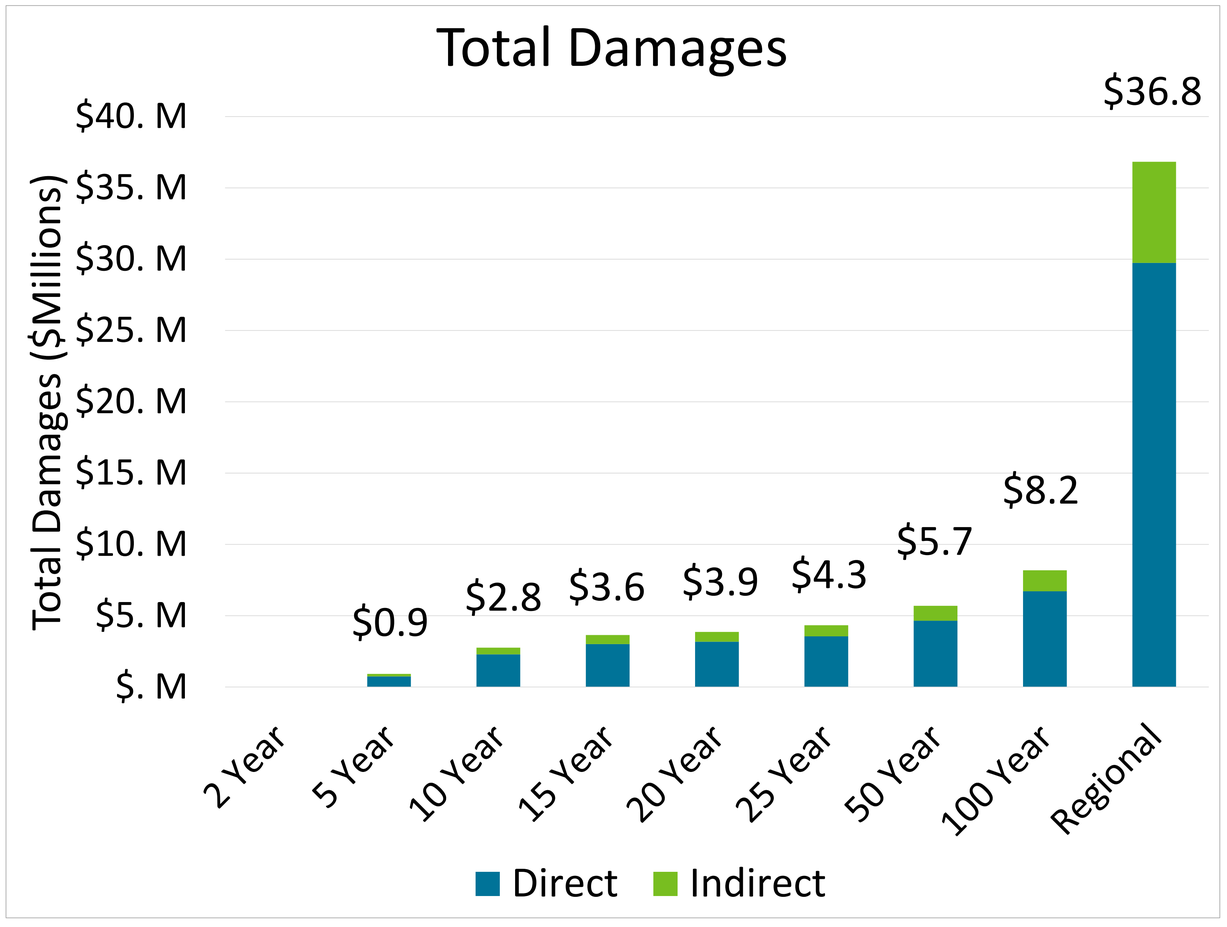
43% response rate (88/203 addresses in floodplain)



Flood Damage Results Overview

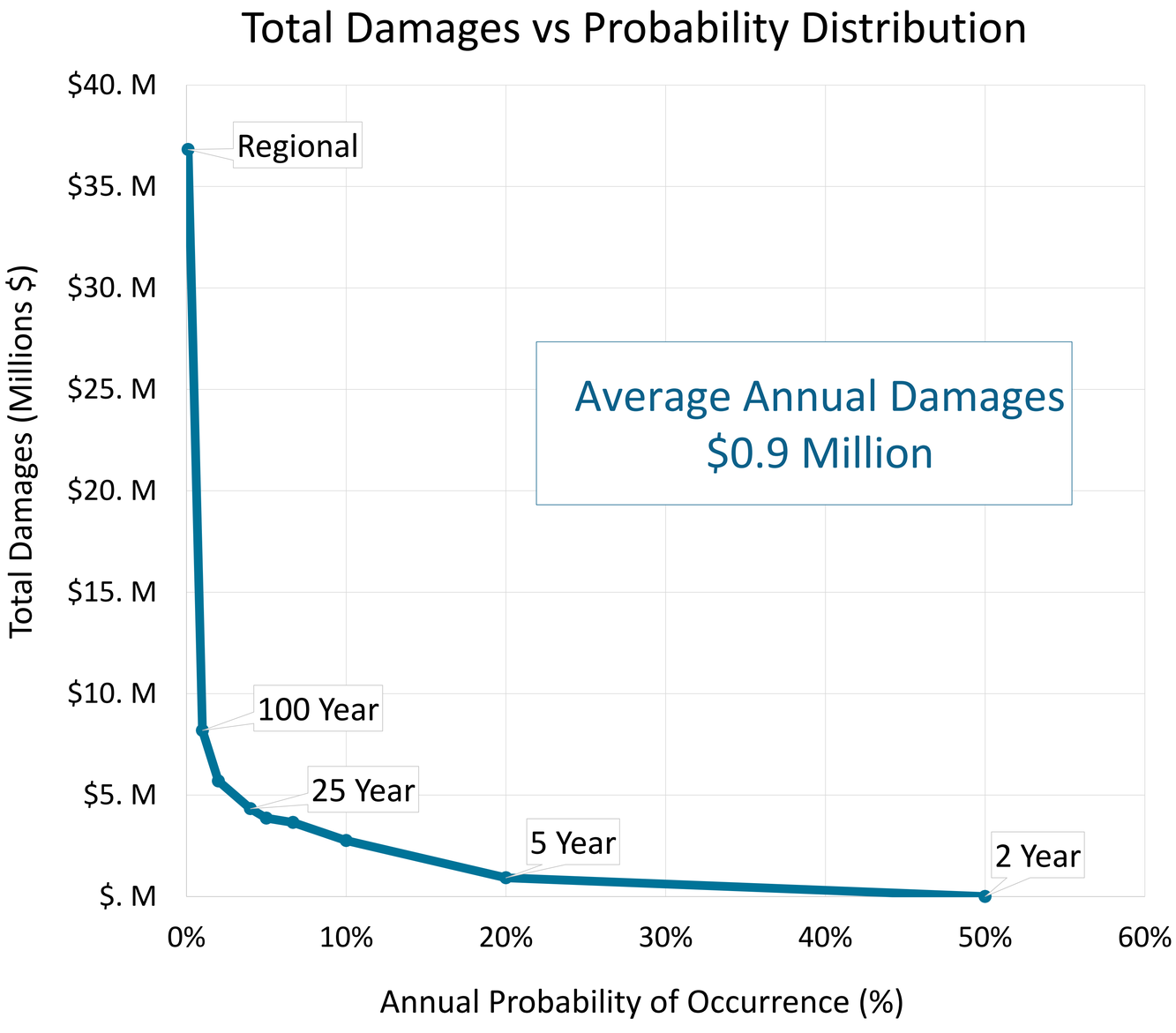
- The number of flooded buildings and the total direct and indirect damages were estimated for a range of flood events of varying severity
- Flood events are described by the annual probability of occurring, i.e., a 100-year flood event means a flood of a magnitude that has a 1% chance of happening every year
- Estimated damages are highest for less frequent flood events





Based on local residents survey, total damages assumes 50% reduction in basement structural damages, and 25% reduction in basement content damages

Average Annual Damages



Average Annual Damages (AAD):

- Cumulative potential damages occurring from various flood events over an extended period of time
- Averaged over time and presented as a uniform annual amount
- GRCA survey used to adjust AAD
  - 50% reduction in basement structural damages to reflect unfinished basements
  - 25% reduction in basement content damages to reflect property flood protection measures

Potential Impacts to Infrastructure

Infrastructure damages are difficult to estimate

- amount of damage is a function of both the flood water characteristics (depth, velocity, debris, ice), and
- ability of the infrastructure (e.g., a road) to withstand flood conditions (road surface, life span, state of repair)

Inventory of potential at-risk infrastructure

- Length of roads (km) flooded for each storm event
- Bridges requiring repair or replacement if the water surface elevation reaches the ground surface elevation at any point along the bridge

Storm Event	Flooded Roads (km)	Inundated Bridges (repairs or full replacement)				
		Railway	Shade St	Huron St	Pedestrian	Hwy 7
2 Year	0.0	No	No	No	No	No
5 Year	0.9	No	No	No	No	No
10 Year	1.4	No	No	No	No	No
15 Year	1.6	No	No	No	No	No
20 Year	1.7	No	No	No	No	No
25 Year	1.8	No	No	No	No	No
50 Year	1.9	No	No	No	No	No
100 Year	2.0	No	No	No	No	No
Regional	4.2	No	Yes	Yes	Yes	No

Huron St Bridge on Feb 21, 2018

Dec 28, 2008

Identify & Assess Flood Mitigation Options

Steps:

1. Identify long-list of potential options for reducing (mitigating) flood damages
2. Screen long-list using criteria and develop short-list of options for more analysis
3. Evaluate short-list options:
   - Flood level changes (reduced flooding, backwater, emergency access)
   - Implementation costs
   - Reduction in annual average flood damages
   - Impacts on debris and ice jams (qualitative)
   - Climate change resiliency (qualitative)
4. Assess costs and benefits, and preliminary return on investment, for short-listed mitigation options

Long List Flood Mitigation Options

Long List Mitigation Option	Technical Screening	Economic Screening	Environmental Screening	Stakeholder Screening	Policy Screening	Overall Screening Result
Channel Conveyance Improvements						
1. Channel Widening (widening the main channel)	High	Medium	Low	High	Medium	Advanced for Further Study
2. Dam Removal and Channel Naturalization (removing the dam and restoring the main channel to pre-dam conditions)	Low	Low	Medium	Low	Low	Option Screened Out
3. Floodplain Improvement/Widening (modifying the dike alignment to increase the floodplain width)	Medium	High	Medium	Medium	High	Advanced for Further Study
4. Bridge Replacement (evaluated by removing existing bridges)	High	Medium	High	High	Medium	Advanced for Further Study
Flow Containment						
5. Dike Improvements (increased height for higher protection level)	Medium	Medium	High	Medium	Medium	Advanced for Further Study
6. Floodwalls (where there is not enough space for earthen dike, a vertical treatment can be used)	Medium	Medium	High	Medium	Medium	Advanced for Further Study
Flow Diversion						
7. Bleams Road Conduit or Surface Flow Route (divert flows around downtown via Bleams Road)	Low	Low	Low	Low	Low	Option Screened Out
8. Highway 7/8 Flow Diversion (divert flows around Highway 7/8 bridge via culverts etc.)	High	Medium	High	Medium	Medium	Advanced for Further Study
Storage						
9. Regional Flood Control (Nithburg Reservoir)	Low	Low	Low	Low	Low	Option Screened Out
10. Online Storage (lower the Dam Invert to add online storage capacity)	Low	Low	Medium	Medium	Medium	Option Screened Out
Policy Solutions						
11. Improve Flood Resilience of Buildings (backflow prevention valves, basement waterproofing, sealed entrances, etc.)	Medium	Medium	High	High	High	Advanced for Further Study
12. Land Acquisition (property buyouts)	Low	High	High	Low	Medium	Option Screened Out (Assess under Future Study)
13. Improvements to Flood Warning System (improving the existing flood warning system)	Low	Low	High	Medium	Medium	Option Screened Out

