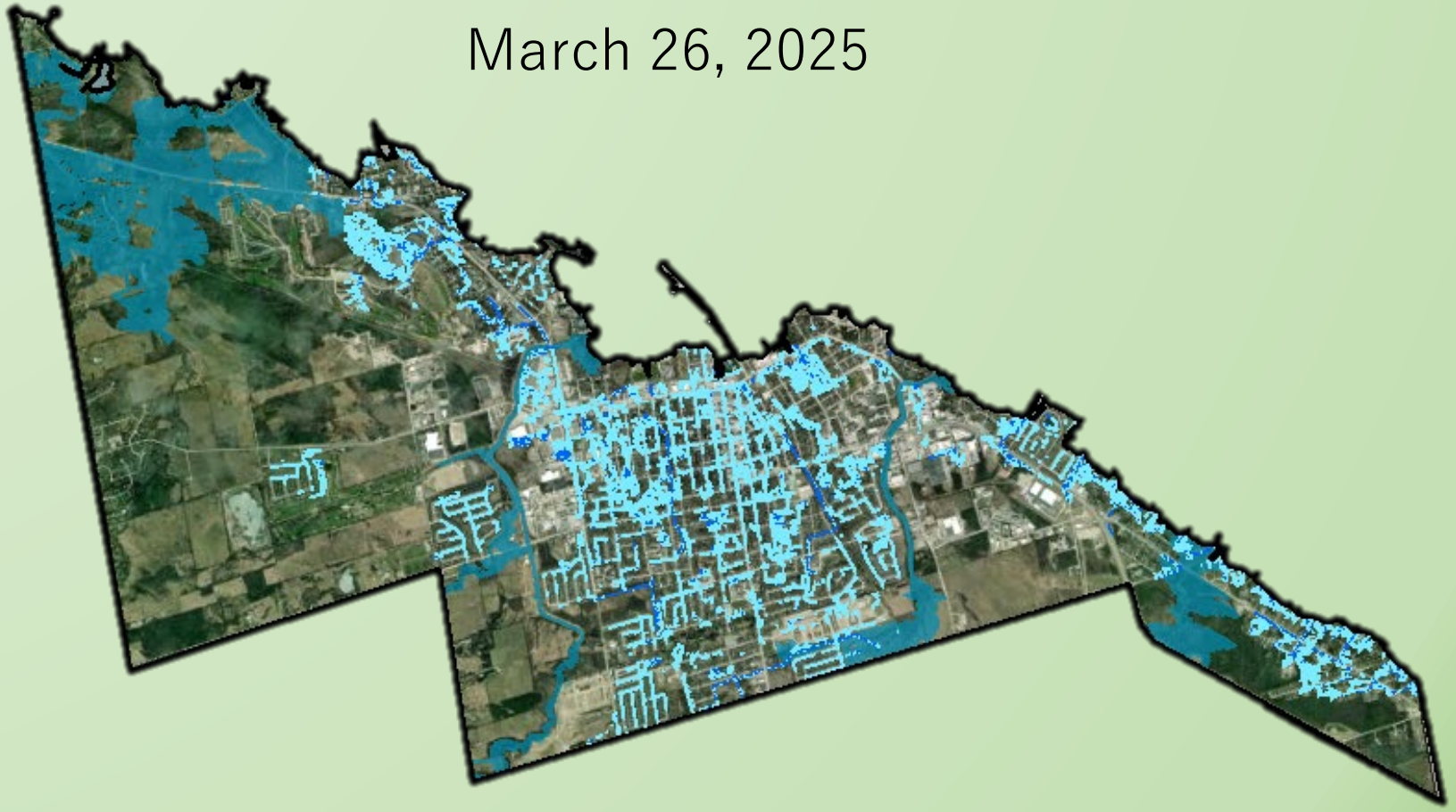
Management Master Plan – Phase II

Public Information Centre #2

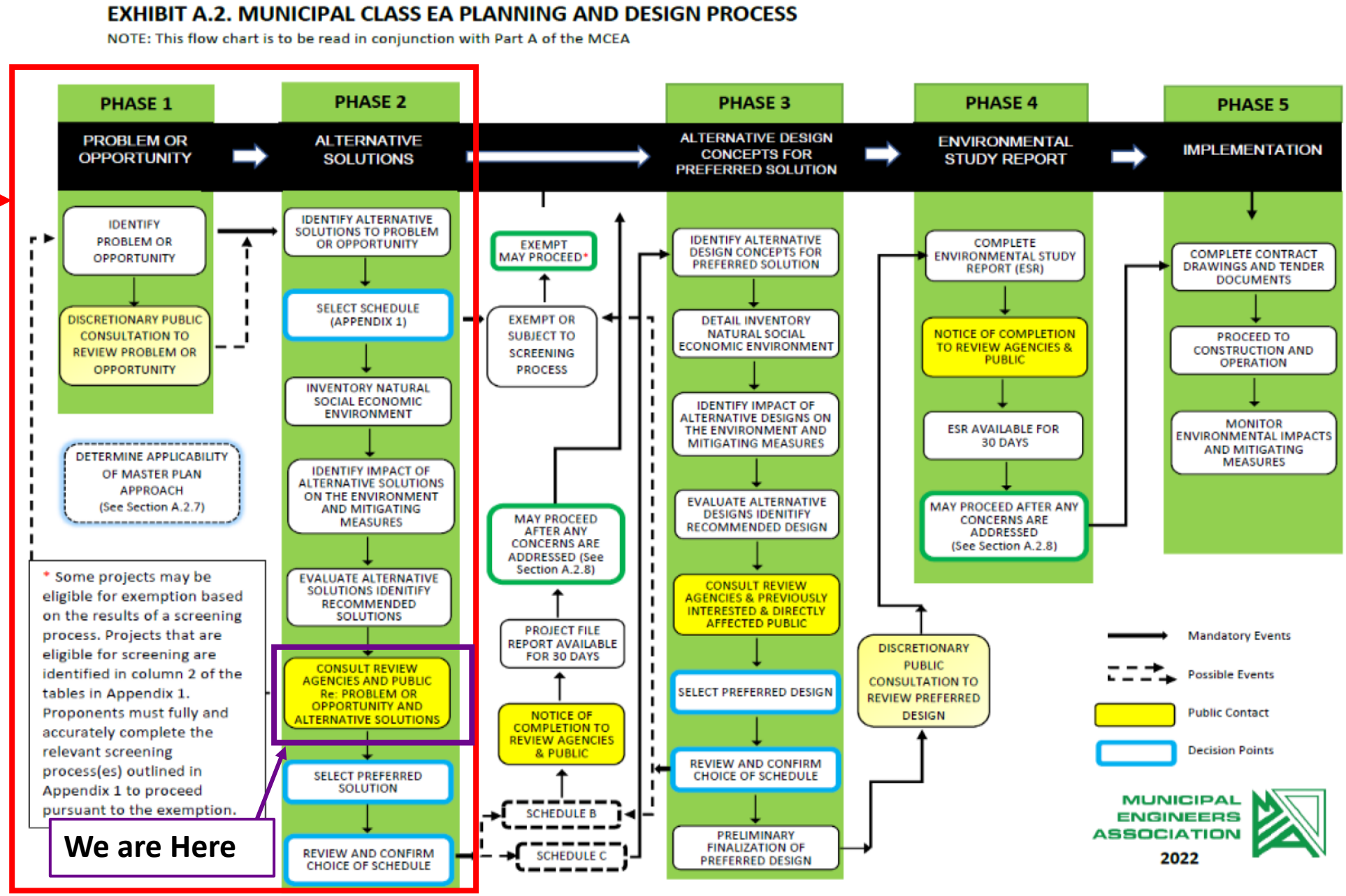
Presented By: Greenland International Consulting Ltd.

March 26, 2025



Municipal Class EA Process

The Master Plan will complete Phases 1 & 2 of the EA process



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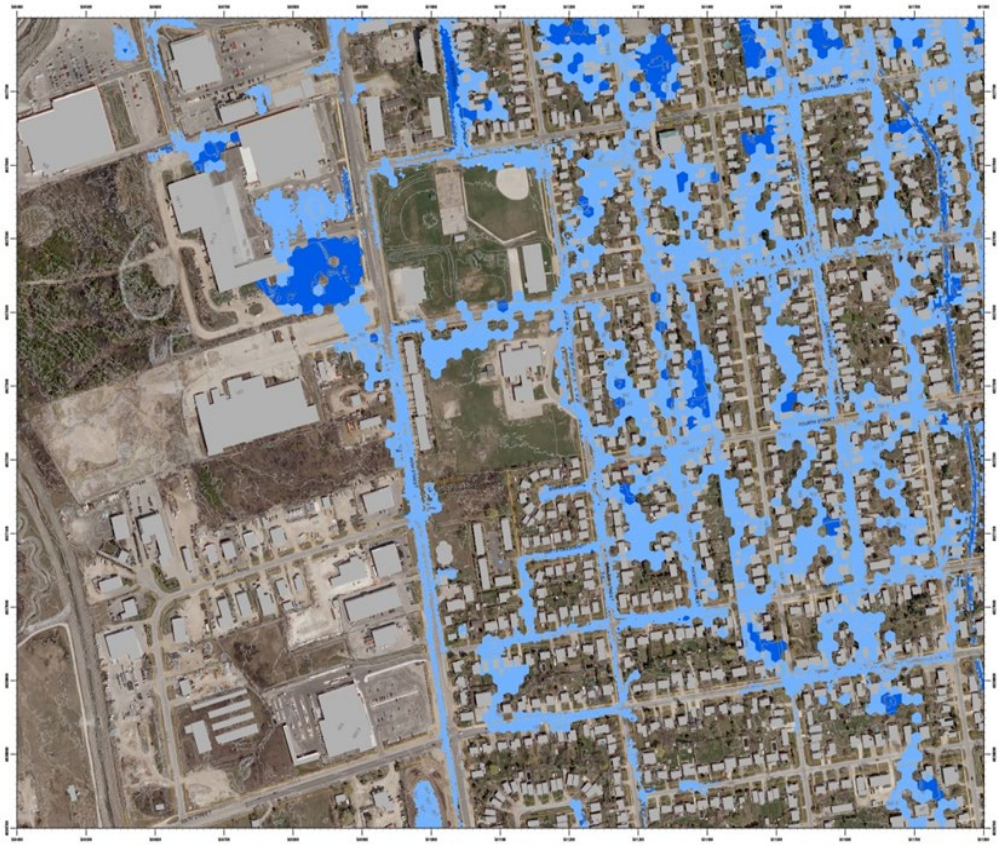
Background – Phase I

- Existing conditions Stormwater Management (SWM) model developed, consisting of the existing storm sewer drainage system and multiple watercourses that traverse the Town of Collingwood limits.
- **Purpose**: Gain a better understanding of the existing capacity of the stormwater infrastructure and riverine systems and identify potential flood damage zones within the Town of Collingwood.
- **Deliverables:**
  - Updated stormwater master infrastructure database
  - Flood line mapping of the riverine systems
  - Flood mapping of the urban areas
  - Summary report

