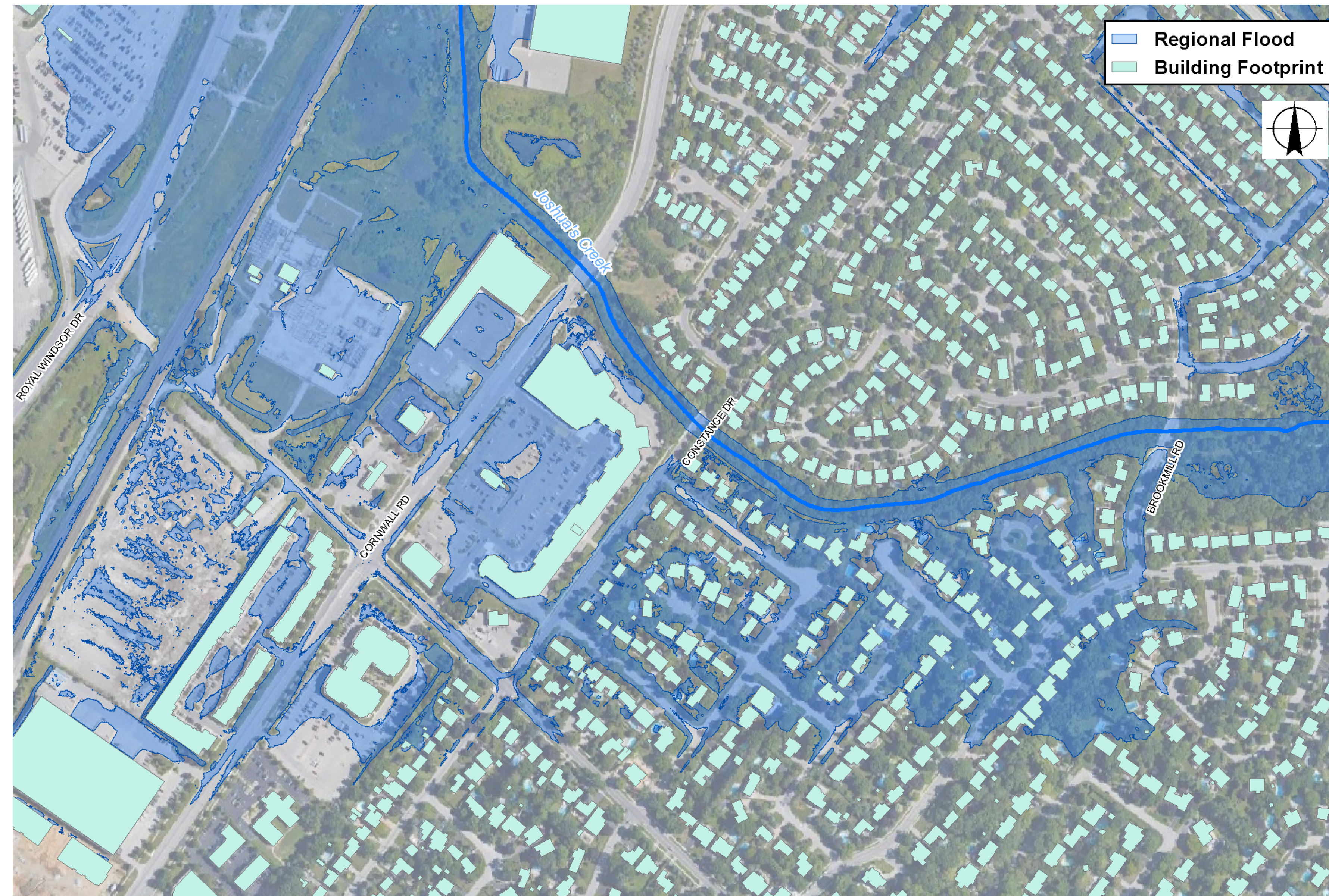


DRAFT REGIONAL FLOOD MAP (Hurricane Hazel)



- Flooding of the commercial and residential areas is likely to only occur during extreme storm events such as Hurricane Hazel.