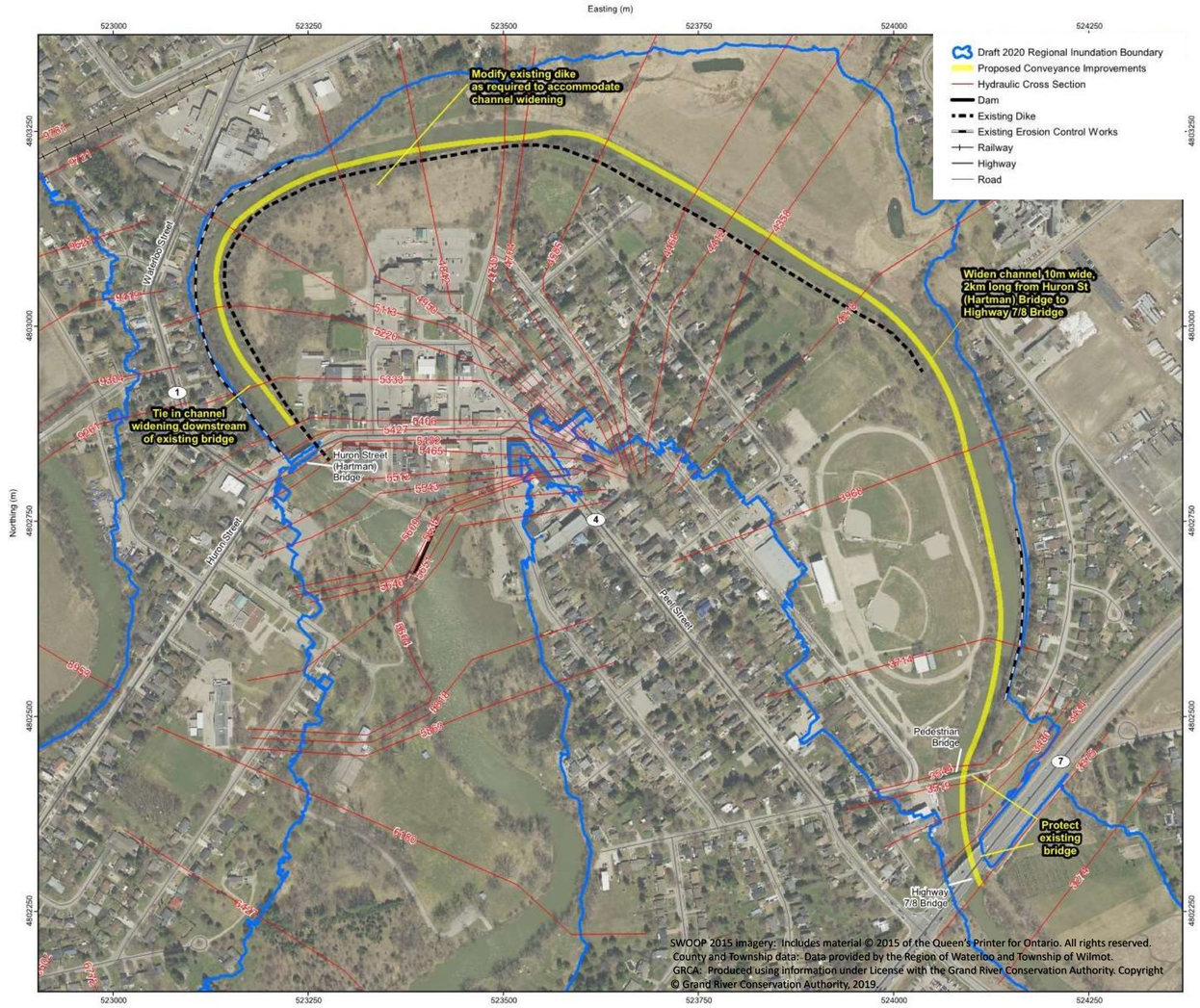
Option 1 – Channel Widening

Description

- Widen channel by 10 m over a 2 km reach from Huron St (Hartman) Bridge to Highway 7/8 Bridge

Evaluation

- Lowers the water level 30-50 cm between the Dam and Highway 7/8 bridge for all flood events
- 31 fewer buildings are flooded in the 10-year event (27 fewer for 25-year, 23 fewer for 100-year)
- Higher reductions in damages for smaller flood events (5- to 10-year), tapering to smaller reductions in damages in the Regional event
- Can be combined with dike and bridge improvements
- Potentially high environmental impacts during construction and if ongoing dredging is needed
- Requires engagement of GRCA, all levels of government, private property owners
- Expanding channel widening for climate change resiliency is constrained by hydraulic benefit, land and environmental impacts
- May improve debris and ice jam resiliency
- No change to emergency access (flooded roads)



Estimated Cost: $26M

Benefit (AAD Reduction): $0.51M

Preliminary Return on Investment: 51 years

- Costs do not include ongoing operation and maintenance (e.g., dredging)
- Return on Investment (ROI) is preliminary and more advanced economic assessment would be done as part of further studies

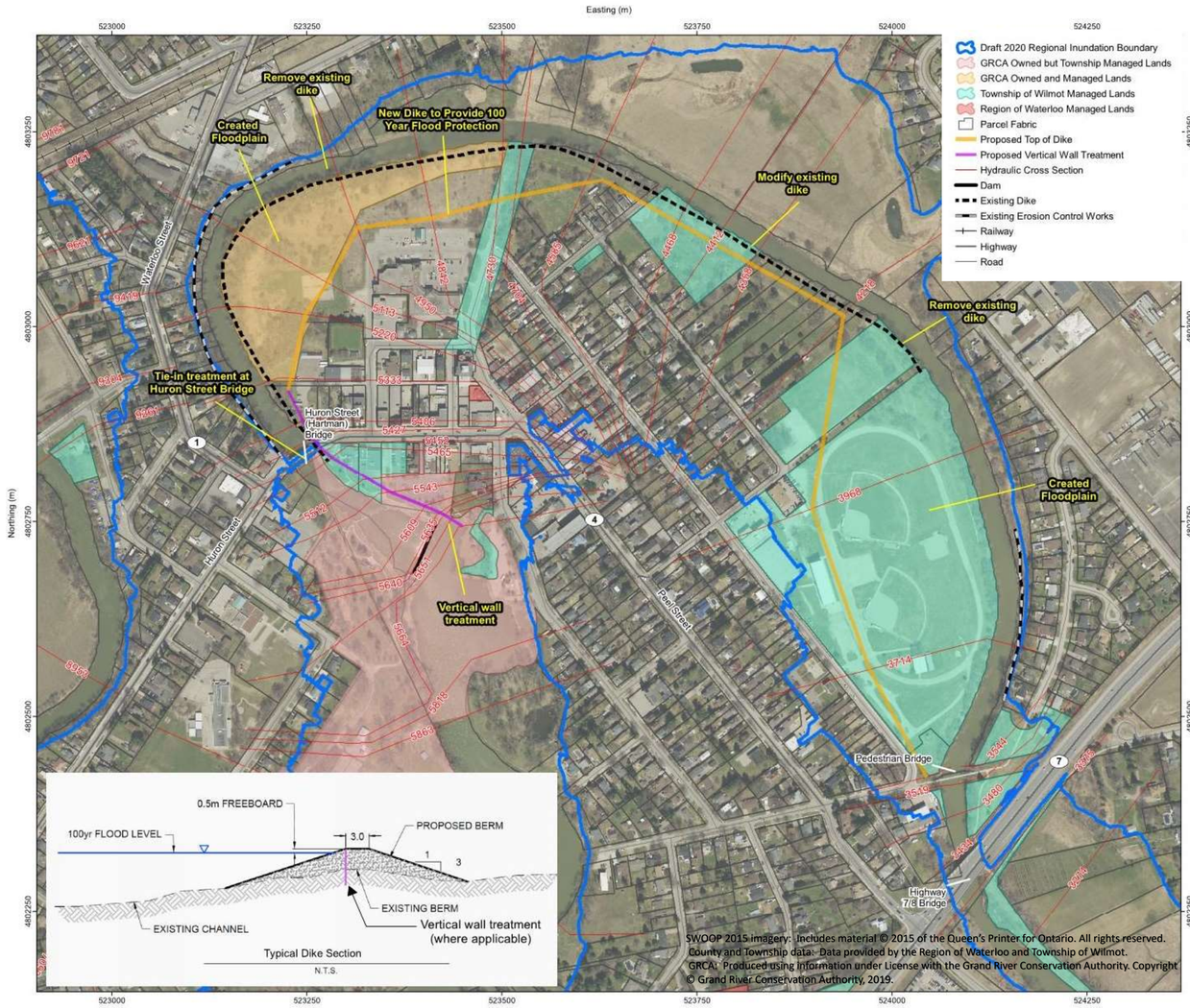
Option 2 – Dike and Floodplain Improvements for 100-Year Protection

Description

- Move existing dike to create additional floodplain area
- Raise height of dike to 0.5 m above the 100-year water level

Evaluation

- Higher dike causes backwater impacts for the Regional (regulatory) event, which are not acceptable without additional and extensive mitigation to reduce Regional backwater impacts, or land acquisition
- 41 fewer buildings are flooded in the 10-year event (59 fewer for 25-year, 83 fewer for 100-year)
- Nearly complete reduction in damages in the 5- through 100-year events, and slightly higher Regional damages
- Requires engagement of GRCA, all levels of government, private property owners
- Impacts to private property from raised dike, number of properties affected depend on dike alignment
- Increasing flood protection level for climate change resiliency is constrained by backwater impacts
- May improve debris and ice jam resiliency
- Improvements to emergency access (flooded roads) until the dike is overtopped (Regional flood event)



Estimated Cost: $28M

Benefit (AAD Reduction): $0.69M

Preliminary Return on Investment: 41 years

- Costs do not include mitigation of backwater impacts, operation and maintenance or land acquisition
- Return on Investment (ROI) is preliminary and more advanced economic assessment would be done as part of further studies