Urban Overland Flood Mapping (100 year event)
West End of Town Centre



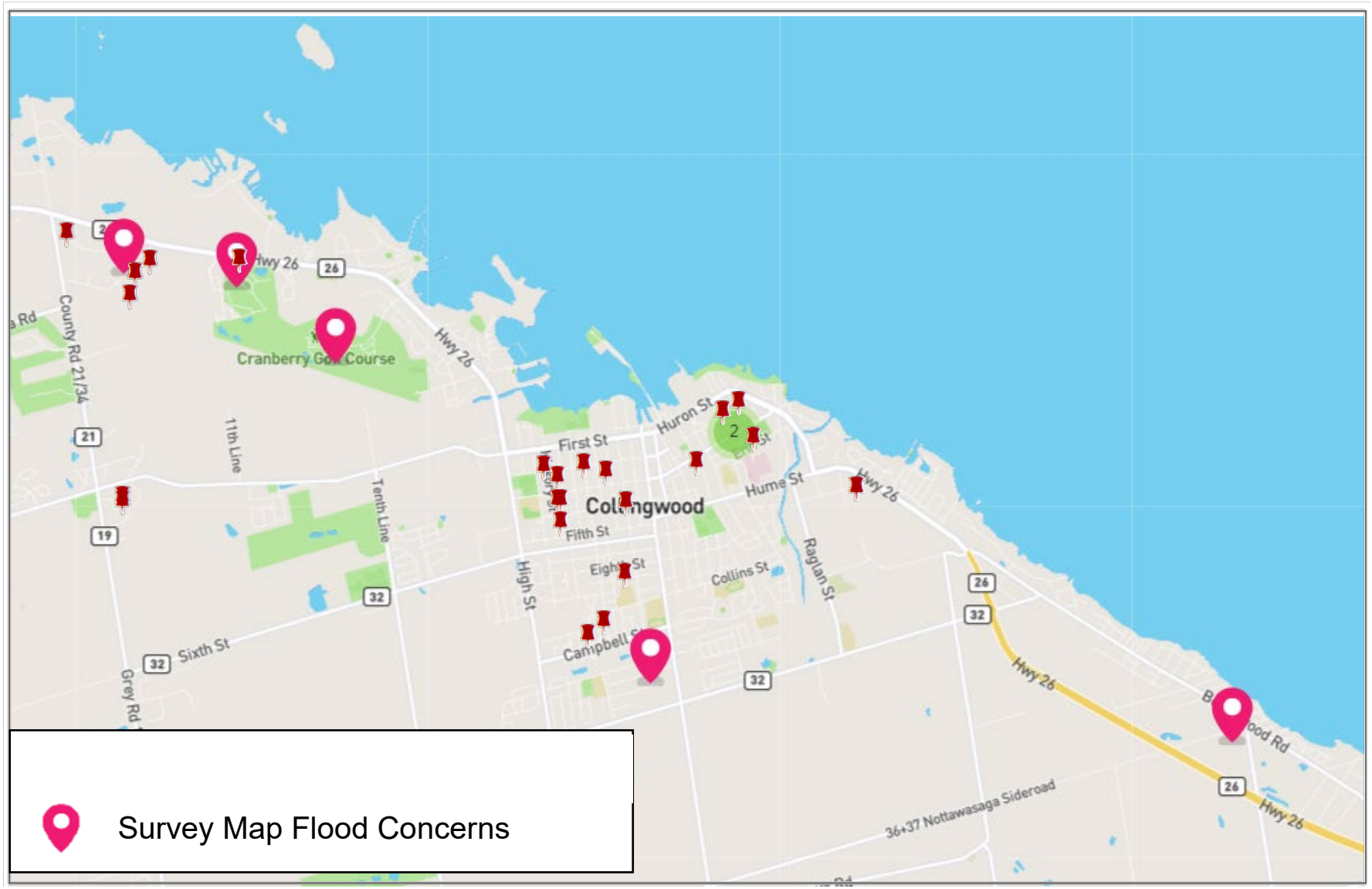
Purpose of Phase II

- Phase II of the SWM Master Plan will identify alternative solutions to address overland (urban) flooding issues within Collingwood and establish preferred solutions to effectively mitigate flood issues in impacted areas.
- The primary objectives of this assignment are to:
  - Analyze the model results obtained during Phase I and identify all existing flooding problems and opportunities related to the current conditions;
  - Update the modeling to account for future development scenarios; and,
  - Determine mitigation solutions that align with the Municipal Class EA process.

PIC #1 – June 10, 2024

- Project introduction including problem & opportunity statement;
- Presented updated existing conditions flood mapping & flood damage centres for urban and riverine areas;
- Presented long list of proposed solutions & evaluation criteria; and,
- Opportunity for public feedback on existing areas of flooding concern.

Public Survey Feedback – Areas of Concern

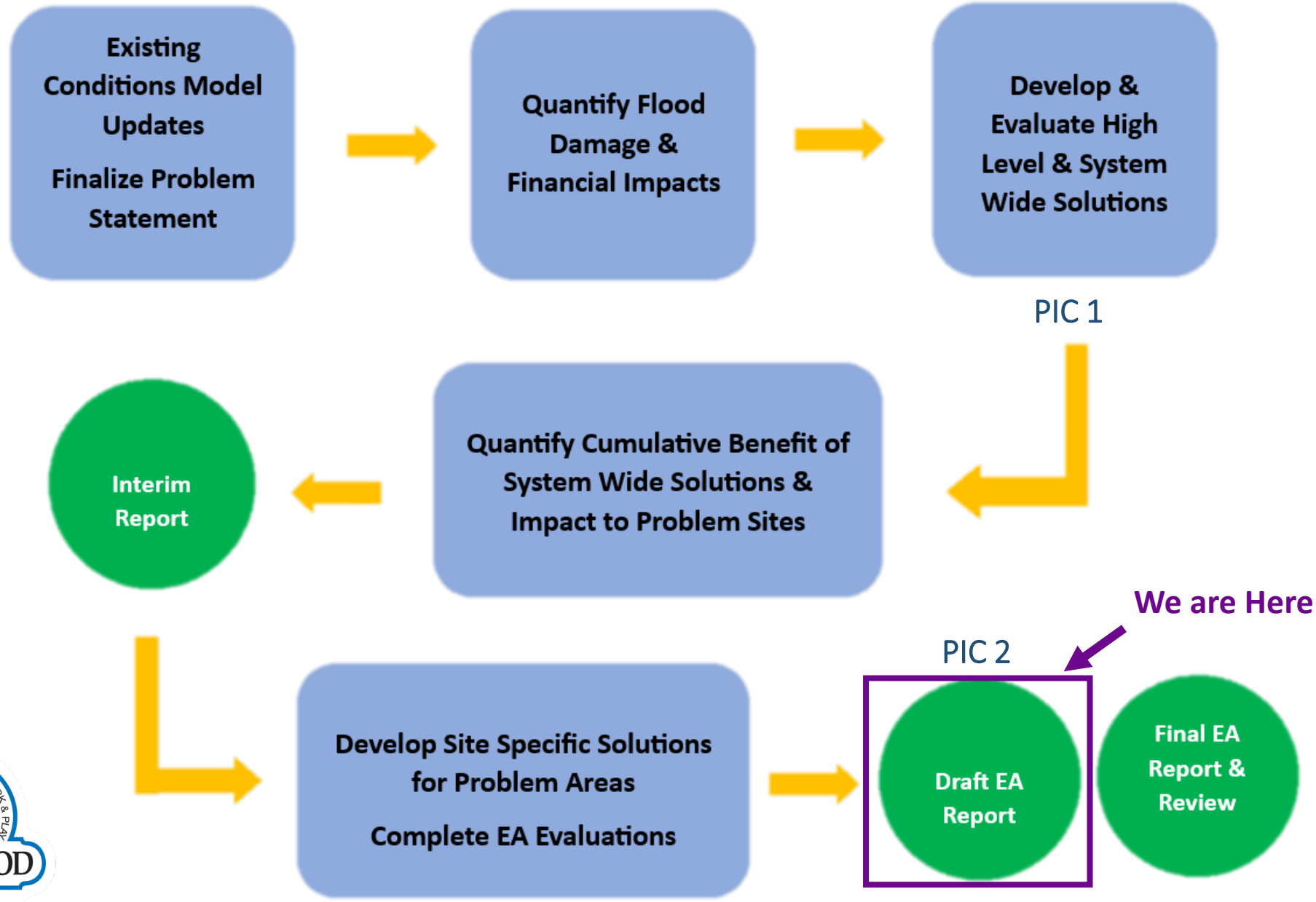


Problem & Opportunity Statement

The Objective of the Collingwood Stormwater Management Master Plan (SWM MP) is to identify and select preferred alternative stormwater management solutions to address existing and future anticipated overland (urban) flooding issues in Collingwood. Selected solutions will minimize impacts to both the natural and social environments and will be both technically feasible and economically sensible.

The SWM MP will also provide existing and future conditions infrastructure modeling and asset management/planning recommendations for the proposed stormwater management systems identified.

Project Process



Development Scenarios

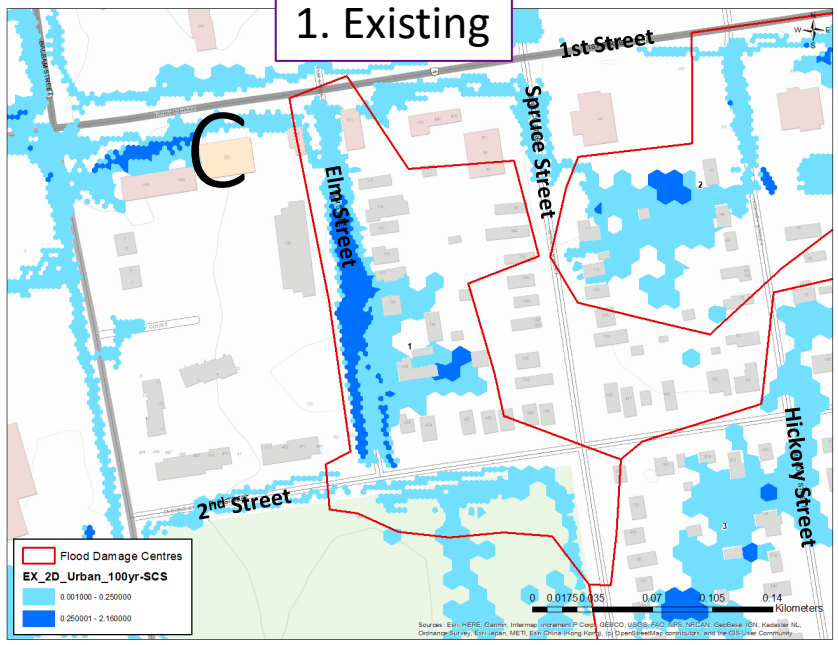
Development Scenarios Modelled:

1. Existing
    - Current conditions
2. Existing with Climate Change
    - Current development with Climate Change (2064 target year)
    - Assess climate change on existing systems, without any impacts of development
3. Existing with Climate Change and Intensification
    - Current development with projected infill development (50% of population growth to 2051 considered infill per Official Plan targets)
    - Assess how infill development will impact systems under a future climate change scenario (2064 target climate year)
    - **Baseline scenario for proposed improvement projects** (future development will have post to pre stormwater quantity control)
4. Development to 2051 (2051)
    - Includes projected development areas to 2051, in accordance with Collingwood's Master S Stud & Wastewater
    - Climate Change based on 2051 target year

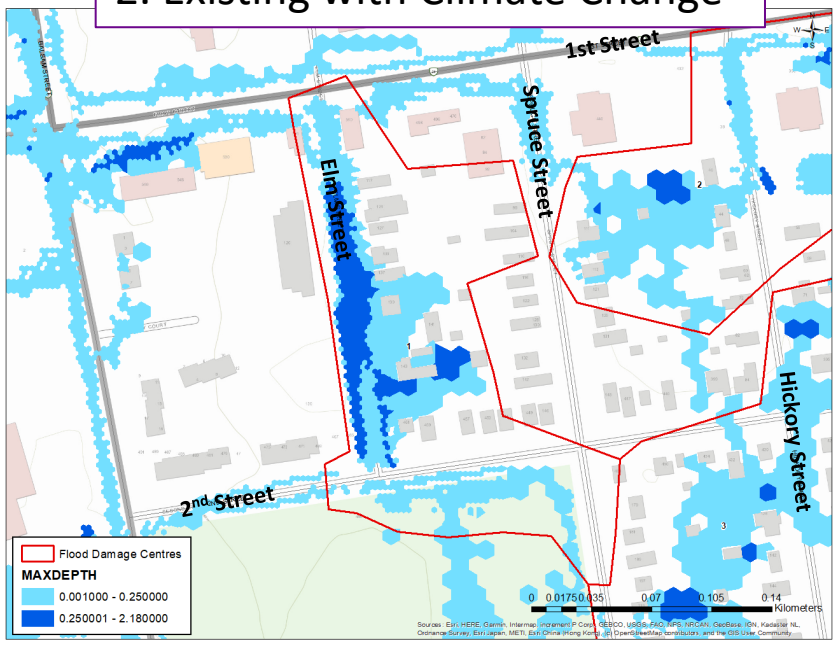
Comparison of Flooding Under Each Development Scenario