POTENTIAL ALTERNATIVE SOLUTIONS TO REDUCE FLOOD RISK

- The following alternatives have been identified and screened for potentially reducing the flood impacts of Joshua’s Creek in the Study Area. The short-listed alternatives were carried forward and evaluated to determine the preliminary preferred alternative for the Study:

Alternatives	Feasibility	Comments
Alternative 1 – Do Nothing	✓	• This alternative will be carried forward in the Study.
Alternative 2 – Increase the Capacity of the Metrolinx Railway Bridge	✓	• This alternative will be carried forward in the Study.
Alternative 3 – Construct Flood Control Infrastructure	✓	• This alternative will be carried forward in the Study.
Alternative 4 – Install Relief Culvert Under Royal Windsor Drive	✗	• Road overtopping depth and velocity are not significant during the Regional flood event.
Alternative 5 – Provide Flood Storage	✗	• Flood storage facility would not be feasible due to spatial and environmental constraints, and high land acquisition costs.
Alternative 6 – Implement Low Impact Development Measures	✗	• LIDs are not intended to provide flood control for extreme events such as the Regional flood.
Alternative 7 – Construct Flow Diversion	✗	• Flow diversion is not feasible due to the significant development, challenging topography and existing flood concerns in the adjacent watercourses (i.e., Wedgewood Creek).
Alternative 8 – Implement Non-Structural Measures	✓	• This alternative will be carried forward in the Study.