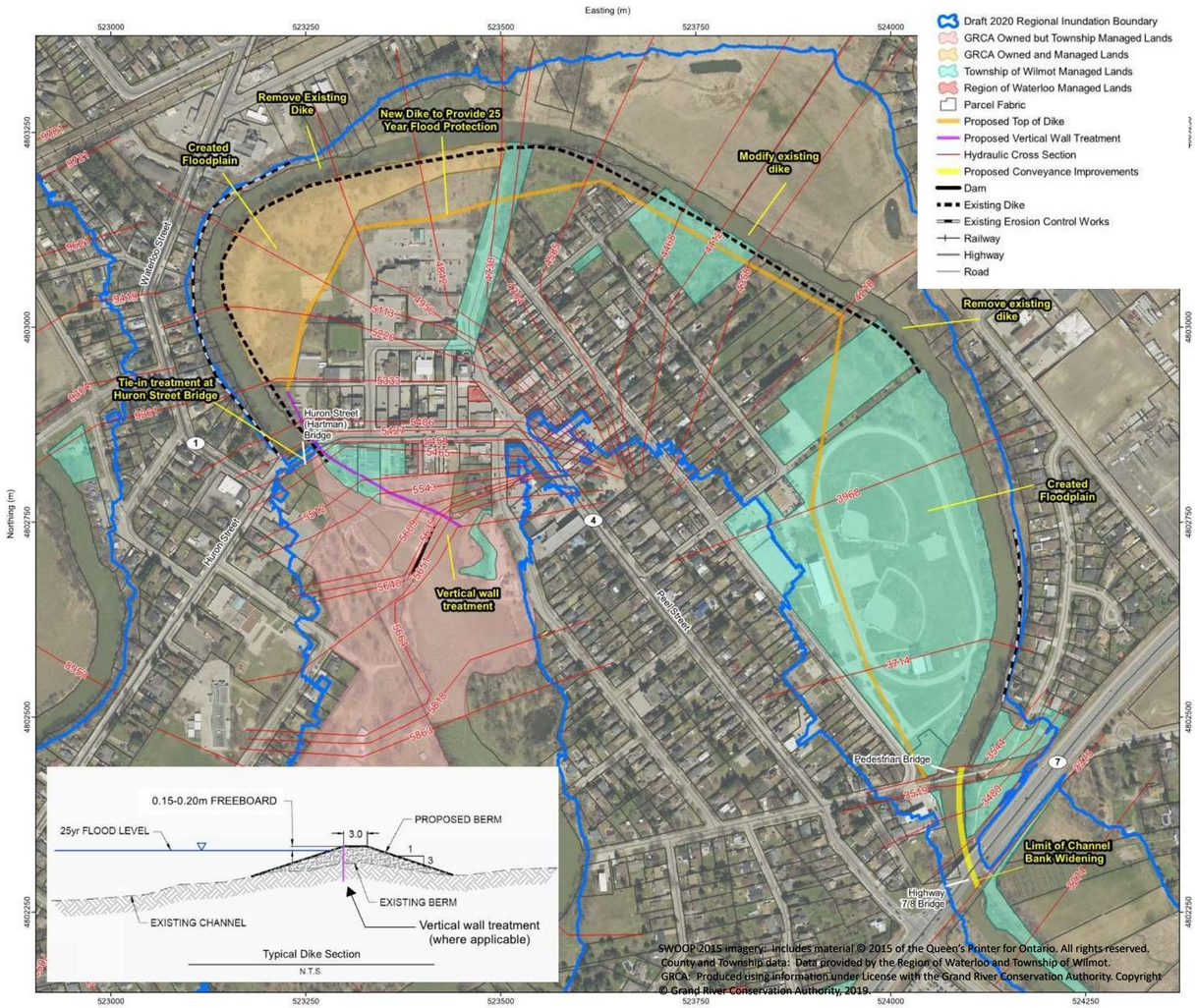
Option 3 – Dike, Floodplain, and Channel Improvements for 25 Year Protection

Description

- Move existing dike to create additional floodplain area
- Raise height of dike to 0.15-0.20 m above the 25-year water level
- Widen channel along a 170 m reach upstream of the Highway 7/8 bridge to mitigate backwater impacts

Evaluation

- Lowers the water level between the Dam and Highway 7/8 bridge for all flood events (up to 40 cm during the Regional flood)
- 41 fewer buildings are flooded in the 10-year event (59 fewer for 25-year, 13 fewer for 100-year)
- Nearly complete reduction in damages in the 5- through 25-year events, then smaller reductions in damages for events >25-year
- Minor backwater impacts upstream of the Dam during the Regional flood but no impacts to any structures
- Requires engagement of GRCA, all levels of government, private property owners
- Impacts to private property from raised dike, number of properties affected depend on dike alignment
- Increasing flood protection level for climate change resiliency is constrained by backwater impacts
- May improve debris and ice jam resiliency
- Improvements to emergency access (flooded roads) until the dike is overtopped (>25-year flood event)



Estimated Cost: $26M
Benefit (AAD Reduction): $0.60M
Preliminary Return on Investment: 43 years

- Costs do not include mitigation of backwater impacts upstream of Dam, operation and maintenance or land acquisition
- Return on Investment (ROI) is preliminary and more advanced economic assessment would be done as part of further studies

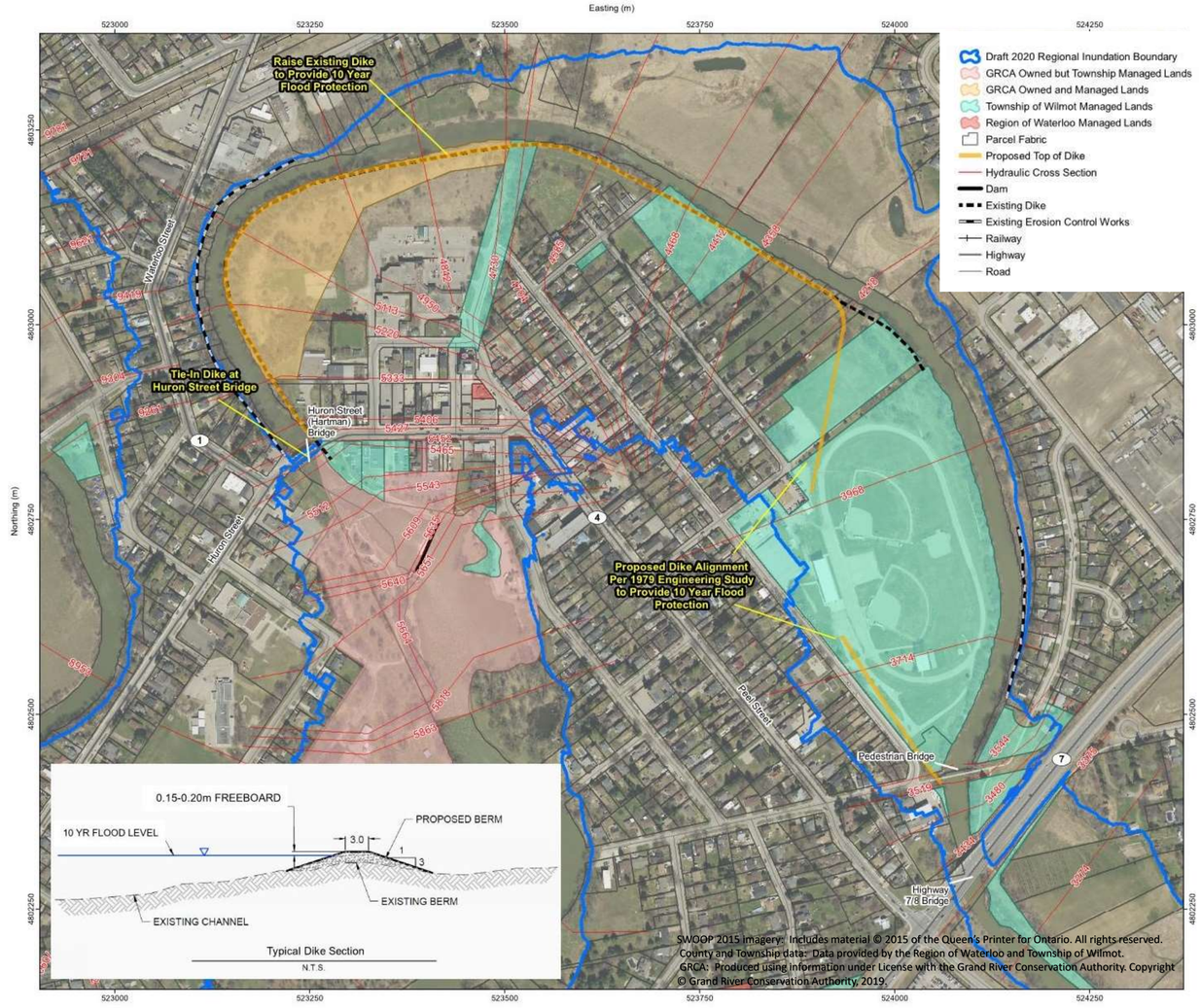
Option 4 – Dike Improvements for 10 year Protection

Description

- Extend dike from Hartman bridge to Pedestrian bridge and around the Fairgrounds to protect downtown core
- Raise dike from current 2-year level to 0.15-0.20 m above 10-year water level

Evaluation

- Raises the water level (1-5 cm) between the Dam and Highway 7/8 bridge for all flood events
- 41 fewer buildings are flooded in the 10-year event (6 fewer for 25-year, 4 fewer for 100-year)
- Nearly complete reduction in damages in the 5- through 10-year events, slightly higher damages for events >10-year
- Backwater impacts negligible upstream of the Dam
- Requires engagement of GRCA, all levels of government, private property owners
- Impact to private property from raised dike, number of properties affected increases due to extension
- Increasing flood protection level for climate change resiliency is constrained by backwater impacts
- Raising the existing dike, without realignment to create floodplain, may worsen debris and ice jams
- No change to existing emergency access (flooded roads)



Estimated Cost: $7.7M
Benefit (AAD Reduction): $0.32M
Preliminary Return on Investment: 24 years

- Costs do not include mitigation of backwater impacts upstream of Dam, operation and maintenance or land acquisition
- Return on Investment (ROI) is preliminary and more advanced economic assessment would be done as part of further studies

Option 5 – Pedestrian and Highway 7/8 Bridge Replacement

Screening

- Backwater impacts of the Pedestrian and Hwy 7/8 bridges were considered individually
- Backwater impacts are mainly due to Hwy 7/8 bridge up to the 100-year flood, and mainly due to Pedestrian bridge at Regional flood
- Combined replacement of both Pedestrian and Highway 7/8 bridges was included in the short-list

Description

- Evaluated by removing both bridges from hydraulic model, replacement bridges assumed to have negligible impact on water levels due to redesign

Evaluation

- Lowers the water level 15-25 cm between the Dam and Highway 7/8 bridge for all flood events
- 16 fewer buildings are flooded in the 10-year event (10 fewer for 25-year, 13 fewer for 100-year)
- Reduces damages by 10% to 30% for the 5- through 100-year events and by 5% for the Regional event
- New bridges can be designed for climate change, debris and ice jam resiliency
- No change to emergency access (flooded roads)
- Estimated cost and ROI are for a replacement bridge installed before end-of-lifecycle
- Replacing bridges at the end of lifecycle, the marginal cost of improving the hydraulic capacity of the existing bridges is estimated to have a cost:benefit of 15-25:1

Estimated Cost: $18-21M (full bridge replacement)

Benefit (AAD Reduction): $0.17M

Preliminary ROI: 106 to 123 years (before end-of-lifecycle)

- It is outside the scope of this study to determine bridge designs that would achieve the desired hydraulic improvements. A simplified cost was carried forward to analyze the ROI. The estimated implementation cost is based on the simplified assumption of $8,000/m^2 deck area based on the existing bridge dimensions plus a 30% to 50% cost increase to achieve a more hydraulically efficient bridge (e.g., wider span, improved bridge piers). Cost does not consider operation and maintenance. ROI is preliminary and more advanced economic assessment would be done as part of further studies.