FDC 1 Example

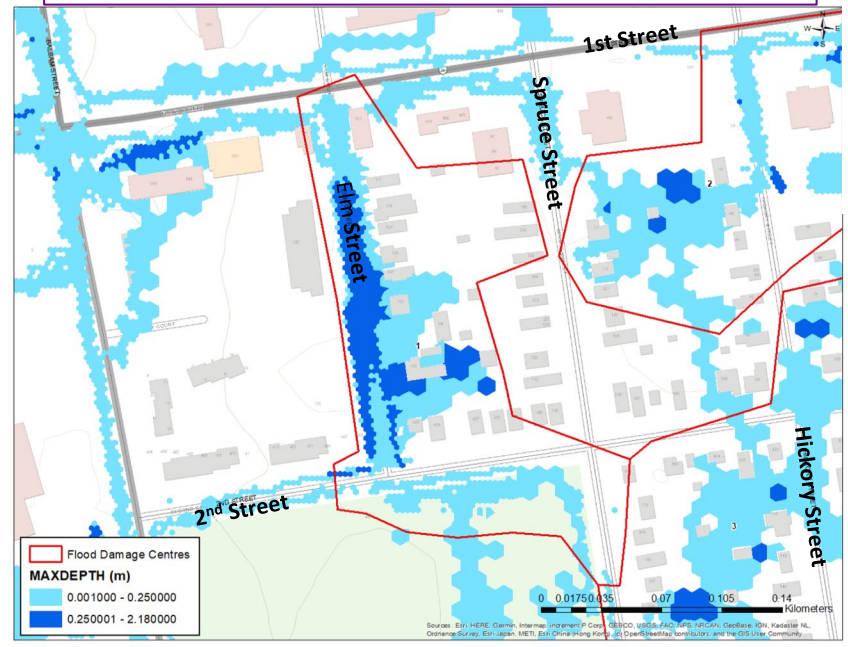
1. Existing



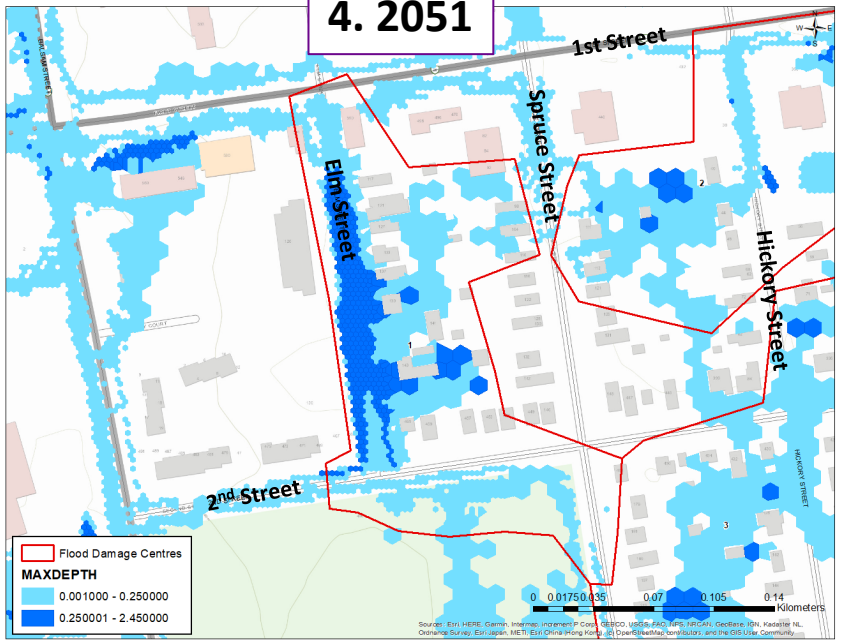
2. Existing with Climate Change



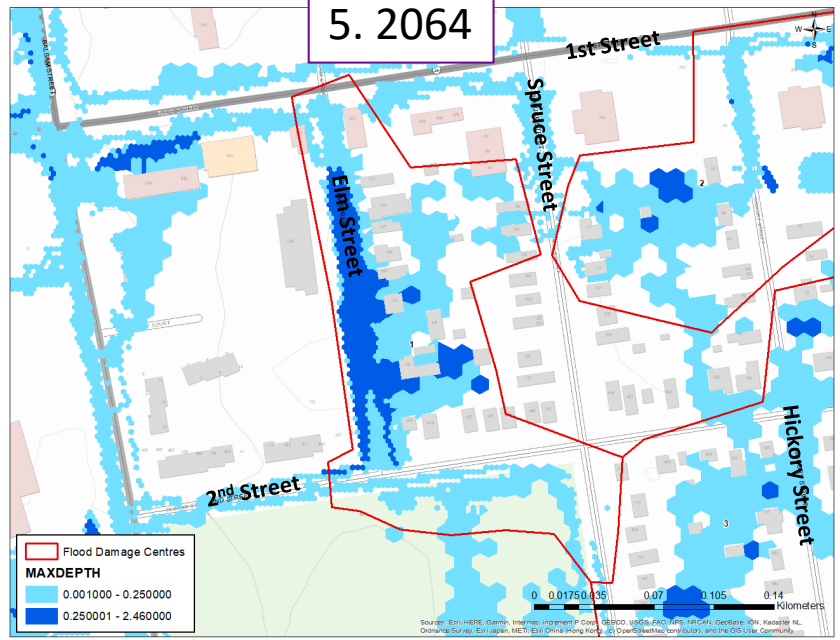
3. Existing with Climate Change and Intensification



4. 2051

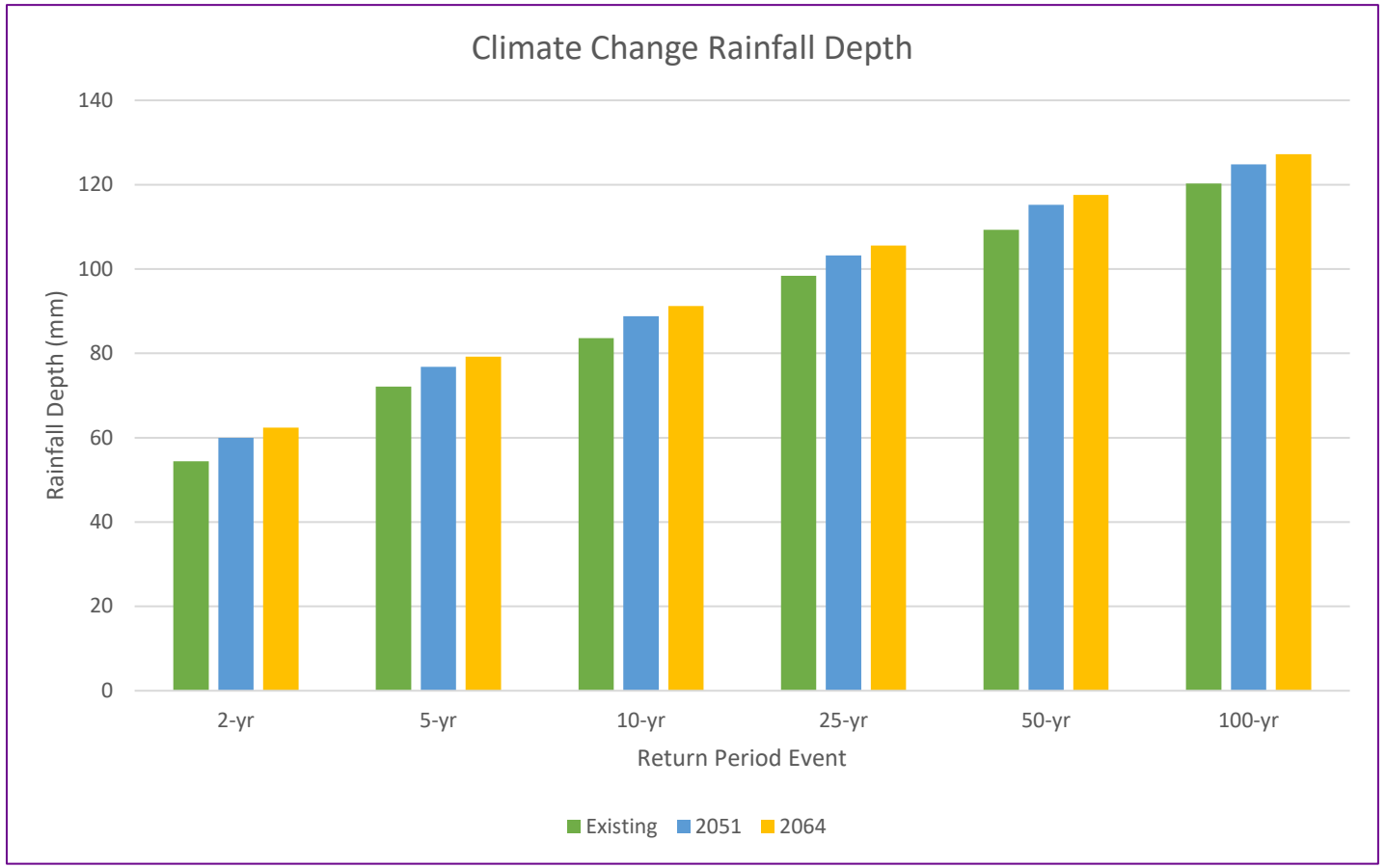


5. 2064



Climate Change

- MTO IDF Curve Look Up was used to determine rainfall depths and IDF curves for Climate Change Scenarios
- Uses a linear projection to estimate climate change based on historical data
- Climate Change values from the 2051 and 2064 target years were used for modelling development scenarios