SHORT-LISTED ALTERNATIVE SOLUTIONS

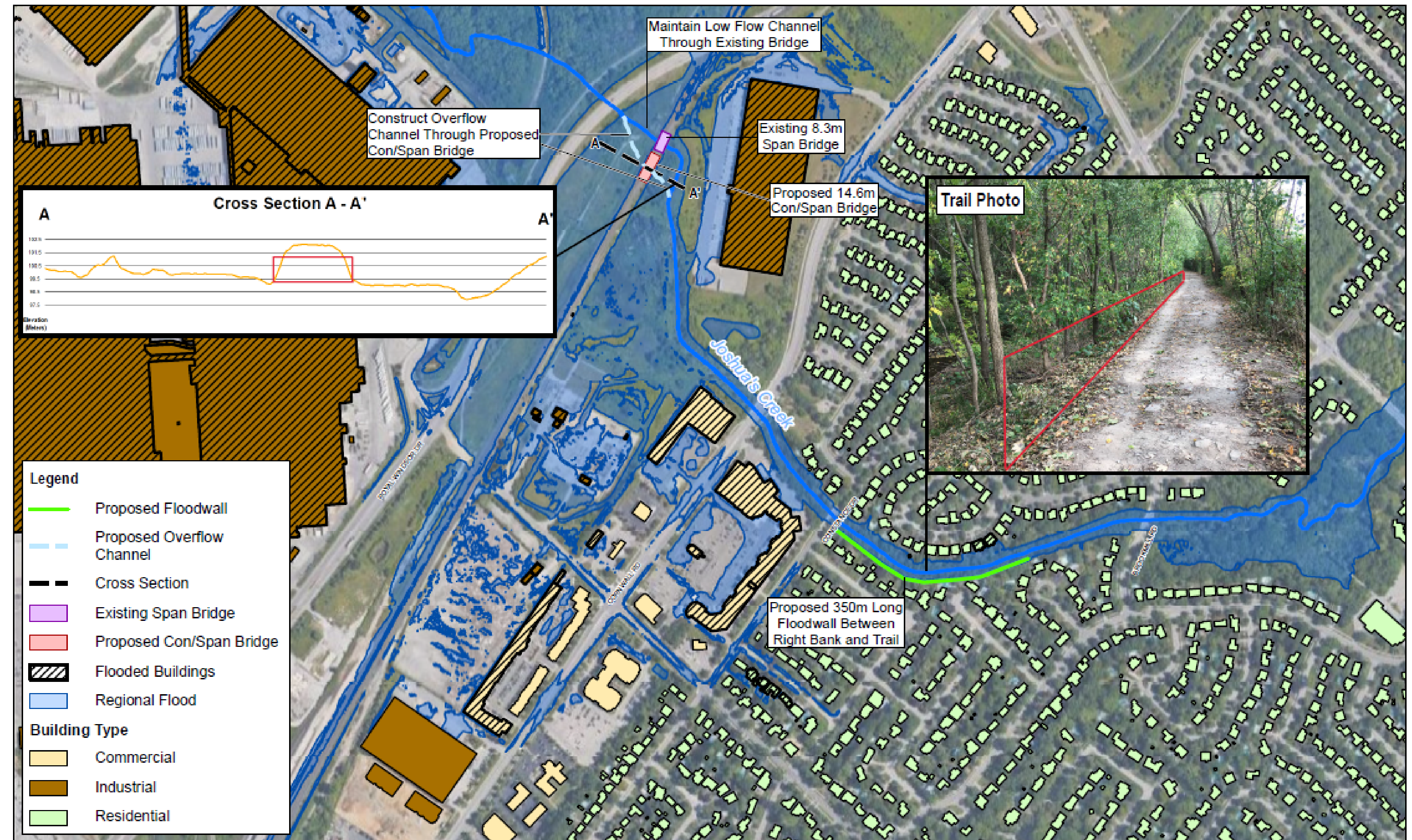
Alternative 1 – Do Nothing

- This alternative involves the maintenance of existing conditions of the creek system, with no implementation of, or improvements to flood mitigation infrastructure.
- The purpose of this alternative is to provide a benchmark for other alternatives to be compared to.
- Although no structural improvements are contemplated as part of the “do nothing” alternative, other measures such as the application of Conservation Halton’s regulation and regulatory policies, as well as municipal official plans and zoning by-laws to inform development in floodplain areas help to mitigate risk.

ALTERNATIVE SOLUTIONS

Alternative 2 – Increase the Capacity of the Metrolinx Rail Bridge

- The hydraulic capacity of the Metrolinx Railway Bridge would be increased by widening the bridge span, which would allow more water to pass through the bridge to lower upstream water levels.
- Any impacts to the rail bridge are contingent on acceptance by Metrolinx.
- The floodwall would be constructed along the trail on the right creek bank between Constance Drive and Brookmill Road.
- Alternative 2 would mitigate the spill to the Wedgewood Creek system during the 100-year climate change event and reduce flood impacts to the commercial and residential areas located in the right overbank area of the creek, downstream of the railway during the Regional flood event.
- Flood risk would be **reduced**, but not eliminated.