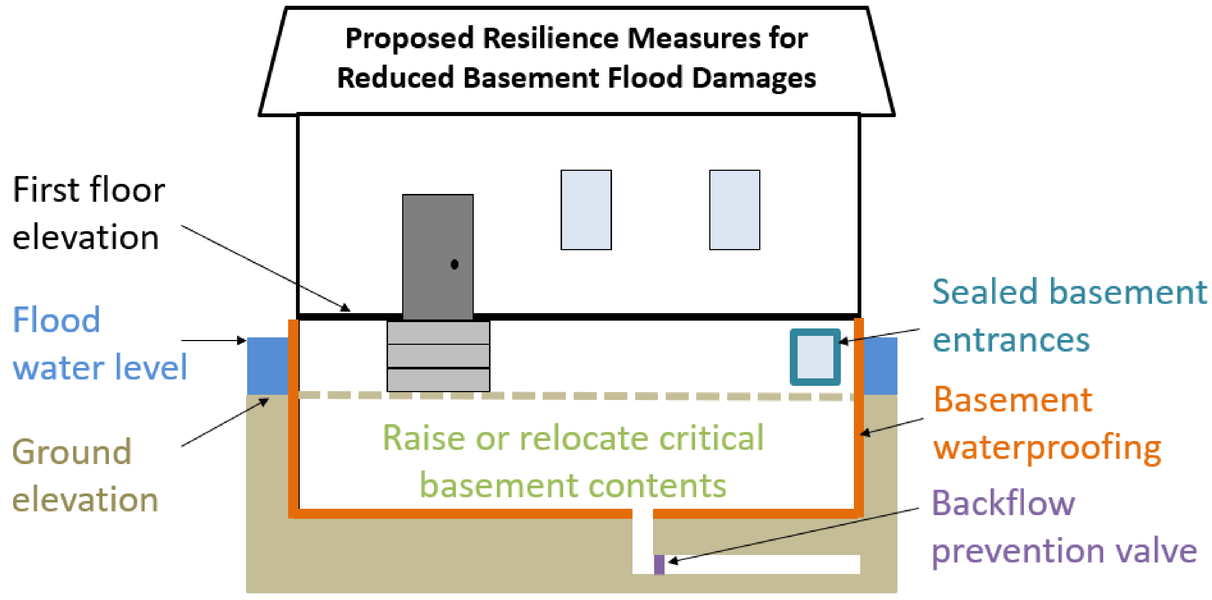
Option 6 – Improved Flood Resilience of Buildings

Description

- Implement residential lot-level flood resiliency measures including basement waterproofing, sealing basement entrances (doors and windows), and installing backflow prevention valves
- Assuming 80% reduction to basement damages for flood-resilient residences within the 50-year floodplain until the first floor is flooded

Evaluation

- No change to flood water levels or number of at-risk buildings; mitigation option reduces basement flood damages only
- Reduces damages by 30% to 70% for the 5- through 100-year events and <5% in the Regional event
- Requires voluntary private property participation
- Number and extent of properties can be optimized to maximize return on investment
- Low implementation cost compared to other options
- Number of properties and proposed measures can be expanded for climate change resiliency
- No change to debris and ice jam resiliency
- No change to existing emergency access (flooded roads)



Estimated Cost: $1.6M
Benefit (AAD Reduction): $0.35M
Preliminary Return on Investment: 5 years

- Estimated $25,000 cost per residential building
- If the first floor is flooded, damages for the basement and first floor are per existing conditions
- Costs do not include homeowner operation and maintenance of measures
- Return on Investment (ROI) is preliminary and more advanced economic assessment could be done as part of further studies

Option 7 – Vegetation Management

Description

- GRCA evaluated the benefits of vegetation removal between the river bank and the existing dike for approximately 1,600 m
- Evaluated by reducing roughness coefficient in hydraulic model

Evaluation

- Lowers water levels 1-8 cm between the Dam and Highway 7/8 bridge for floods between a 2-year and 100-year return period, and 1-3 cm during the Regional Flood
- Reduces damages by 2-10% for the 5- through 100-year events, and by 2.5% for the Regional event
- Engagement of all landowners would be required
- Annual maintenance of vegetation removal would be required to maintain improved flow conveyance
- Limited potential to improve debris and ice jam resiliency
- Limited climate change resiliency because vegetation management has smaller impact at higher flows

Estimated Cost: $0.2M
Benefit (AAD Reduction): $0.04M
Preliminary Return on Investment: 5 years

- Costs do not include operation and maintenance
- Return on Investment (ROI) is preliminary and more advanced economic assessment would be done as part of further studies.
- This assessment is for initial clearing of vegetation and does not include annual maintenance

Flood Depths 5 Year Return Event

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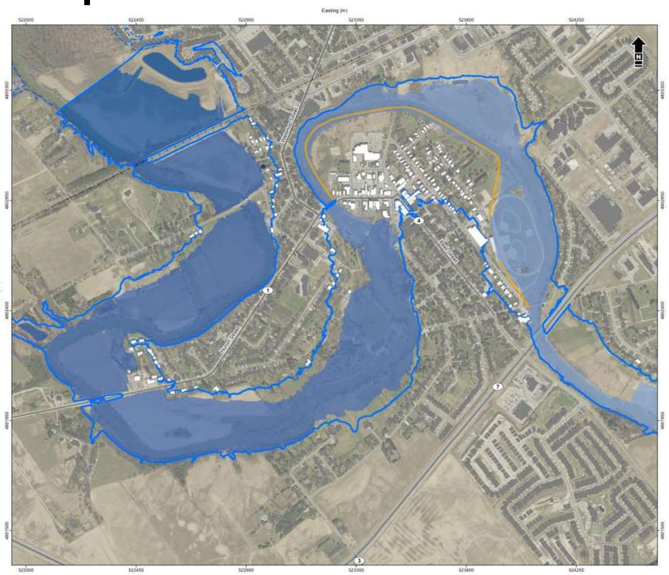
Grand River Conservation Authority

Existing

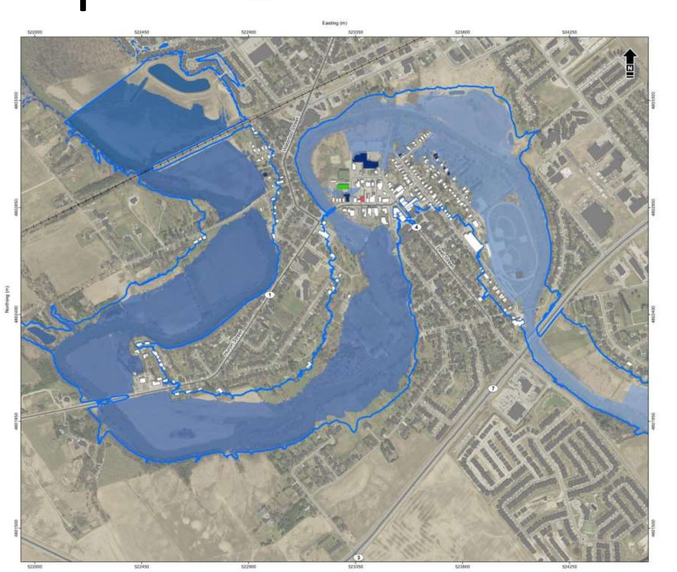
Option 1

Option 2

Option 3



Option 4



Option 5

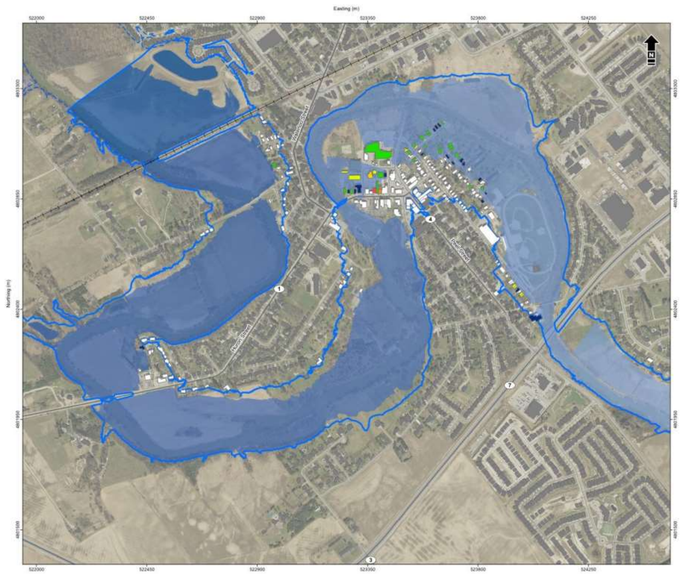
Option 6 Improved Flood Resilience of Buildings does not require hydraulic modelling to estimate benefits; therefore, no flood depth maps are generated.

Option 7 Vegetation Management has not resulted in significant changes to flood depths (<0.04m); therefore, no flood depth maps are generated.

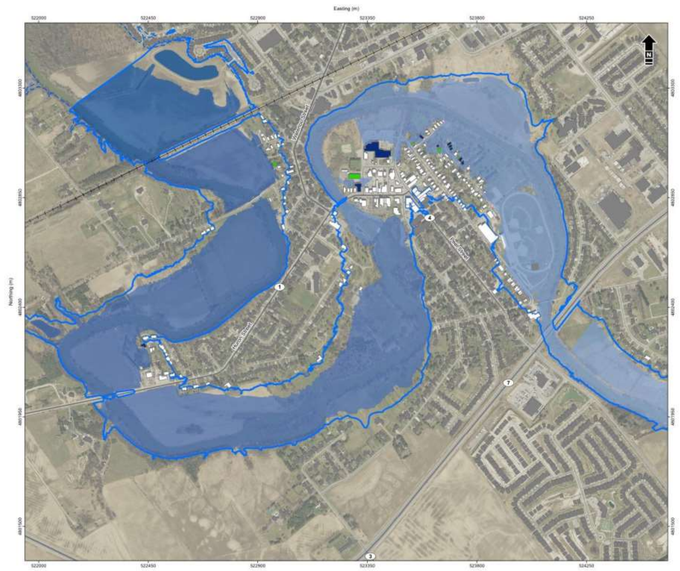
Flood Depths 10 Year Return Event

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Grand River Conservation Authority



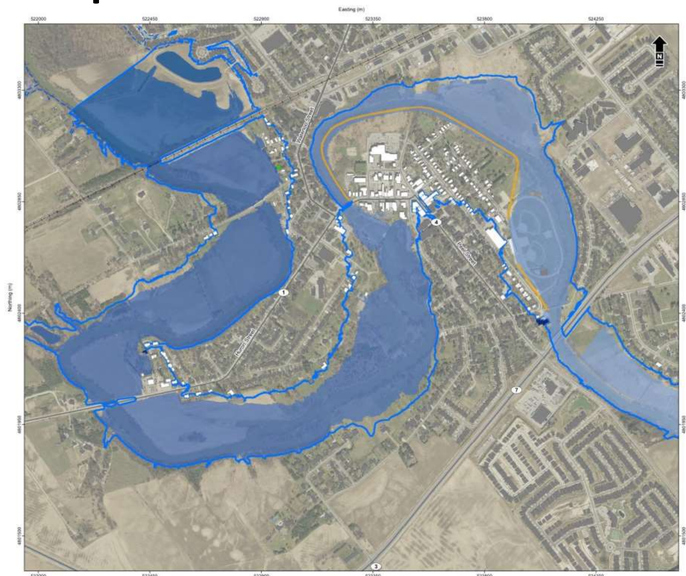
Existing



Option 1

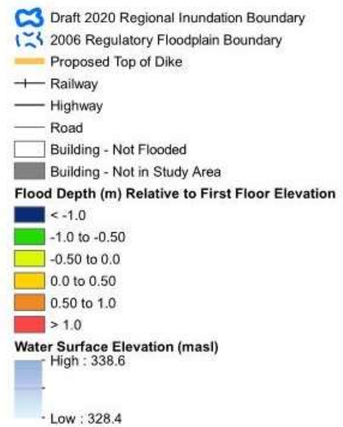
Option 2

Option 3



Option 4

Option 5



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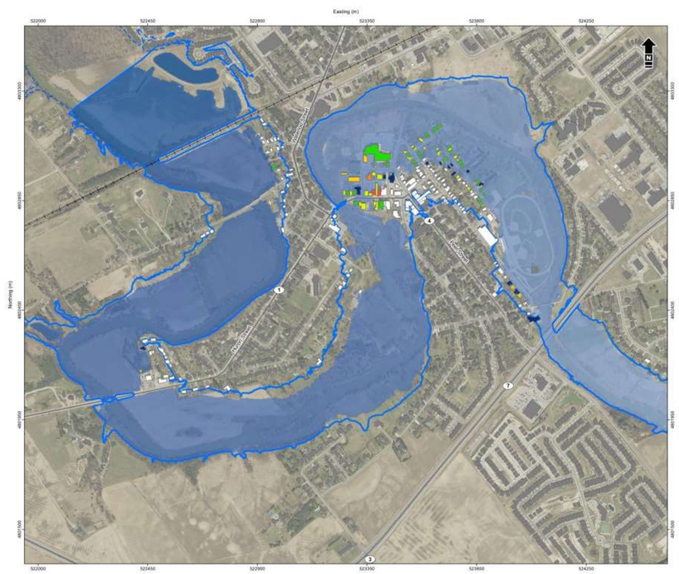
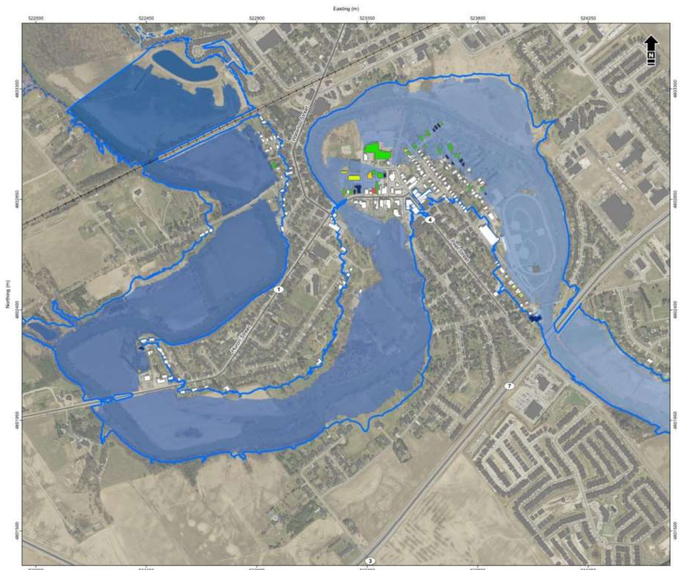
Flood Depths 25 Year Return Event