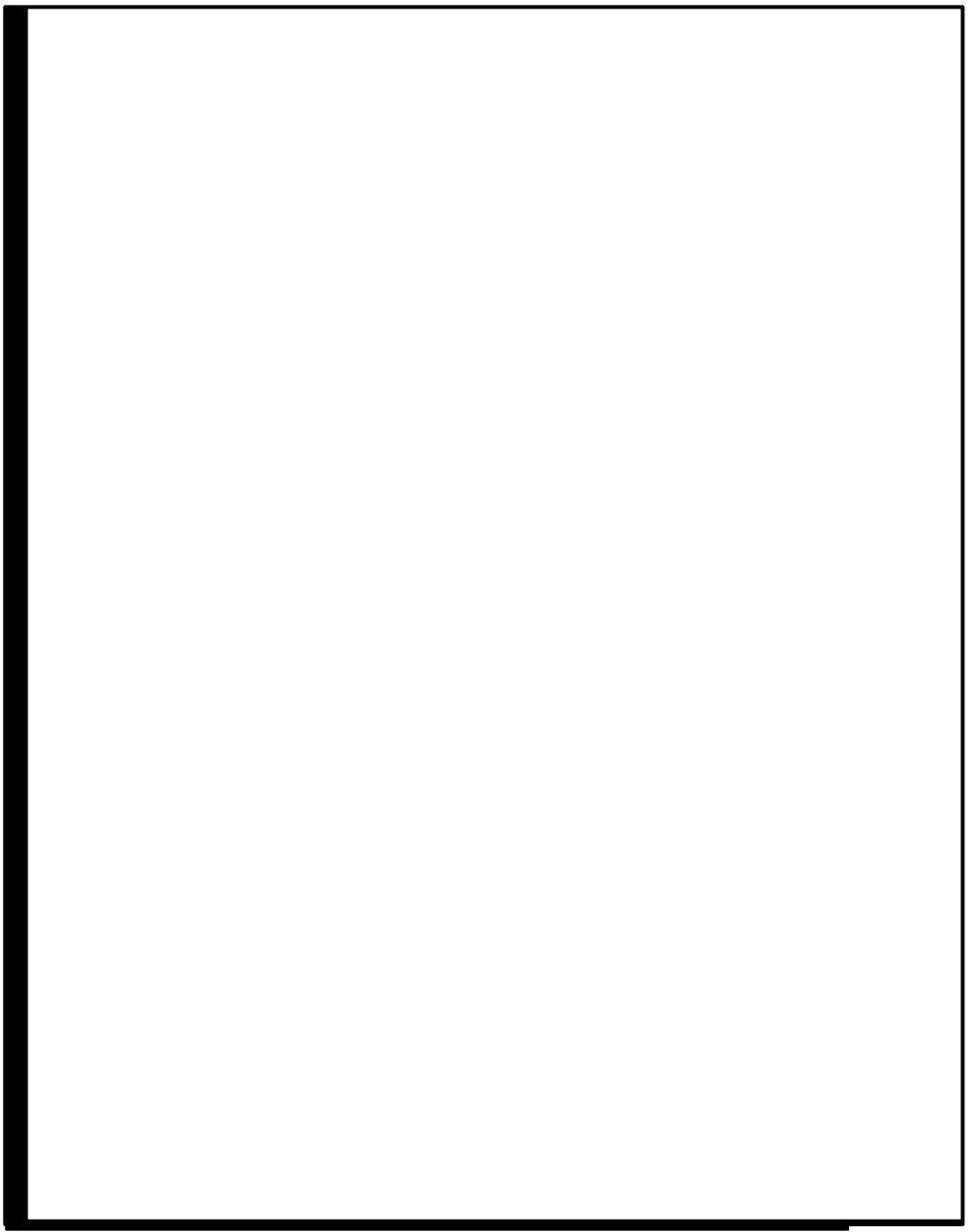
Return Period	Rainfall Depth (mm)			Change from Existing to 2064
	Existing	2051	2064	
2-yr	54.4	60	62.4	13%
5-yr	72.1	76.8	79.2	9%
10-yr	83.6	88.8	91.2	8%
25-yr	98.4	103.2	105.6	7%
50-yr	109.3	115.2	117.6	7%
100-yr	120.3	124.8	127.2	5%

Ontario Ministry of Transportation (MTO): https://idfcurves.mto.gov.on.ca/results_out.shtml?coords=44.49361,-80.23426

Flood Damage Centres

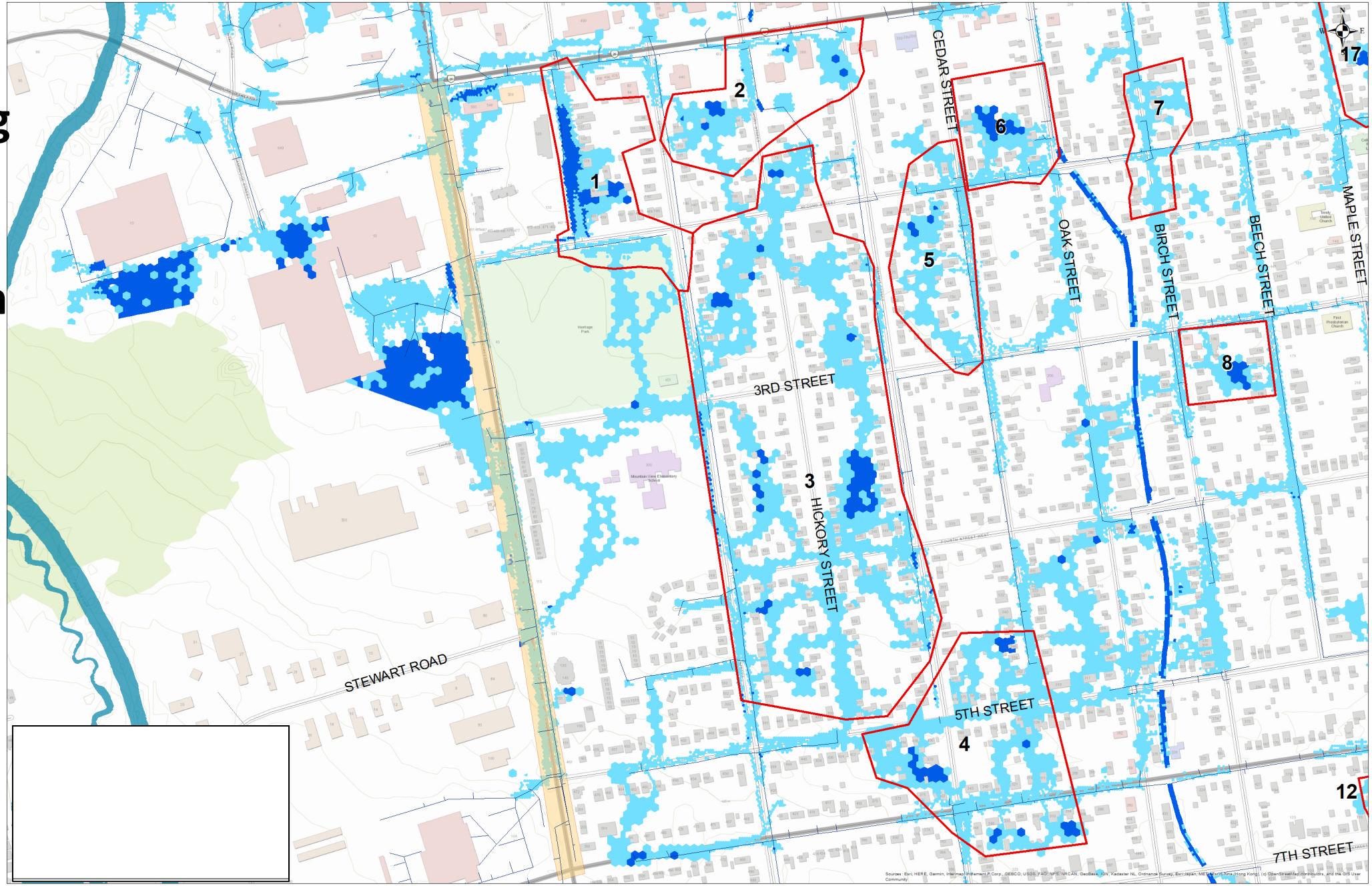
Existing Condition, with Climate Change and Urban Intensification (Infill)

Map Legend



- Urban and Riverine Flood Damage Centres (FDCs)
- Other Areas of Concern Identified by the Public
- Existing storm sewers
- Major watercourses
- Riverine Floodplain and spill area, Regulatory event
- New stormwater management facility
- Updated ROW grading and addition of curb
- Sewer upgrades proposed as part of FDC solution
- Ditch upgrades proposed as part of FDC solution
- 100 Yr storm event flooding
- Flood depths less than 25cm
- Flood depths greater than 25cm
- Municipal roads
- Municipal boundary

FDC 1-8 Flooding Under Existing with Climate Change and Intensification



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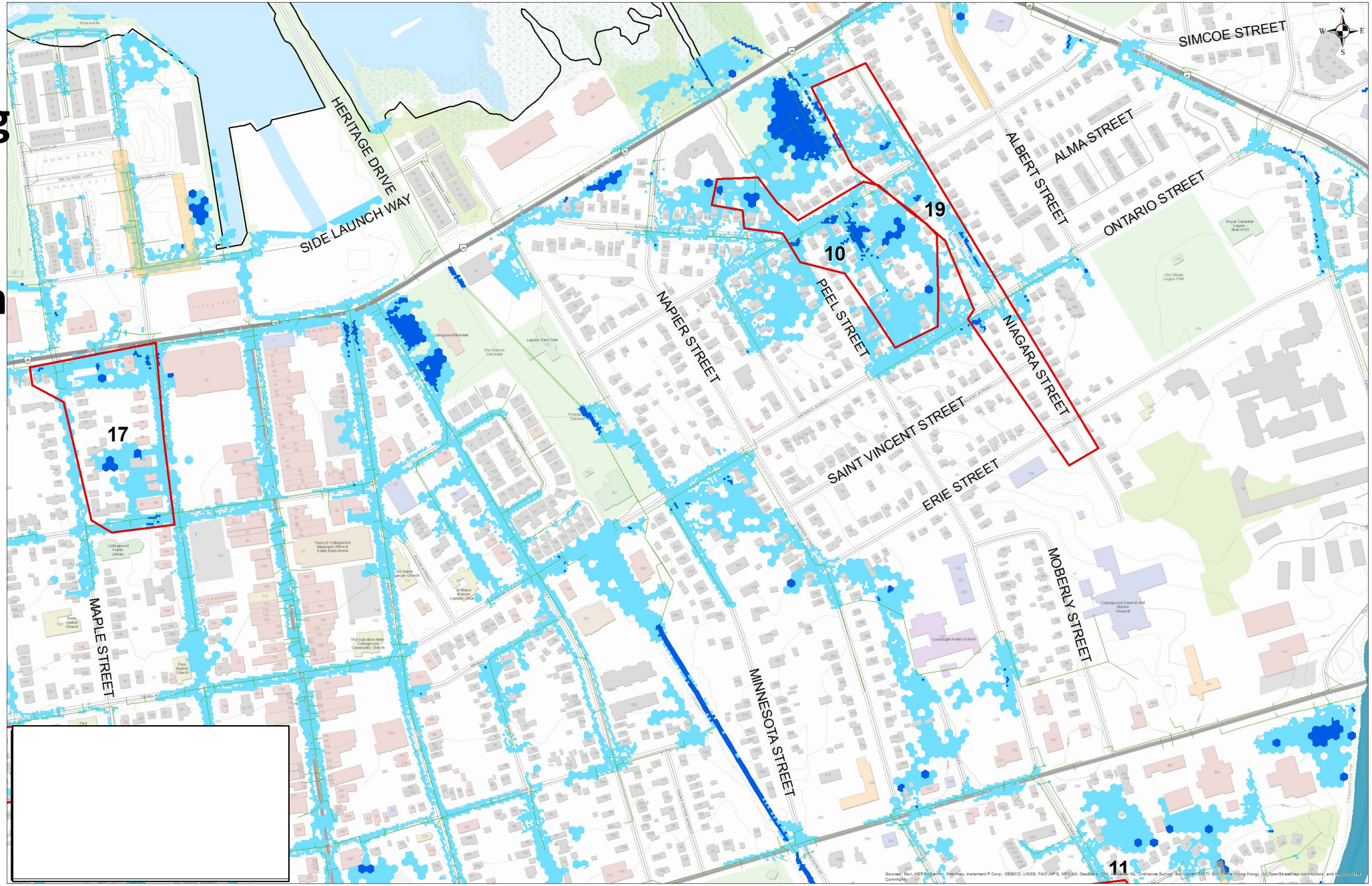
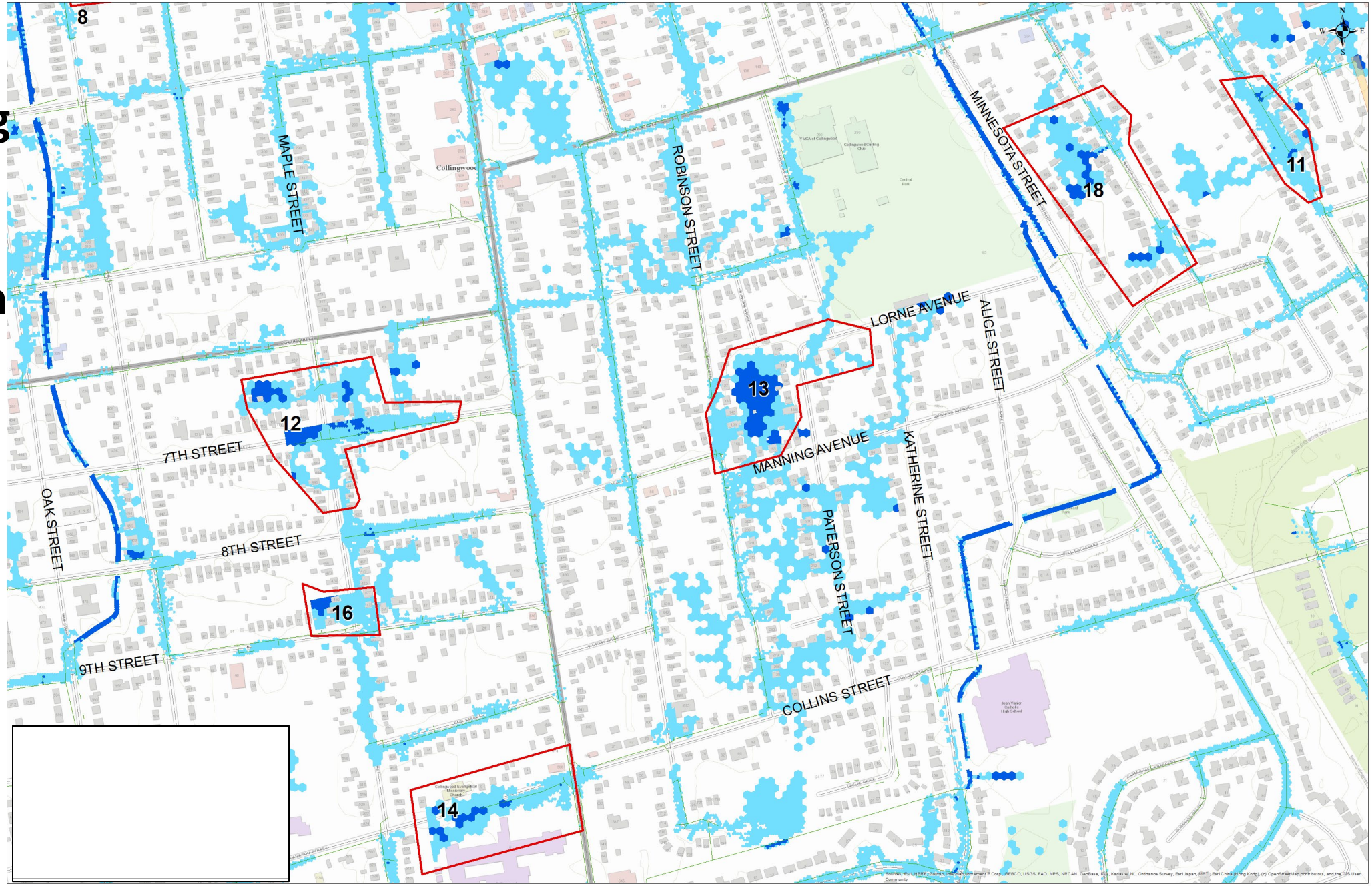
FDC 10, 17 & 19 Flooding Under Existing with Climate Change and Intensification