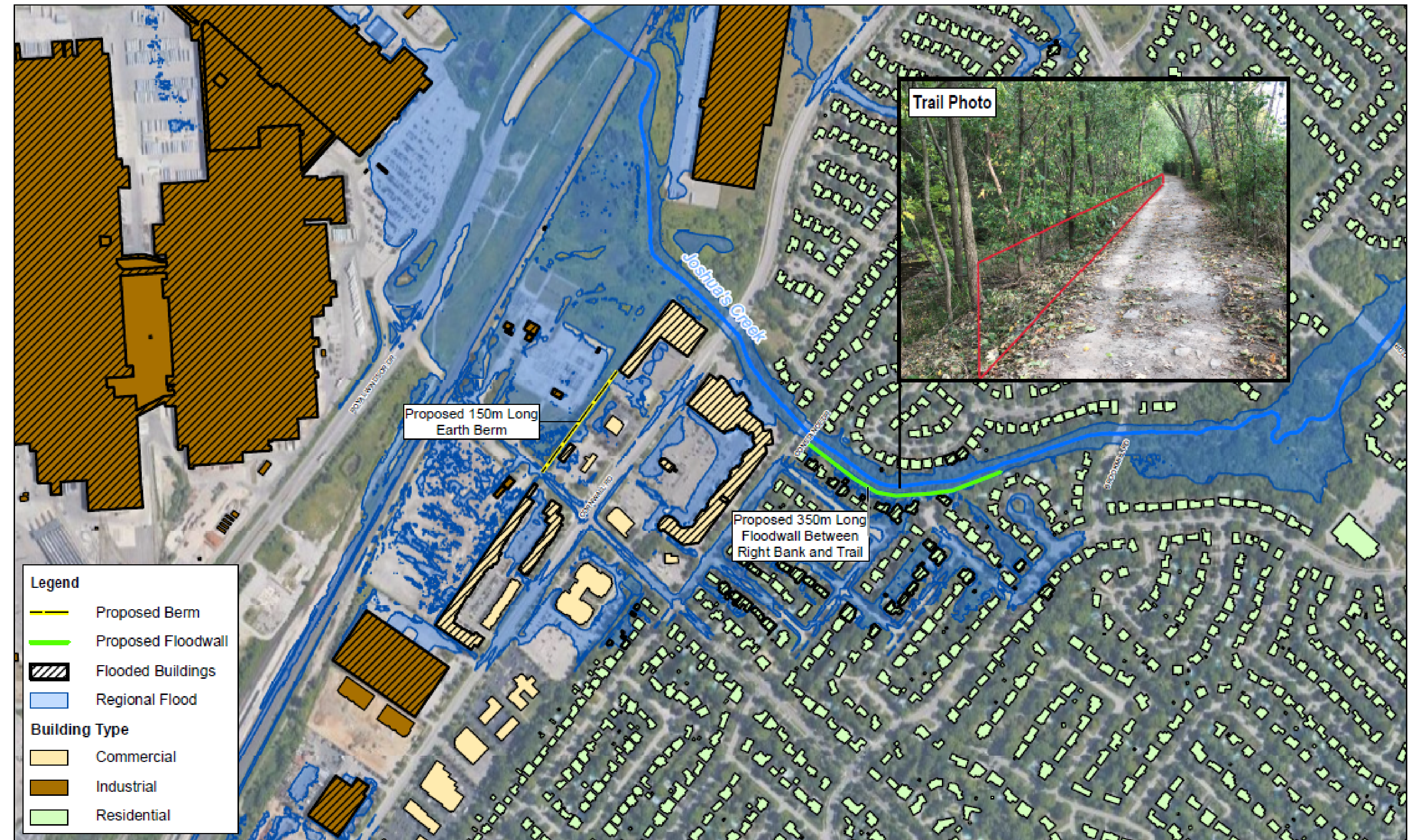


Regional Flood Inundation Boundary with Alternative 2 Mitigation Measures in Place

ALTERNATIVE SOLUTIONS

Alternative 3 – Construct Flood Control Infrastructure

- A flood control berm would be constructed between four private properties on the south side of the Hydro One facility.
- This design requires agreements and purchase of land from private property owners.
- The floodwall would be constructed along the trail on the right creek bank between Constance Drive and Brookmill Road.
- The flood control infrastructure would reduce flood impacts of the commercial and residential properties located in the right overbank area of the creek and downstream of the Metrolinx railway during the Regional flood event.
- Alternate locations for flood control infrastructure including the Cornwall Road and Constance Drive rights-of-ways were considered and determined to be infeasible.
- This alternative may not result in changes to Conservation Halton's regulatory floodplain mapping for the Study Area.
- Flood risk to the residential area is reduced, but not eliminated.