Existing



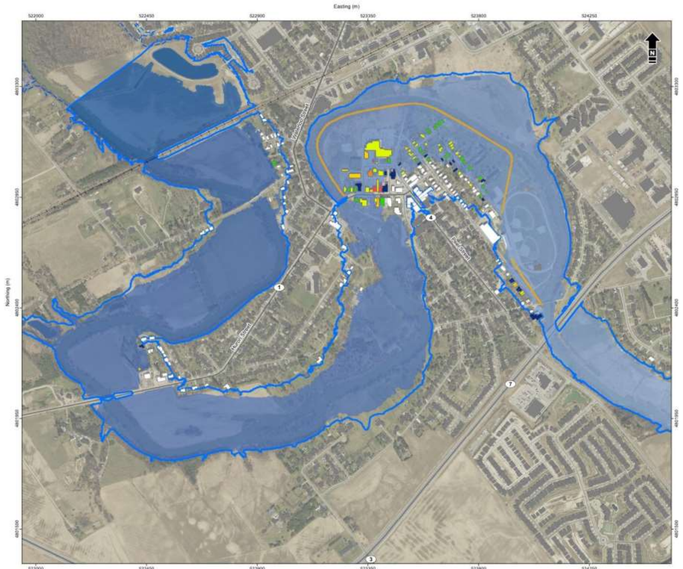
Option 1



Option 2

Option 3

Option 4

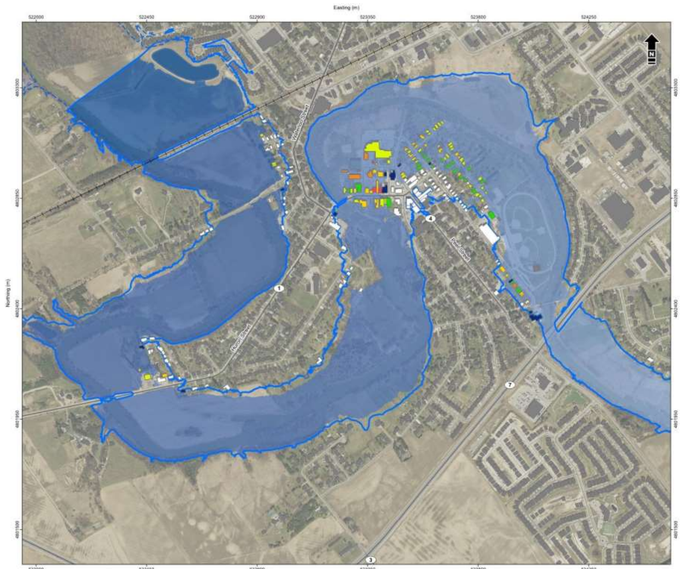


Option 5

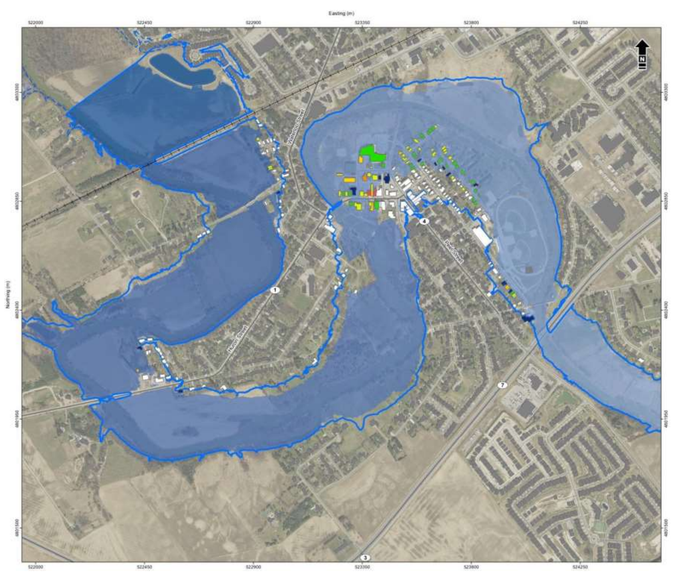
Option 6 Improved Flood Resilience of Buildings does not require hydraulic modelling to estimate benefits; therefore, no flood depth maps are generated.

Option 7 Vegetation Management has not resulted in significant changes to flood depths (<0.04m); therefore, no flood depth maps are generated.