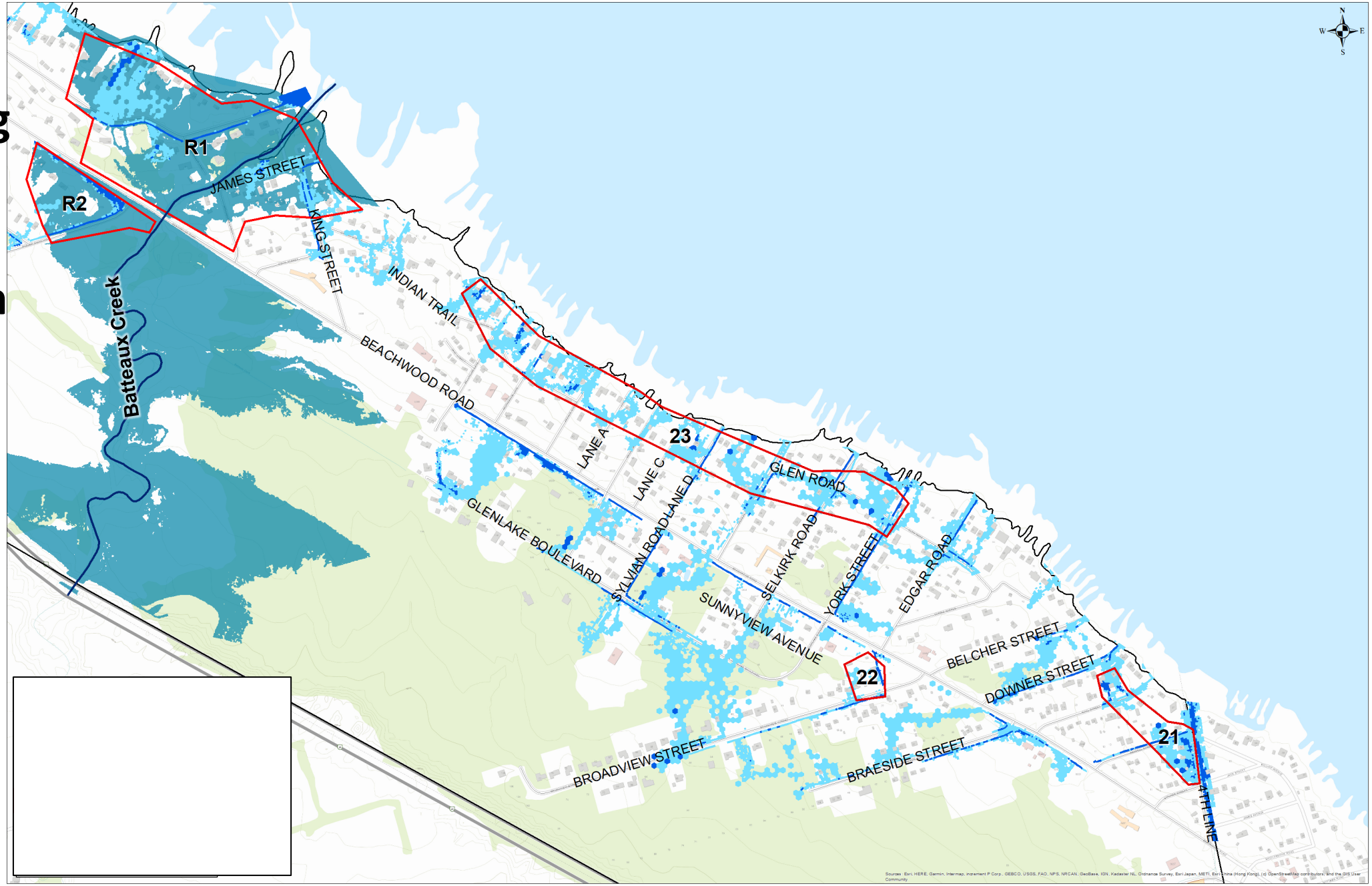


FDC 11-14, 16 & 18 Flooding Under Existing with Climate Change and Intensification



FDC 15, 20 Flooding Under Existing with Climate Change and Intensification

FDC 21-23, R1 & R2 Flooding Under Existing with Climate Change and Intensification