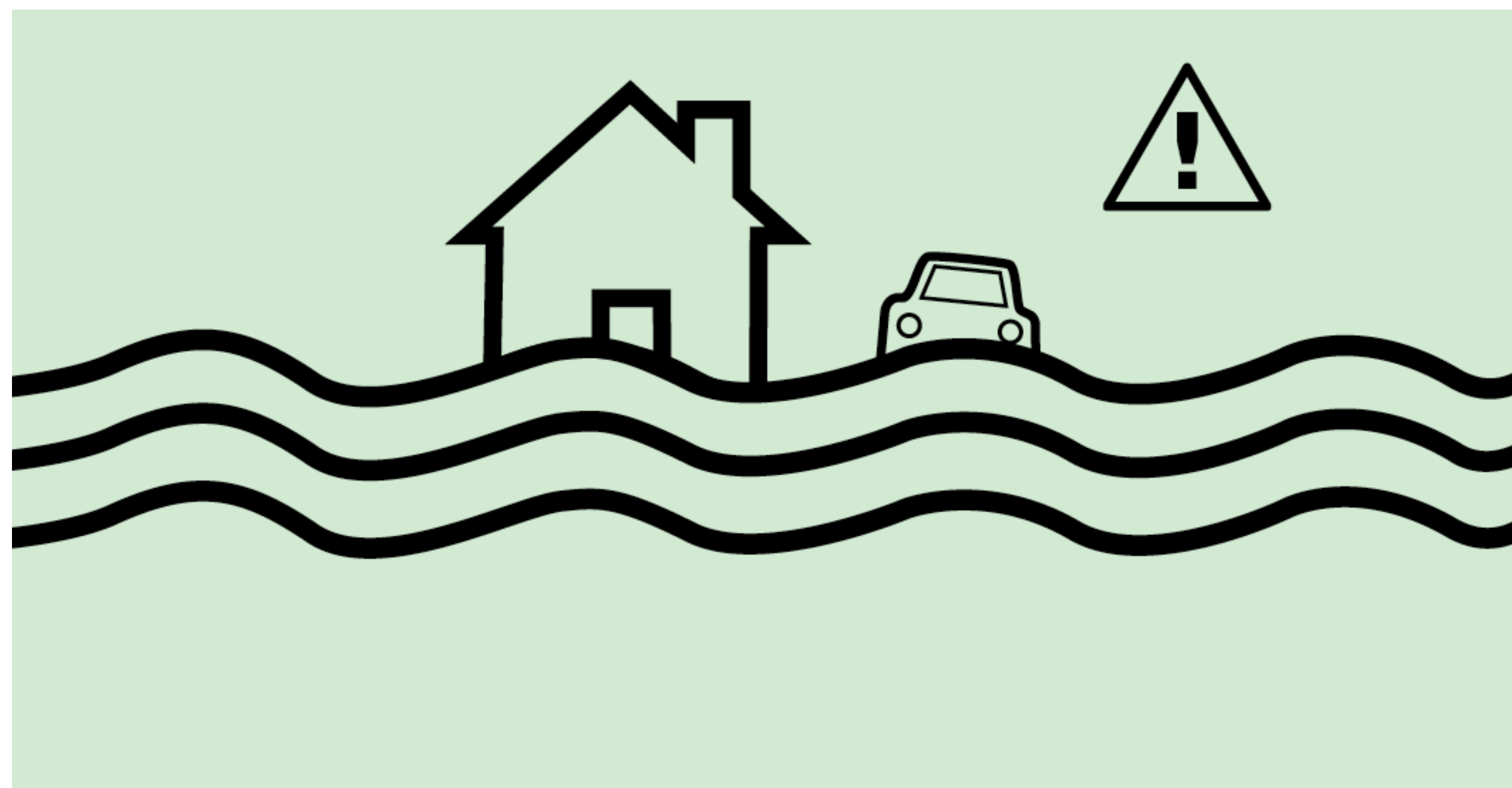
Regional Flood Inundation Boundary with Alternative 3 Mitigation Measures in Place

ALTERNATIVES SOLUTIONS

Alternative 8 – Non-Structural Measures

Mitigation

- Non-structural flood mitigation measures such as emergency preparedness plans, flood forecasting/warning, floodplain policies/regulations, and land acquisition could be implemented in locations where it may not be feasible to construct structural flood mitigation measures (i.e., in highly developed areas such as the Study Area).



Emergency Preparedness Plan

- Identifies properties located in the floodplain and provides property owners with a set of possible actions for flood protection.
- Actions could include installation of permanent or temporary flood control measures (i.e., sandbags, aqua dams, sealing windows/doors, waterproofing utilities).
- Flood warning/forecasting is the responsibility of the local conservation authority.
- Conservation Halton would advise the Town of anticipated extreme flood conditions, and the Town and property owners would implement their emergency preparedness plans.
- The emergency response plan would be made publicly available.
- The Town of Oakville, Region of Halton, and Conservation Halton would work together to create a public outreach program in order to educate the residents, and business/property owners within the floodplain on flood risk, and actions they can take to prepare flood proofing measures.



CONSERVATION HALTON

- Section 28 (1) of the Conservation Authorities Act allows conservation authorities to make regulations related to development in hazardous lands.
- Conservation Halton's (CH) regulation is Ontario Regulation 162/06 and its purpose is to protect life and property from natural hazards such as flooding and erosion.
- Under Ontario Regulation 162/06, CH regulates: Watercourses, Valleylands, Wetlands, Lake Ontario and Hamilton Harbour Shoreline, Hazardous Lands (e.g., flooding, erosion hazards), and Lands adjacent to these features.
- Permission is required from CH to develop in these areas.
- The Town's Study will be used by CH to develop screening mapping and may also be used to inform future updates to CH's regulatory floodplain mapping.
- Visit www.conservationhalton.ca for more information.