Flood Depths 100 Year Return Event

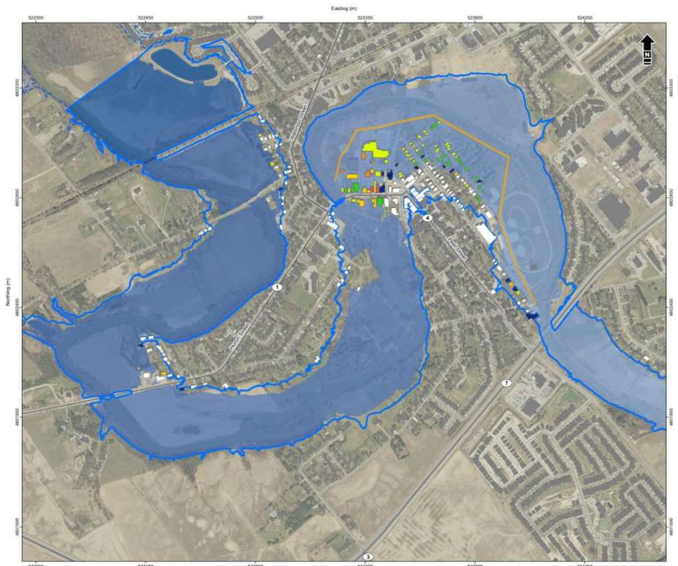


Existing

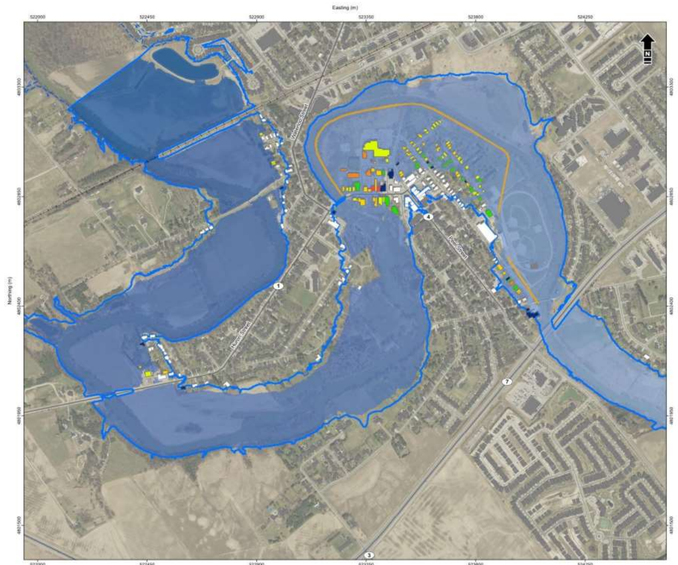


Option 1

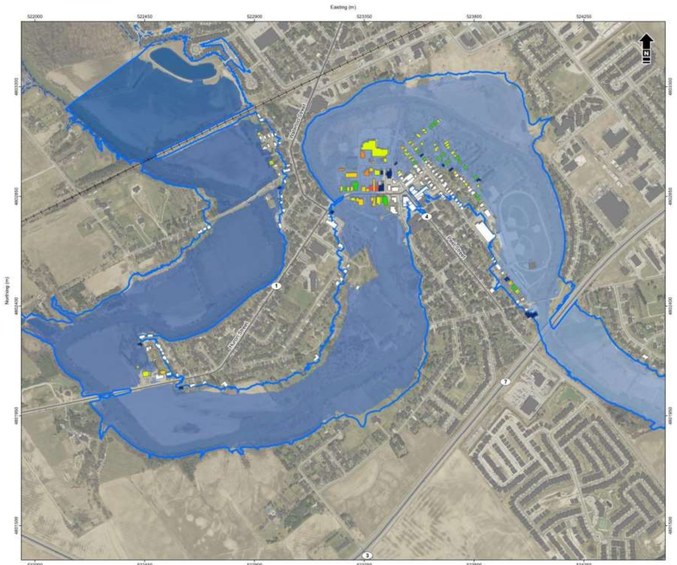
Option 2



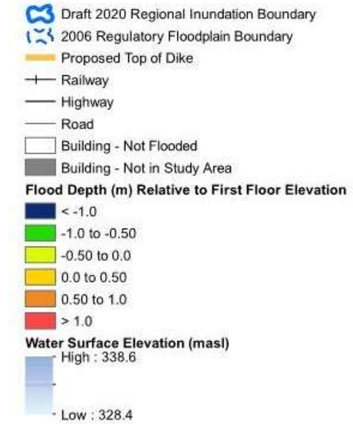
Option 3



Option 4



Option 5



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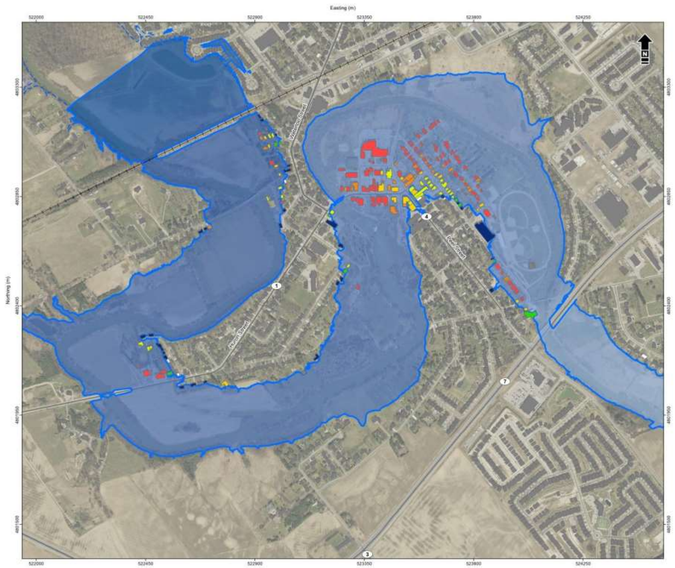
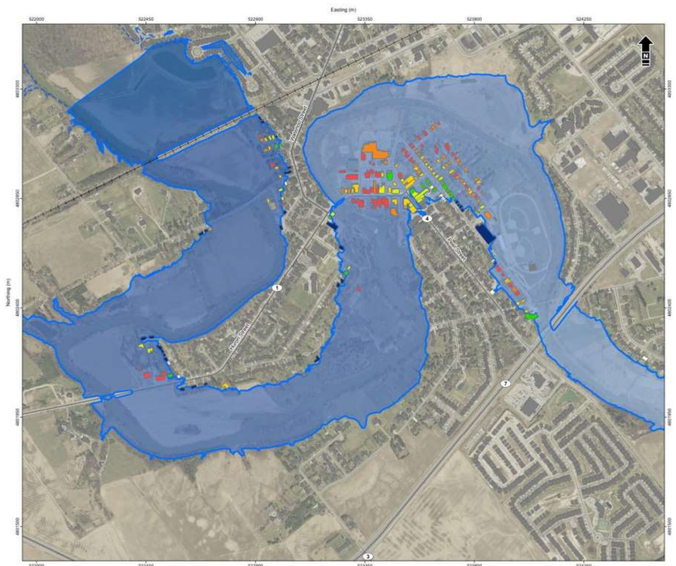
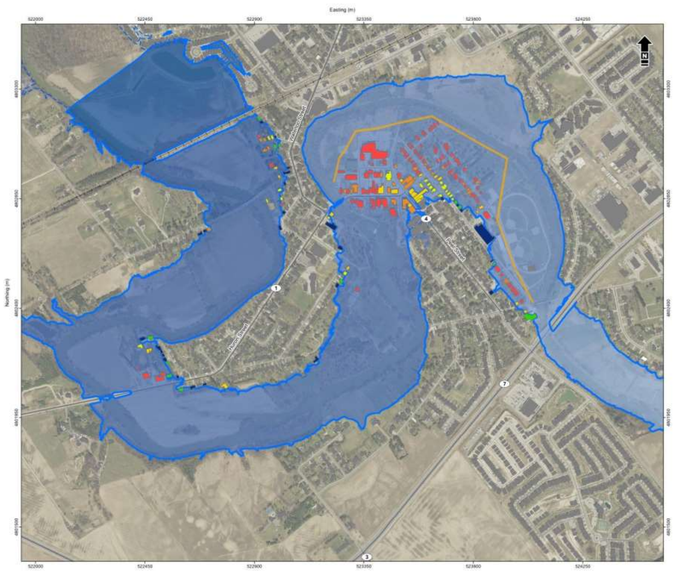
Flood Depths Regional Event



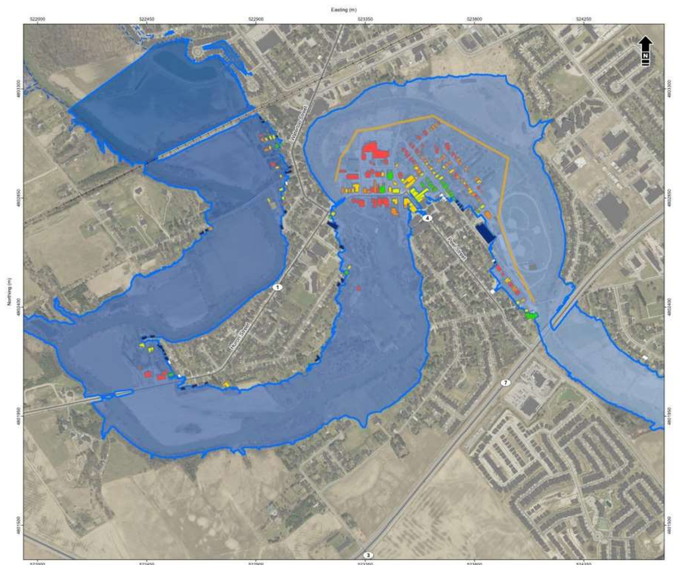
Existing



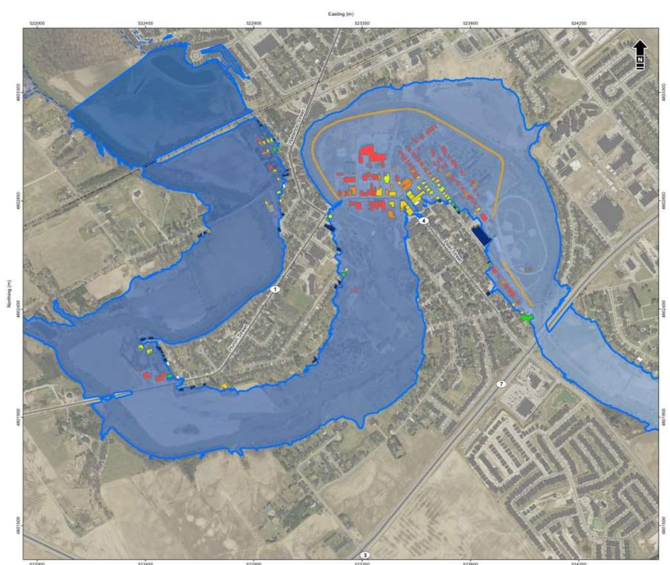
Option 1



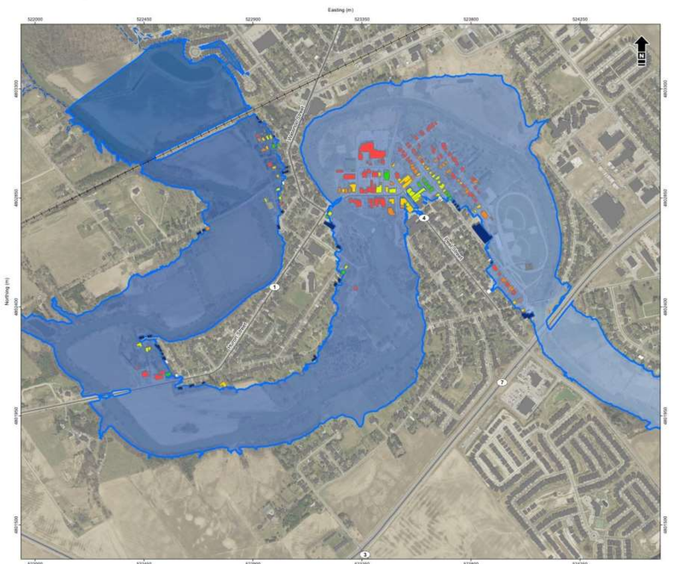
Option 2



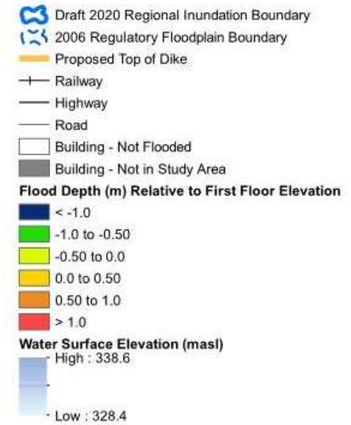
Option 3



Option 4



Option 5

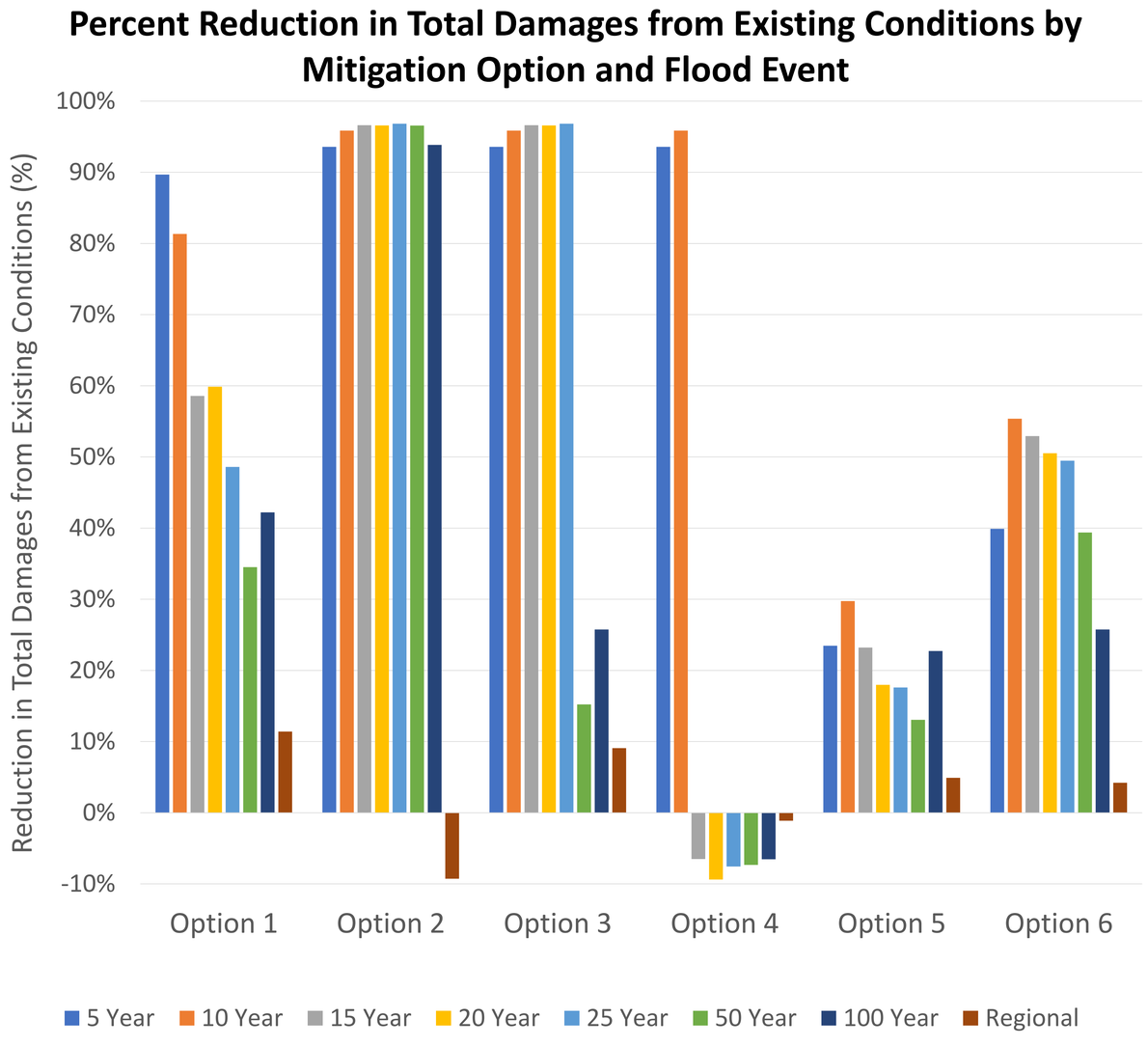


Option 6 Improved Flood Resilience of Buildings does not require hydraulic modelling to estimate benefits; therefore, no flood depth maps are generated.

Option 7 Vegetation Management has not resulted in significant changes to flood depths (<0.04m); therefore, no flood depth maps are generated.