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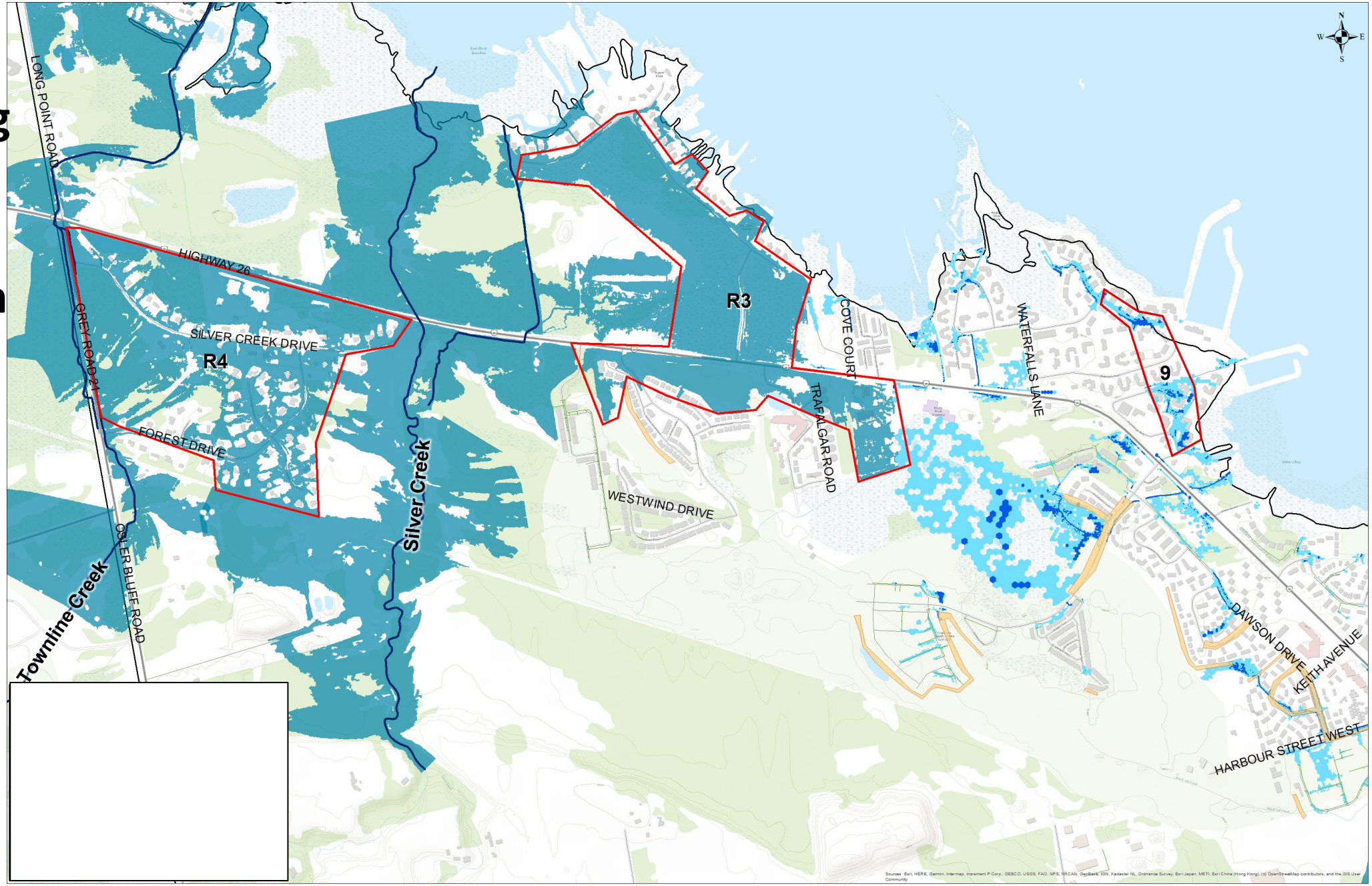
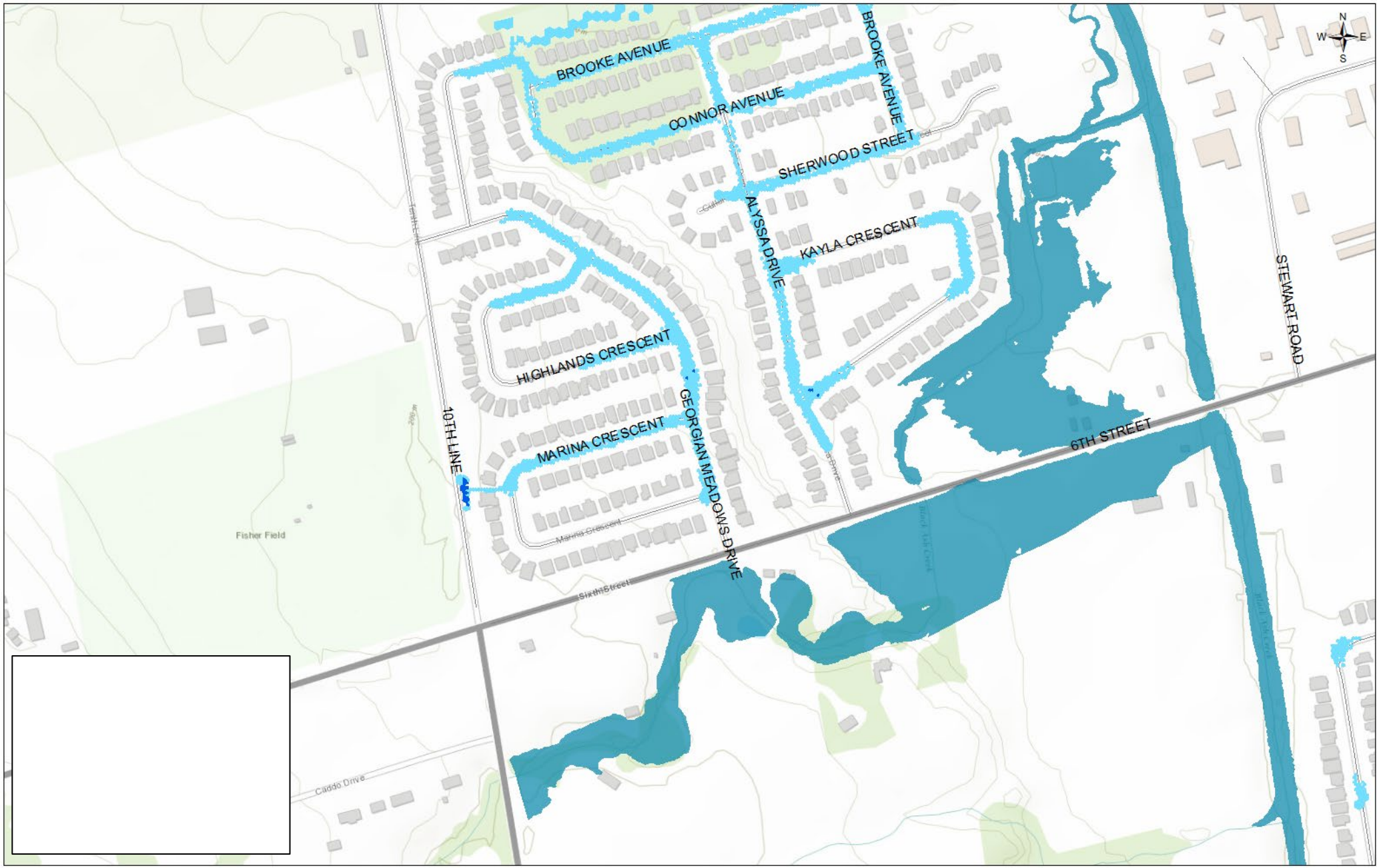
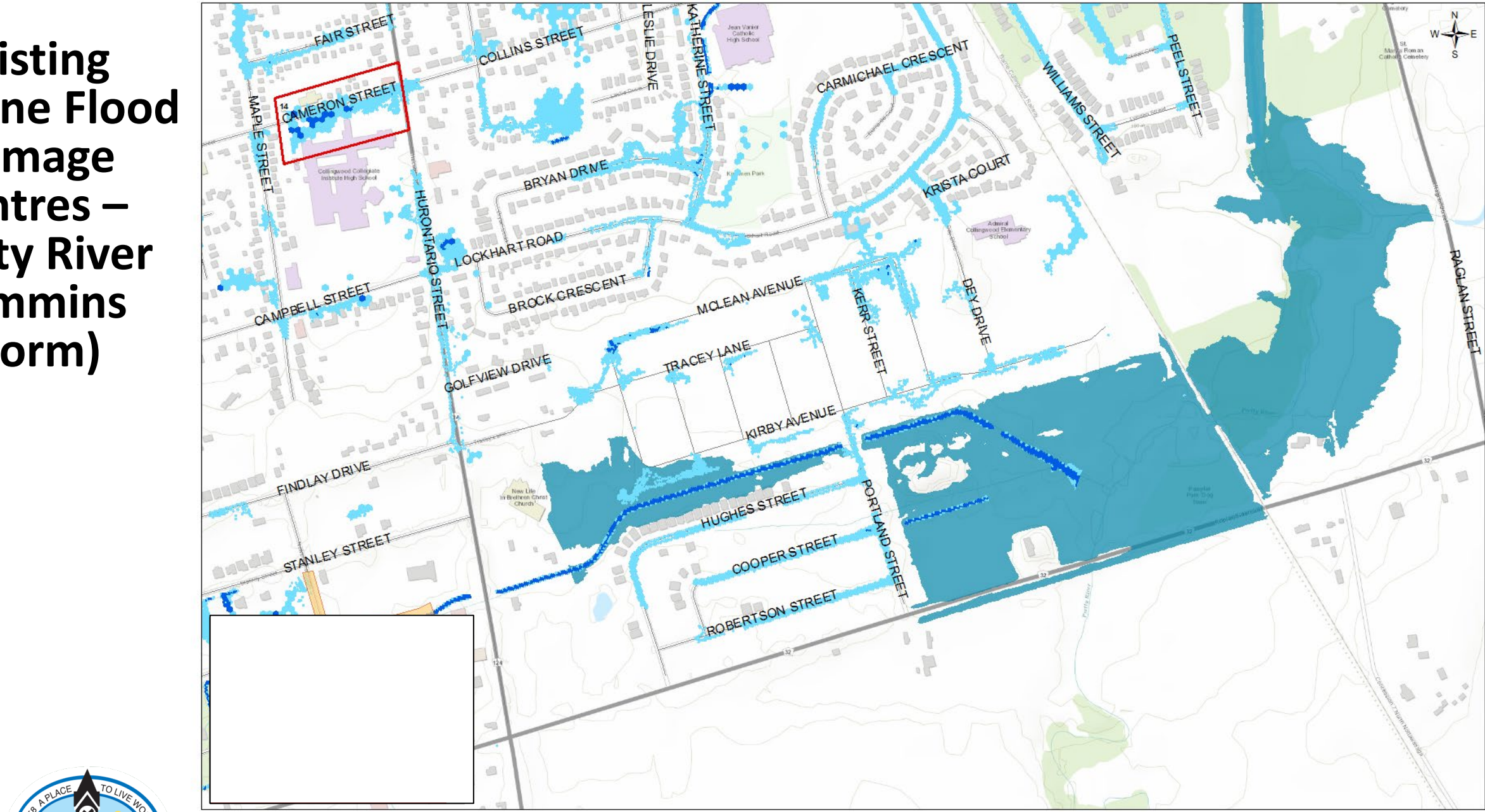
FDC 9, R3 & R4 Flooding Under Existing with Climate Change and Intensification



Existing Riverine Flood Damage Centres – Black Ash (Timmins Storm)



Existing Riverine Flood Damage Centres – Pretty River (Timmins Storm)



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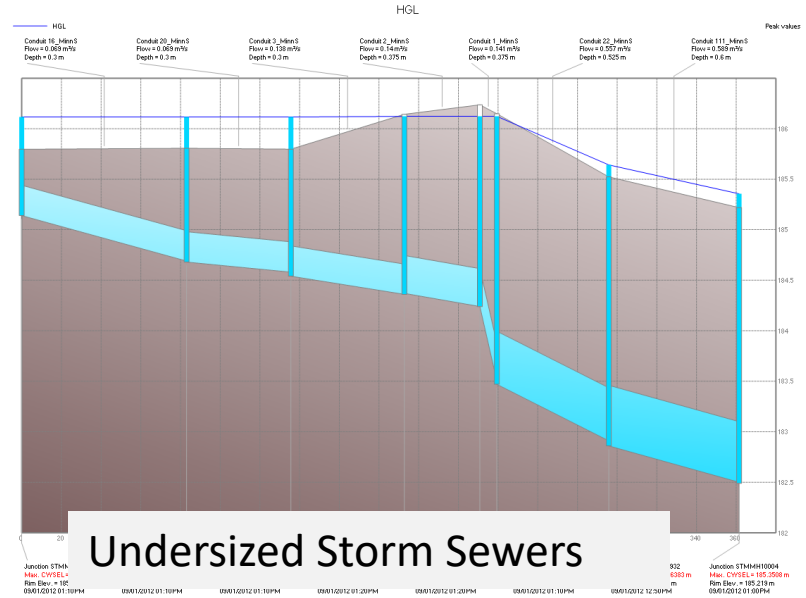
Evaluation Process

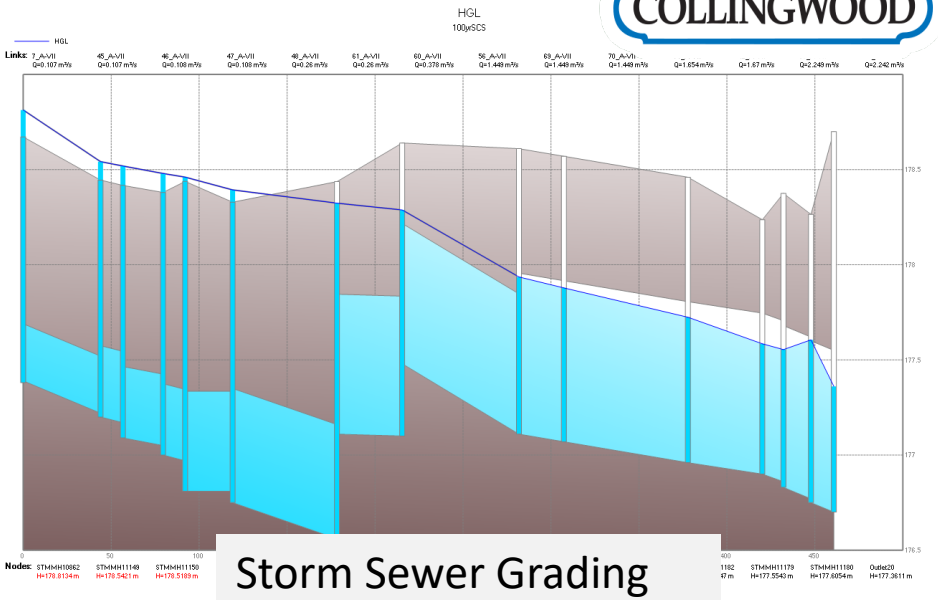
Causes of Flooding, Long List of Solutions, Screening & Detailed Evaluation of Shortlisted Solutions

Causes of Flooding (General)