EVALUATION CRITERIA

- The short-listed alternatives were assessed with respect to technical factors, natural environment, social/cultural environment and costs.
- A quantitative ranking system was used to rank/score alternatives based on evaluation criteria presented below.

Criteria	Basis of Evaluation
Technical	
Impacts to Floodplain	The preferred alternative should effectively reduce flood inundation of the identified flood risk sites and should not increase flood potential along other sections of the creek.
Constructability	Requirements for specialized expertise or equipment, sensitivity to weather conditions, access restrictions, specialized materials, etc. are evaluated to assess overall constructability of each alternative.
Approvability	The potential for the alternative to receive regulatory approval from applicable review agencies such as Conservation Halton, Fisheries and Oceans Canada, Ministry of Natural Resources and Forestry, Ministry of the Environment and Climate Change, and landowners impacted by the works.
Considerations for Climate Change Impacts	The preferred alternative should be resilient to projected climate change impacts for the Study Area.
Natural Environment	
Long-term Effects on Fish and Fish Habitat	Evaluate the ability of the alternative to provide species diversity and a stable, healthy fish and aquatic community in the long term.
Long-term Effects on Wildlife	Evaluate the ability of the alternative to provide species diversity and a stable, healthy terrestrial and wildlife community in the long term.
Long-term Effects on Vegetation and Significant Woodlands	Evaluate the effect of the alternative on existing vegetation, including mature trees within the natural channel corridor, adjacent green spaces and significant woodlands.

EVALUATION OF ALTERNATIVES

Criteria	Basis of Evaluation
Social Environment	
Short-term Impacts During Construction	Evaluation of the potential temporary disruption to adjacent residents (i.e., traffic impacts, property access impacts), as well as nuisance factors such as noise and dust generation.
Effects on Public Safety	The alternative must provide a safe environment for members of the public of all ages.
Effects on Land Use	Measure of the impact to adjacent private property (i.e., loss of property, access to property).
Effects on Potential Archaeological and Built Heritage	The alternative should mitigate impacts to areas of archaeological and cultural heritage interest and preserve existing historical/heritage features.
Economic/Financial	
Estimated Capital Costs	The capital cost to implement the alternative is estimated based on conceptual level information. The lowest cost Alternative is assigned a score of 3. The highest cost Alternative is assigned a cost of 1.

SCORING SYSTEM

- 4 – highest ranking, 1 – lowest ranking
- Alternatives are assigned a score for each category equal to the sum of the rankings divided by the maximum possible value of the sum of the rankings.
- Alternatives are then assigned an overall score equal to the average of the categorical scores.

EVALUATION OF ALTERNATIVES

Evaluation Criteria	Alternative 1 Do Nothing		Alternative 2 Metrolinx Bridge + Floodwall on Trail		Alternative 3 Flood Control Berm + Floodwall on Trail		Alternative 8 Non-structural Flood Control Measures	
Technical							15	Max. Possible Value
Impacts to Floodplain	1	163 buildings impacted by floodwater	4	35 buildings impacted by floodwater	3	86 buildings impacted by floodwater	2	Decreased flood risk dependent on public participation
Constructability	4	No construction	1	Very challenging staged construction, while maintaining traffic on adjacent lines	3	Routine construction	4	No construction
Approvability	4	No approvals	1	Very challenging and time-consuming approval process. Approval may be required from DFO, CH and coordination required with local landowners	1	Challenging coordination due to work on private property.	3	Coordinated effort between the Town, CH, Region
Consideration for Climate Change Impacts	1	No consideration for climate change	3	Climate change resilience incorporated into the design process	3	Climate change resilience incorporated into the design process	2	Climate change resilience can be considered into the planning process
Score	0.67		0.60		0.67		0.73	
Natural Environment							9	Max. Possible Value
Long-term Effects to Fish Habitat	2	No effects	2	No effects	2	No effects	2	No effects
Long-term Effects to Wildlife	2	No effects	2	No effects	2	No effects	2	No effects
Long-term Effects to Vegetation and Significant Woodlands	2	No effects	2	No effects	2	No effects	2	No effects
Score	0.67		0.67		0.67		0.67	