Summary of Mitigation Options

Scenario	Cost	AAD	Benefit (AAD reduction)	Cost:Benefit
Existing Conditions	-	$0.91M	-	-
Option 1 – Channel Widening	$26M	$0.39M	$0.51M	51:1
Option 2 - Dike and Floodplain Improvements for 100 Year Protection	$28M	$0.22M	$0.69M	41:1
Option 3 - Dike, Floodplain and Channel Improvements for 25 Year Protection	$26M	$0.31M	$0.60M	43:1
Option 4 - Dike Improvements for 10 Year Protection	$7.7M	$0.58M	$0.32M	24:1
Option 5 - Pedestrian and Highway 7/8 Bridge Replacement	$18M-$21M	$0.73M	$0.17M	106-123:1
Option 6 - Lot-level Flood Resiliency Improvements	$1.6M	$0.56M	$0.35M	5:1
Option 7 – Vegetation Management	$0.2M	$0.87M	$0.04M	5:1



- Table includes summary of costs and benefits for each mitigation option

- Chart shows damages for each mitigation option as percent reduction from existing damages
- Option 7 analysis was undertaken by GRCA; percent reduction in total damages is 2-10% for the 5- through 100-year events, and 2.5% for the Regional event

Summary of Mitigation Options

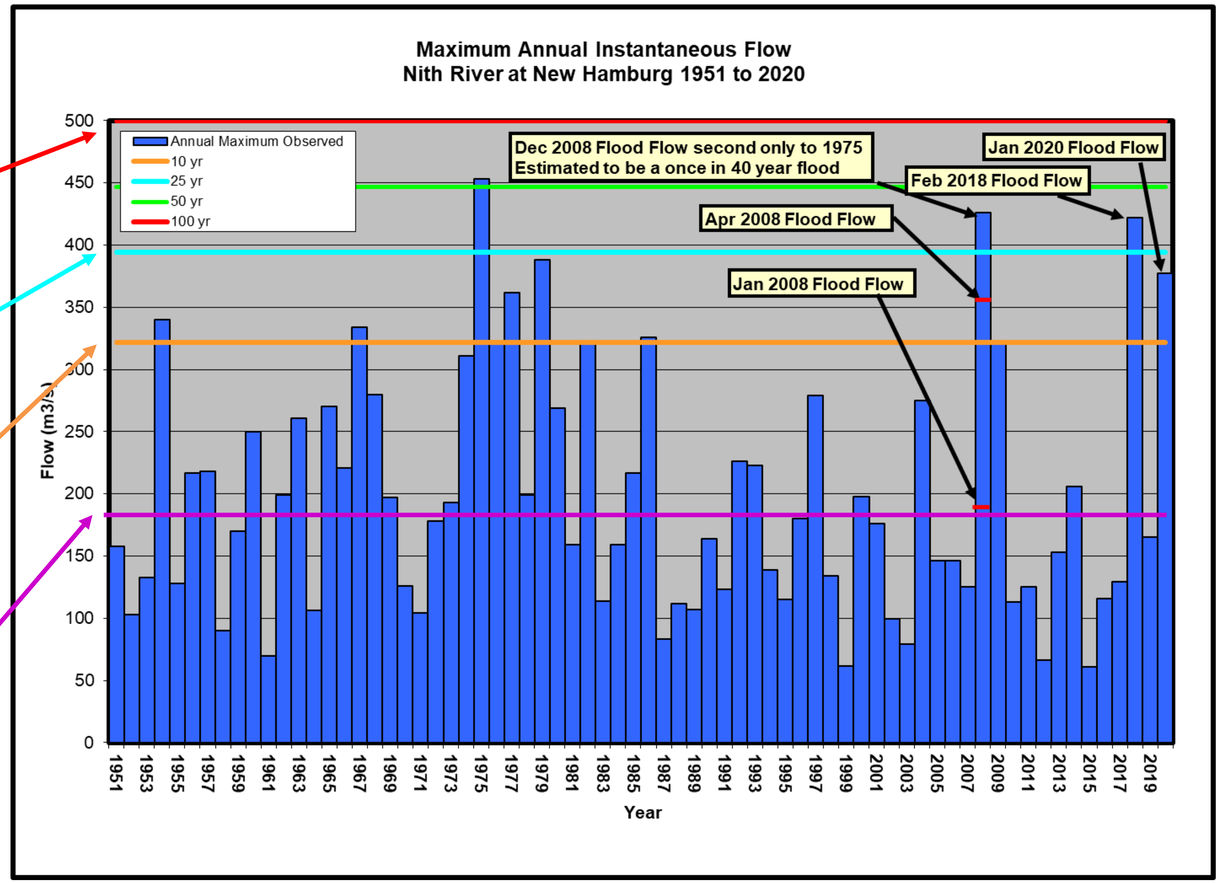
- Even with implementation of some of these options, flooding would still have been experienced during recent events in 2020, 2018, 2008
- This chart shows the highest flows in the Nith River at New Hamburg by year
- Where flows are higher than the coloured lines, flood damages would have occurred

Option 2 - Dike & floodplain improvements for 100-year protection

Option 3 - Dike, floodplain & channel improvements for 25-year protection

Option 4 - Dike improvements for 10-year protection

Existing dike for 2-year protection



Study Conclusions

- No mitigation options will remove all risk of flood damages – there will always be flood risk in the floodplain in New Hamburg
- The study will result in updated floodplain mapping. Updates to the GRCA Regulation mapping are under review. The floodplain policies for land use planning and GRCA permits will remain unchanged. The mitigation options are not intended to open up undeveloped areas for development.
- Lower cost options could provide immediate benefits but would require participation of landowners, agencies, government, and other stakeholders
  - Improved flood resiliency of buildings (Option 6)
  - Dike bank vegetation removal (Option 7)
- The options with dike improvements (raising, changing alignment) are effective but costly, and need to balance level of protection and upstream water level impacts
- Dike improvements providing protection to the 100-year flood event (Option 2) are not acceptable without additional and extensive mitigation to reduce backwater impacts. Backwater impacts of dike improvements for the smaller flood events (Option 3, 25-year; Option 4, 10-year) appear to be minor but would require confirmation.
- Bridge replacement and redesign should be considered at the end of Pedestrian and Highway 7/8 bridges lifecycle

Next Steps

- Consultation with municipalities and others on study findings to identify which options have support
- Vegetation Maintenance on bank of dike (Option 7)
  - Landowner agreements, major maintenance budgeting/funding
- Improvements to flood resilience of buildings (Option 6)
  - Voluntary implementation, explore cost-share funding
- Medium-term - Improvements to the dikes (10-, 25-, 100-year protection options)
  - Engagement of GRCA, all levels of government, private property owners
  - Environmental assessment
  - Capital improvement funding programs, cost-share model

Next Steps

- The study will result in updated floodplain mapping. Updates to the GRCA Regulation mapping are under review.
- The floodplain policies for land use planning and GRCA permits will remain unchanged. The mitigation options are not intended to open up undeveloped areas for development
- GRCA-led review of flood warning zone mapping

New Hamburg

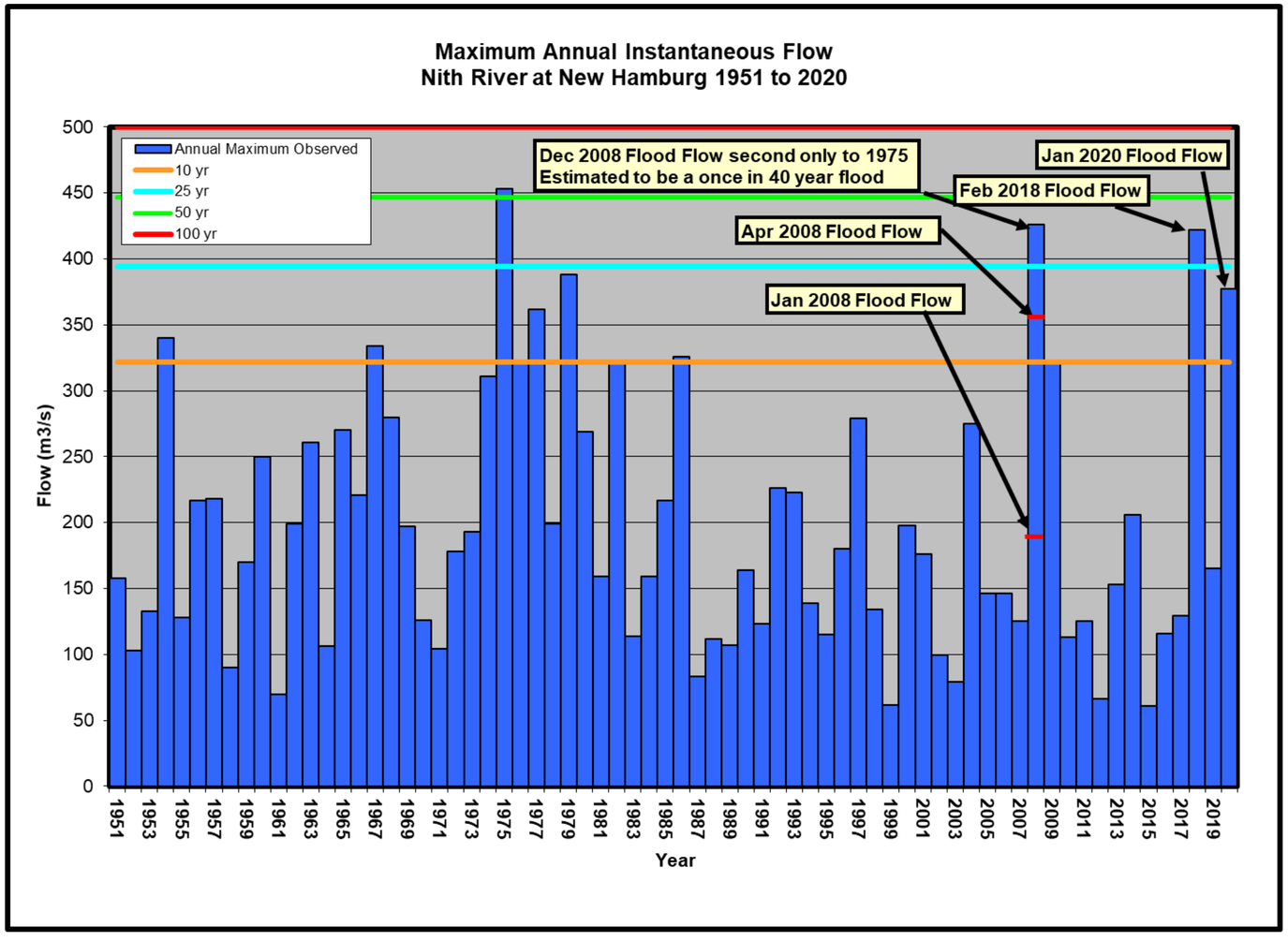
History of Studies and Works

- 1962 Grand River Hydraulics Report
- 1966 GRCA acquires New Hamburg dam
- 1970 New Hamburg dike built
- 1978 Preliminary Engineering Study – Nith River at New Hamburg
- 1978-1982 Nith River Erosion Protection Works
- 1983 Grand River Basin Water Management Study – Flood Damages Report
- 1985 Nith River Flood Line Mapping Study
- 1989 New Hamburg dam rebuilt
- 2017 New Hamburg dike maintenance (tree and brush removal)