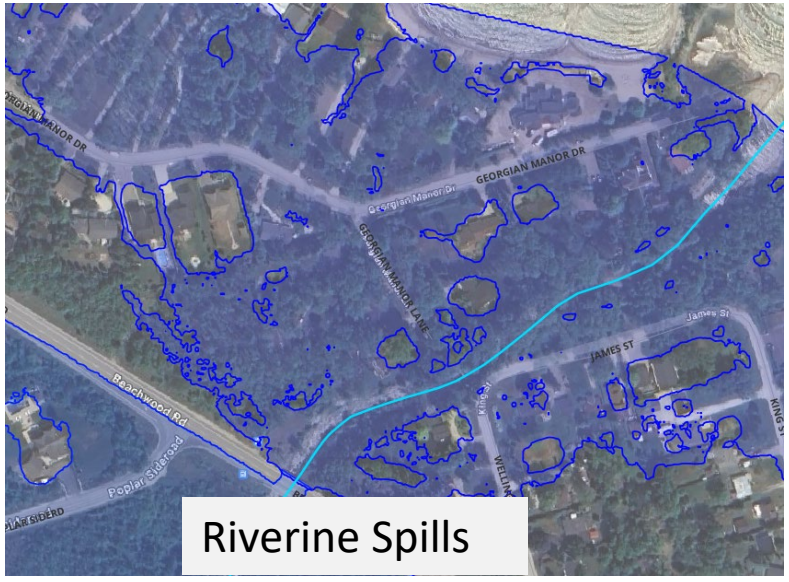


Undersized Storm Sewers

Lot Grading



Storm Sewer Grading



Riverine Spills

Undersized Ditches & Culverts

Right of Way Grading

Long List of Solutions - Catchment Level

Riverine Spills	Overland Flooding - Urban
Do Nothing	Do Nothing
Flow Diversion – direct riverine storm flows through a different channel to prevent spills	Oversized Stormwater Management Ponds – over control storm flows from major developments
Oversized stormwater management ponds – over control storm flows from major developments	Flow capture through broad implementation of Low Impact Development (e.g., Rain Gardens, Permeable Pavement, Infiltration Trenches, Bioswales etc.)
Offline flood storage – peak-shaving facility	Flow capture through broad implementation of alternative stormwater management techniques (e.g., Underground Storage Tanks)
Channel maintenance – improve flow efficiency through channel by removal of vegetation	Size storm sewers to account for future climate change
Construct a levee to prevent spills	Flood forecasting & floodproofing measures
Construct a dam upstream to reduce or control flows	

Long List of Solutions – Site Level

Storm Sewer Surcharging	Lot Grading	Riverine Spills
Do Nothing	Do Nothing	Do Nothing
Update Right of Way grading to re-direct storm flows	Regrade Right-Of-Way to direct stormflows through roadways	Flow Diversion – direct riverine storm flows through a different channel to prevent spills
Replace / upgrade storm sewers through road re-construction program (including additional catch basins)	Require Lot re-grading as part of proposed redevelopment	Update lot grading as part of proposed development / redevelopment
Replace / upgrade storm sewers separate to road reconstruction program (including additional catch basins)	Implement Low Impact Development features	Update Right of Way grading to prevent overtopping of spills
Implement Low Impact Development features	Require floodproofing for all proposed development	Increase culvert/ bridge size
Upsize ditches and culverts	Optional floodproofing for existing residents	Construct a Levee to prevent spills
	Flood forecasting and floodproofing measures	Flood forecasting and floodproofing measures

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Long List Screening Criteria

Screening criteria were developed to eliminate Options which will not be viable.

The long list of options was subjected to the following screening questions (Yes/No):

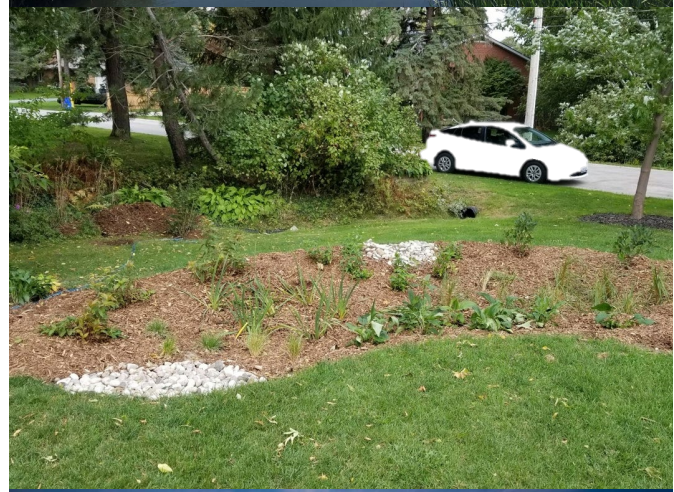
1. Can the Option satisfy the requirements of the Problem / Opportunity Statement?
2. Does the Option have obvious and significant Environmental Impacts that could offset its ability to address the Problem / Opportunity Statement, as compared to other solutions (i.e. severe detrimental effects to the environment)?
3. Does the Option have obvious and significant Socio-Economic Impacts that could offset its ability to address the Problem / Opportunity Statement, as compared to other solutions (i.e. exorbitant cost)?
4. Does the Option have obvious and significant Technical Impacts that could offset its ability to address the Problem / Opportunity Statement, as compared to other solutions (i.e. exceptional technical difficulty)?

General Short-Listed Solutions – Urban Flooding

1. Flow capture through underground storage or a stormwater management facility (wet pond);
2. Replace, upgrade or extend storm sewers through the road reconstruction program (including additional catch basins);
3. Replace, upgrade or extend storm sewers separate to the road reconstruction program (including additional catch basins);
4. Urbanize the Right-of-way (add curb, update boulevard grading);
5. Upgrade/ construct ditches and culverts;
6. Increase urban drain capacity; and,
7. Non-structural solutions (homeowner education, floodproofing, flood forecasting).

Short List Detailed Evaluation Criteria

- **Natural Environment Impacts (30%)**
  - Impacts of the option to the natural environment (10%)
  - Water quality implications (5%)
  - Resiliency of the option to climate change and extreme weather impacts (15%)
- **Social / Cultural Environment Impacts (20%)**
  - Land use considerations (including First Nations, Public & Agency Outreach) (5%)
  - Impacts to residents (10%)
  - Visual landscape/ aesthetic impacts (5%)
- **Technical / Operational Considerations (20%)**
  - Difficulty to construct or implement the option relative to other alternatives (15%)
  - Operation & maintenance (O&M) efficiency and regulatory obligations (5%)
- **Economic Impacts (30%)**
  - Capital / construction costs (benefit:cost ratio*) (20%)
  - Long term O&M cost burden (5%)
  - Payment structure, cost recovery options, phasing flexibility (5%)



Preferred solution must have a benefit:cost ratio greater than 1.0, and eliminate or minimize flooding from the 100 year storm.

*Note: a benefit:cost ratio is the ratio of the cost to implement a project (capital costs & reduced flood damages) as compared to the cost of flood damages without the project in place

Short List Evaluation FDC 1-10

	Project Alternative	Description	Natural Environment	Social / Cultural Environment	Technical / Operational	Economic	Overall Ranking
FDC 1-3	Option 1	Flow capture through implementation of alternative stormwater management techniques (Underground Storage Tanks)	Minor improvements to water quality post-construction.High CC resiliency.	Makes use of Town-owned lands. No visual impact post-construction	Requires re-direction of some existing sewers. Long term O&M considerations.	High benefit: capital costs. Ongoing maintenance costs.	**76%**
	Option 2	Replace / upgrade or extend storm sewers through road reconstruction program (Hickory St. upgrades)	Moderate CC resiliency. Moderate reduction to overland flooding.	No additional land requirements. No visual impact post-construction.	Requires upgrades of some existing sewers. Minor change over existing O& M	Low benefit: capital costs. Minor maintenance costs.	61%
	Option 3	Replace / upgrade or extend storm sewers separate to road reconstruction program (upgrades on Spruce St. N of 5th St., additional CBs, sewer deficiencies)	Moderate CC resiliency. Moderate reduction to overland flooding.	No additional land requirements. No visual impact post-construction.	Requires upgrades of deficient existing sewers. Minor change over existing O&M	Maximum benefit: capital costs. Minor maintenance costs.	74%
	Option 4	Regrade Right-Of-Way to direct stormflows through roadways (update grading of boulevards/ driveways, urbanization)	Reduce overland flooding. Medium CC resiliency	Potential expropriation for wider ROW. Possible impact to existing boulevards. Provides minor aesthetic benefits.	Requires upgrades of some existing sewers. New road cross sections. Minor change over existing O&M	Moderate benefit: capital costs. Minor maintenance costs.	57%
FDC 4	Option 1	Replace / upgrade or extend storm sewers through road reconstruction program (sewer deficiencies)	High CC resiliency. Eliminate overland flooding.	No additional land requirements. No visual impact post-construction.	Requires upgrade of some existing sewers. Minor O&M change over existing	High benefit: capital costs. No additional maintenance costs	**92%**
	Option 2	Regrade Right-Of-Way to direct stormflows through roadways (boulevard / driveway grading)	Slight Negative impact on water quality. Medium CC resiliency. Reduce overland flooding.	Potential expropriation for wider ROW. Possible impact to existing boulevards. Provides minor aesthetic benefits.	Requires urbanization, update ROW grading. Minor change over existing O& M	Low benefit: capital costs. Minor additional maintenance costs	62%
FDC 5-7	Option 1	Upgrade or extend storm sewers separate to road reconstruction program (additional CBs, extension S on Birch St., sewer deficiencies)	High CC resiliency. Reduce overland flooding.	No additional land requirements. No visual impact post-construction.	Requires additional CBs and sewer extension. Minor O&M change over existing	Moderate benefit: capital costs. Minor additional maintenance costs.	80%
	Option 2	Regrade Right-Of-Way to direct stormflows through roadways (urbanization)	Medium CC resiliency. Potential impact to mature trees. Eliminate overland flooding.	Potential expropriation for wider ROW. Possible impact to existing boulevards. Provide minor aesthetic benefits.	Requires urbanization of some roads and intersections. No additional O& M requirements over existing	High benefit: capital costs. No additional maintenance costs.	**81%**
FDC 8	Option 1	Replace / Upgrade or extend storm sewers separate to road reconstruction program (additional CBs, sewer deficiencies)	High CC resiliency. Reduce overland flooding.	No additional land requirements. No visual impact post-construction	Requires upgrades of some existing sewers and additional CBs. No additional O&M requirements over existing.	Moderate benefit: capital costs. Minor additional O&M costs.	71%
	Option 2	Regrade Right-Of-Way to direct stormflows through roadways (urbanization)	Medium CC resiliency. Eliminate overland flooding. Potential impacts to mature trees.	Potential expropriation for wider ROW. Possible impact to existing boulevards. Provide minor aesthetic benefits.	Requires urbanization of some roads. No additional O&M requirements.	High benefit: capital costs. No additional O&M costs.	**78%**
	Option 3	Non-structural solutions (homeowner education, floodproofing, flood forecasting)	Flooding from extreme events can harm water quality. Medium CC resiliency	Flooding of lots could negatively impact land use. Potential landscaping/structure damage during flooding events.	No construction required. No regulatory obligations.	Highest potential benefit. No capital costs. Minor operation costs.	78%
FDC 10&19	Option 1	Replace / upgrade or extend storm sewers separate to road reconstruction program (sewer deficiencies)	Minor reduction to overland flooding. High CC resiliency	No additional land requirements. No visual impact post-construction.	Requires upgrade of some existing sewers. No additional O&M requirements over existing.	Least benefit: capital costs. No additional O&M costs.	74%
	Option 2	Regrade Right-Of-Way to direct stormflows through roadways (urbanization)	Eliminate overland flooding. Potential impact to mature trees. Medium CC resiliency	Potential expropriation for wider ROW. Provide minor aesthetic benefits.	Requires upgrades of some existing sewers and revised road cross section. No additionals O&M requirements over existing.	Highest benefit: capital costs. No additional O&M costs.	**77%**
	Option 3	Flow capture through implementation of alternative stormwater management techniques (SWMF)	Improve water quality post-construction. Reduce damages caused by existing overland flooding. High CC resiliency	May require expropriation for sewer outlet & storage location. New pond post-construction may create beneficial visual impacts	Requires removal of existing sewer, re-direction/ new sewers. Construction of new SWMF. Long-term O&M considerations.	High benefit: capital costs. Ongoing maintenance required.	70%
	Option 4	Alternative stormwater management techniques (Stormwater Pump)	Reduce overland flooding. High CC resiliency	Small easement required for pump station. Potential use of existing easement. No impacts to landscaping post-construction.	Requires new pump station and forcemain. Long-term O&M considerations.	Hight benefit: capital costs. Highest long Term O&M costs	73%