EVALUATION OF ALTERNATIVES

Evaluation Criteria	Alternative 1 Do Nothing		Alternative 2 Metrolinx Bridge + Floodwall on Trail		Alternative 3 Flood Control Berm + Floodwall on Trail		Alternative 8 Non-structural Flood Control Measures	
Social Environment							15	Max. Possible Value
Short-term Effects During Construction	3	No construction	1	Disruption to rail commuters, trail users, residences adjacent to trail	2	Disruption to trail users, residences adjacent to trail	3	No construction
Effects on Public Safety	2	No effects	3	Decreased flood risk, floodwall can enhance safety for trail users	3	Decreased flood risk, floodwall can enhance safety for trail users	2	Decreased flood risk dependent on public participation
Effects on Land Use	2	No effects	1	Metrolinx infrastructure and Hydro One property impacted by the bridge works	1	4 private property owners impacted by berm construction	2	No effects
Effects to Potential Archaeological and Built Heritage Resources	2	No potential to adversely affect potential archaeological resources	1	Potential to adversely affect archaeological resources. If this alternative is preferred a Stage 1 Archaeological Assessment will be required for impacted areas.	2	No potential to adversely affect potential archaeological resources	2	No potential to adversely affect potential archaeological resources
Score	0.60		0.40		0.53		0.60	
Economic/Financial							3	Max. Possible Value
Estimated Capital Costs	3	No capital cost	1	Highest cost	2	High cost	3	No capital cost
Score	1.00		0.33		0.67		1.00	
TOTAL SCORE	0.73		0.50		0.63		0.75	

PRELIMINARY PREFERRED SOLUTION

Preliminary Preferred Alternative

- Alternative 8 Non-structural Measures (Emergency Preparedness Plan) is recommended for implementation based on the evaluation process.
- Emergency preparedness plans are appropriate for flood mitigation measures in highly developed areas, where structural flood control measures are not practical or feasible to construct.
- Application of Conservation Halton regulation/regulatory policies for development in natural hazard lands together with municipal official plans and zoning bylaws are in place to help mitigate flood risk.

Further Considerations and Justification

- The low probability of damaging flood impacts was considered in the evaluation.
- The modelled flood inundation boundaries, up to and including the 100-year climate change flood event, do not impose significant concerns to public safety, properties, or cultural and environmental features.
- The modelled Regional flood presents the greatest impacts to private properties located downstream of the Metrolinx tracks in the right overbank area of the creek.
- It is important to consider the magnitude of the Regional peak flow rate, which is more than 2x's greater than the 100-year climate change peak flow rate.

Potential Future Works

- The Town and Metrolinx may consider constructing a rail bridge to pass the Regional storm event without overtopping in the future when the bridge is scheduled for replacement.
- Construction of the floodwall on the right creek bank downstream of Constance Drive could then be considered.

PLANNED NEXT STEPS

The planned next steps in the Joshua's Creek Flood Mitigation Class EA Study are as follows:

- Review comments received from PIC 2
- Confirm the preferred alternative solution
- Prepare and file the Project File Report for the 30-day public review period to solicit comments and feedback from interested parties.

COMMENTS

Please submit any comments or questions you may have on the Study by submitting a completed comment form by **November 5, 2021** to the following Project Team members (via e-mail or mail) so that they can be considered and responded to:

Diana Friesen, B.Sc. C.E.T.
Water Resources Technologist
Town of Oakville
1225 Trafalgar Road
Oakville, ON L6H 0H3
Tel: 905-845-6601 ext. 3904
E-mail: diana.friesen@oakville.ca

Janusz Czuj, P.Eng.
Consultant Project Manager
GHD
455 Phillip Street
Waterloo, ON N2L 3X2
E-mail: janusz.czuj@ghd.com

All personal information included in a submission – such as name, address, telephone number and property location – is collected, maintained and disclosed by the Ministry of Environment, Conservation and Parks for the purpose of transparency and consultation. The information is collected under the authority of the Environmental Assessment Act or is collected and maintained for the purpose of creating a record that is available to the general public as described in s.37 of the Freedom of Information and Protection of Privacy Act (FIPPA). Personal information you submit will become part of a public record that is available to the general public unless you request that your personal information remain confidential. For more information, please contact the Ministry of the Environment, Conservation and Parks' Freedom of Information and Privacy Coordinator at (416) 327-1434.