Nith River

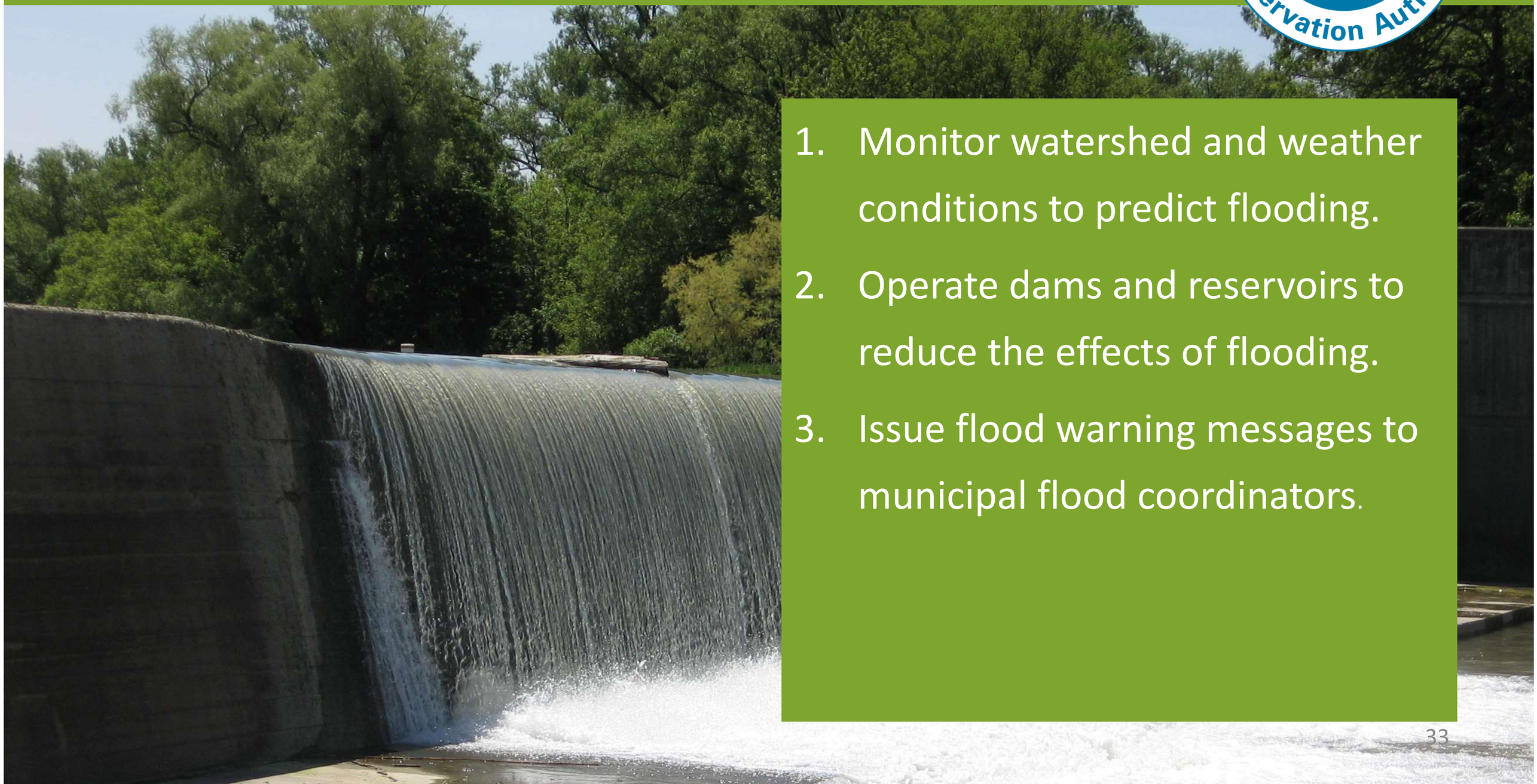
Flooding History

- Highest flood flows on record in 1975
- Other notable floods – December 2008, February 2018, January 2020
- Floods can occur during any season
- Larger floods have resulted from combined snowmelt and rainfall
- The highest annual flows are trending earlier in the year



GRCA Roles in Managing Floods

Flood Response



1. Monitor watershed and weather conditions to predict flooding.
2. Operate dams and reservoirs to reduce the effects of flooding.
3. Issue flood warning messages to municipal flood coordinators.

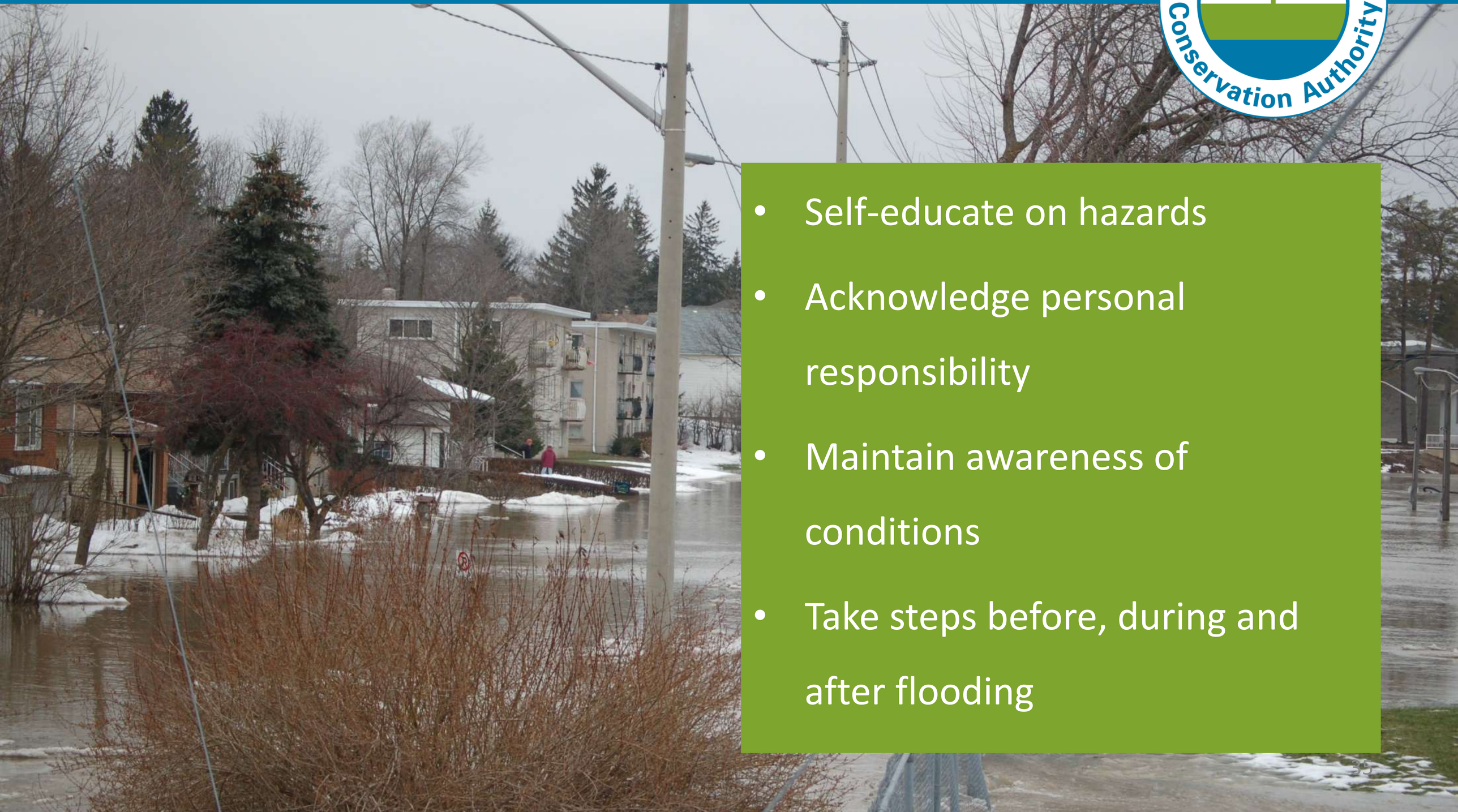
Municipal Roles in Managing Floods

Flood Response

Upon receipt of a Flood Message, Municipal Officials:

1. Warn staff, affected citizens, businesses, and the general public in the forecast flood hazard area.
2. Coordinate and enact Municipal Emergency Flood Response Plans.
3. Monitor the flood situation and liaise with GRCA Flood Coordinators.

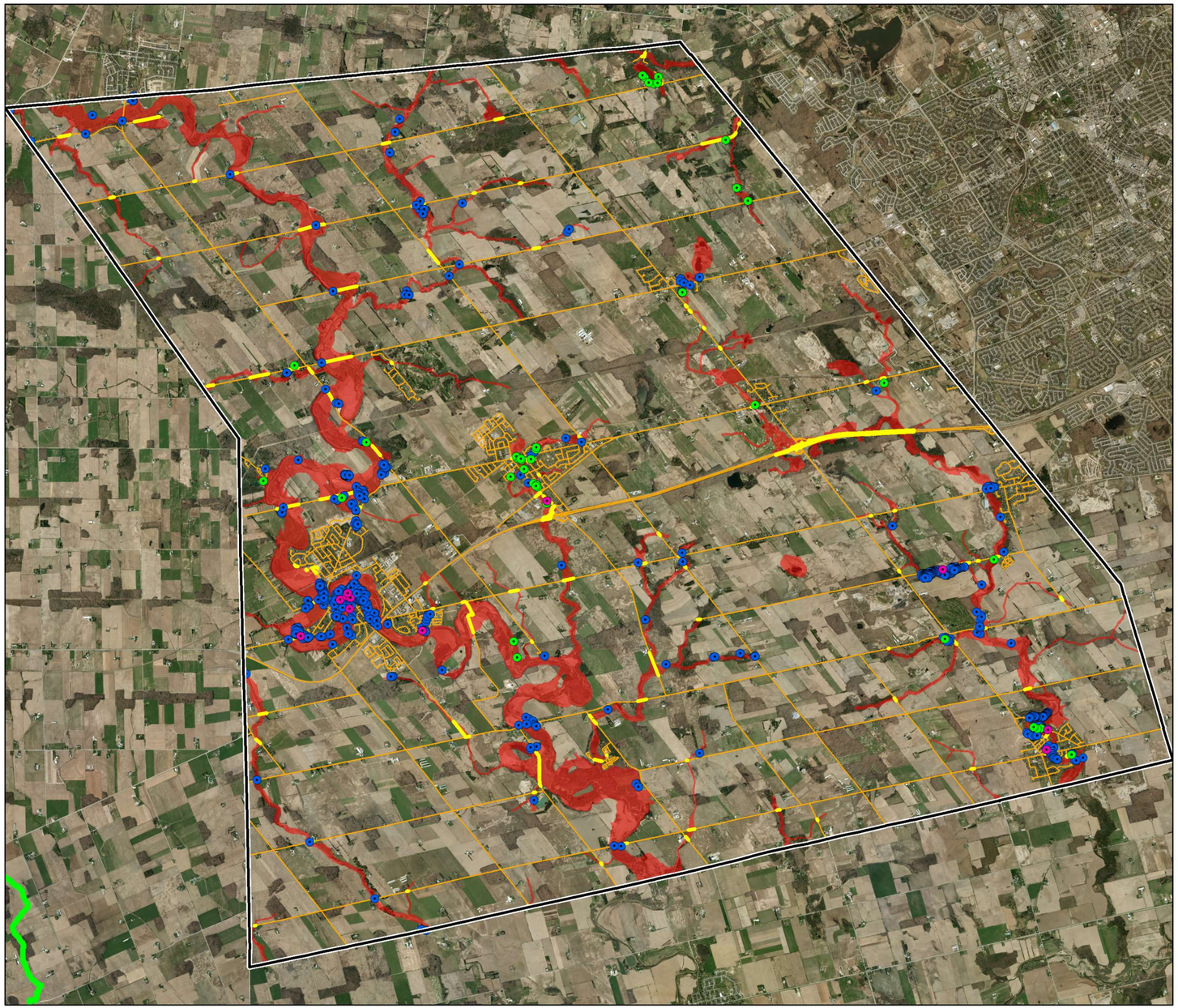
Property Owners' Role in Mitigating Risk



- Self-educate on hazards
- Acknowledge personal responsibility
- Maintain awareness of conditions
- Take steps before, during and after flooding

Nith River

Wilmot Township Flood Preparedness Mapping



Grand River
Conservation Authority

Flood Emergency Map
Township of Wilmot

Legend

- Critical Infrastructure
- Buildings in Floodplain
- Footprints in Floodplain
- Roads in Floodplain
- Roads
- Floodplain
- Township of Wilmot
- Watershed Boundary

Overview Statistics

Count of features in the floodplain:
Buildings in Floodplain: 41
Footprints in Floodplain: 753
Critical Infrastructure: 12
Roads in Floodplain (seg): 213
Roads in Floodplain (km): 32.4
Surface area of Floodplain: 26.23 sq km
Proportion Floodplain of Study: 9.9%

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