Note: CC = Climate Change

Most Preferred	Somewhat Preferred	Least Preferred

Short List Evaluation FDC 11-16

	Project Alternative	Description	Natural Environment	Social / Cultural Environment	Technical / Operational	Economic	Overall Ranking
FDC 11	Option 1	Replace / upgrade or extend storm sewers through road reconstruction program (sewer deficiencies)	High CC resiliency. Eliminate overland flooding.	No additional land requirements. No visual impact post-construction.	Requires upgrades of some existing sewers. Minor O&M change over existing.	Highest benefit: capital costs. Minor O&M costs.	**87%**
	Option 2	Non-structural solutions (homeowner education, floodproofing, flood forecasting)	Flooding from extreme events can harm water quality. Medium CC resiliency	Flooding of lots could negatively impact land use. Potential landscaping/ structure damage during flooding events.	No construction required. No regulatory obligations.	Highest potential benefit. No capital costs. Minor operation costs.	67%
FDC 12	Option 1	Replace / upgrade or extend storm sewers separate to road reconstruction program (flow re-direction to Sixth St., sewer deficiencies)	High CC resiliency. Reduce overland flooding.	No additional land requirements. No visual impact post-construction.	Requires extension & re-direction of some existing sewers. Minor O&M change over existing	Least benefit: capital costs. Minor additional O&M costs.	64%
	Option 2	Replace / upgrade or extend storm sewers through road reconstruction program (Seventh St. & Maple St. construction: complete)	High CC resiliency. Reduce overland flooding.	No additional land requirements. No visual impact post-construction.	Already constructed. Minor O&M change over existing	Hight benefit: capital costs. Minor additional O&M costs over existing.	**96%**
	Option 3	Regrade Right-Of-Way to direct stormflows through roadways (urbanization)	Medium CC resiliency. Reduce overland flooding.	Potential expropriation for wider ROW. Possible impact to existing boulevards. Provide minor aesthetic benefits.	Requires additional Inlets. Additional CBs and sewers and revised road cross section. Minor O&M change over existing	Medium benefit: capital costs. Minor additional O&M costs.	64%
	Option 4	Non-structural solutions (homeowner education, floodproofing, flood forecasting)	Flooding from extreme events can harm water quality. Medium CC resiliency	Flooding of lots could negatively impact land use. Potential landscaping/ structure damage during flooding events.	No construction required. No regulatory obligations.	Highest potential benefit. No capital costs. Minor operation costs.	74%
FDC 13	Option 1	Replace / upgrade or extend storm sewers through road reconstruction program (sewer extension from George St. & Robinson St. intersection, additional CBs, sewer deficiencies)	High CC resiliency. Reduce overland flooding.	No additional land requirements. No visual impact post-construction.	Requires extension & re-direction of some existing sewers. Minor O&M change over existing	Moderate benefit: capital costs. Minor additional O&M costs.	**78%**
	Option 2	Replace / upgrade or extend storm sewers separate to road reconstruction program (sewer extension from George St. & Robinson St. intersection, additional CBs, sewer deficiencies)	High CC resiliency. Reduce overland flooding.	No additional land requirements. No visual impact post-construction.	Requires upgrade/extension sewers. Minor O&M change over existing	Lowest benefit: capital costs. Minor additional O&M costs.	70%
	Option 3	Regrade Right-Of-Way to direct stormflows through roadways (urbanization)	Medium CC resiliency. Eliminate overland flooding.	Potential expropriation for wider ROW. Possible impact to existing boulevards. Provide minor aesthetic benefits.	Requires upgrade some sewers and revised road cross section. Minor O&M change over existing	Moderate to High Potential Benefit. Minor Operation costs.	71%
FDC 14	Option 1	Replace / upgrade or extend storm sewers through road reconstruction program (sewer deficiencies on Hurontario St.)	High CC resiliency. Eliminate overland flooding.	No additional land requirements. No visual impact post-construction.	Requires upgrades of some existing sewers. No O&M change over existing.	Highest benefit: capital costs. No additional O&M costs.	**92%**
	Option 2	Non-structural solutions (homeowner education, floodproofing, flood forecasting)	Flooding from extreme events can harm water quality. Medium CC resiliency.	No changes to Land use. Potential landscaping / house damages during flooding events.	No construction required. No regulatory obligations.	High potential benefit. No capital costs. Minor operation costs.	76%
FDC 15	Option 1	Increase capacity of the urban drain (canal)	Low CC resiliency. Eliminate overland flooding. Negative impacts to existing vegetation in the drain.	May impact on existing trail. Vegetation removal may have negative visual impacts.	Drain works need CA approval and possibly resident approval. Require occasional maintenance.	Moderate benefit: capital costs. Ongoing maintenance costs	51%
	Option 2	Flow capture through implementation of alternative stormwater management techniques (Upstream SWMF)	Improvements to water quality post-construction. High CC resiliency. Eliminate/reduce overland flooding.	Upstream lands may be repurposed. No land use impact in FDC post-construction. No visual impact post-construction.	Requires re- direction existing storm sewer. Construction / upgrade of SWMF. Require occasional maintenance.	Low benefit: capital costs. Ongoing maintenance costs	67%
	Option 3	Non-structural solutions (homeowner education, floodproofing, flood forecasting)	Flooding from extreme events can harm water quality. Medium CC resiliency	Flooding of lots could negatively impact land use. Potential landscaping/structure damage during flooding events.	No construction required. No regulatory obligations.	Highest potential benefit. No capital costs. Minor operation costs.	**76%**
FDC 16	Option 1	Replace / upgrade or extend storm sewers through road reconstruction program (Ninth St. & Maple St. construction: complete)	High CC resiliency. Reduce overland flooding.	No additional land requirements. No visual impact post-construction.	Already constructed. Minor O&M change over existing	Highest benefit: capital costs. Minor additional O&M costs over existing.	**96%**
	Option 2	Replace / upgrade or extend storm sewers separate to road reconstruction program (additional CBs, sewer deficiencies)	High CC resiliency. Reduce overland flooding.	No additional land requirements. No visual impact post-construction.	Requires extension storm sewers and additional CBs . Minor O&M change over existing	Moderate benefit: capital costs. Minor additional O&M costs over existing.	75%
	Option 3	Regrade Right-Of-Way to direct stormflows through roadways (urbanization)	Medium CC resiliency. Reduce overland flooding.	Potential expropriation for wider ROW. Possible impact to existing boulevards. Provide minor aesthetic benefits.	Requires revised road cross section. Minor O&M change over existing	Least potential benefit. Minor additional O&M costs over existing.	55%

Note: CC = Climate Change

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Short List Evaluation FDC 17-23

	Project Alternative	Description	Natural Environment	Social / Cultural Environment	Technical / Operational	Economic	Overall Ranking
FDC 17	Option 1	Replace / upgrade or extend storm sewers separate to road reconstruction program (additional CBs)	High CC resiliency. Reduce overland flooding.	No additional land requirements. No visual impact post-construction.	Requires additional CBs. Minor O&M change over Existing	High benefit: capital costs. Minor additional O&M costs.	**74%**
	Option 2	Flow capture through implementation of alternative stormwater management techniques (i.e. Parking Lot Storage Tanks)	Improvements to water quality post-construction. High CC resiliency. Eliminate/Reduce overland flooding.	Makes use of Town-owned lands. No visual impact post-construction	Requires re- direction existing storm sewer. Construction of underground storage. Long term O&M considerations.	Low benefit: capital costs. Ongoing maintenance costs.	65%
	Option 3	Non-structural solutions (homeowner education, floodproofing, flood forecasting)	Flooding from extreme events can harm water quality. Medium CC resiliency	Flooding of lots could negatively impact land use. Potential landscaping/structure damage during flooding events.	No construction required. No regulatory obligations.	Highest potential benefit. No capital costs. Minor operation costs.	68%
FDC 18	Option 1	Flow capture through implementation of alternative stormwater management techniques (Flap Gates)	Medium CC resiliency. Reduce overland flooding.	Makes use of Town-owned lands. No visual impact post-construction	Requires install of flap gate on CB lead. Require occasional maintenance.	High benefit: capital costs. Minor additional O&M costs.	**78%**
	Option 2	Regrade Right-Of-Way to direct stormflows through roadways (boulevard regrading)	Medium CC resiliency. Reduce overland flooding.	Makes use of Town-owned lands. Negligible grading changes. Need to tie into existing road at limits.	Requires regrading of ROW by overland spill. No additional O&M change over existing	High benefit: capital costs. No additional O&M costs.	**77%**
	Option 3	Non-structural solutions (homeowner education, floodproofing, flood forecasting)	Flooding from extreme events can harm water quality. Medium CC resiliency	Flooding of lots could negatively impact land use. Potential landscaping/ structure damage during flooding events.	No construction required. No regulatory obligations.	Highest potential benefit. No capital costs. Minor operation costs.	67%
FDC 20	Option 1	Replace / upgrade or extend storm sewers separate to road reconstruction program	High CC resiliency. Reduce overland flooding	No additional land requirements. No visual impact post-construction.	Requires upgrade/extension of some existing sewers. No additional O&M requirements.	Low to Moderate benefit: capital costs. No additional O&M costs.	69%
	Option 2	Upsize ditches and culverts or construct new	Medium CC resiliency. Reduce overland flooding.	No additional land requirements. Minor landscaping changes post-construction.	Requires upgrade of ditch/culverts. No additional O&M requirements.	Moderate benefit: capital costs. No additional O&M costs.	73%
	Option 3	Flow Capture through implementation of alternative stormwater management techniques (Upstream SWMF)	High CC resiliency. Reduce damages of overland flooding.	Upstream lands need repurposing. No land use impact in FDC post-construction. No visual impact post-construction.	Requires upstream flow capture & redirection. Long term O&M considerations.	Low benefit: capital costs. Ongoing maintenance costs.	58%
	Option 4	Non-structural solutions (homeowner education, floodproofing, flood forecasting)	Flooding from extreme events can harm water quality. Medium CC resiliency	Flooding of lots could negatively impact land use. Potential landscaping/ structure damage during flooding events.	No construction required. No regulatory obligations.	Highest potential benefit. No capital costs. Minor operation costs.	**76%**
FDC 21	Option 1	Upsize ditches and culverts or construct new (4th Line, Sandell St., Kohl St.)	Medium CC resiliency. Reduce overland flooding.	No additional land requirements. No visual impact post-construction.	Requires upgrade of ditch/culverts. No additional O&M requirements.	High benefit: capital costs. No additional O&M costs.	**81%**
	Option 2	Increase capacity of the urban drain (Wasaga Beach Jurisdiction)	Low CC resiliency. Eliminate flooding from the drain. Negative impacts to existing vegetation.	May impact existing trail. Vegetation removal may cause negative Visual impacts .	Drain works need CA approval and possibly resident approval. Require occasional maintenance.	Moderate benefit: capital costs. Ongoing maintenance required	50%
	Option 3	Non-structural solutions (homeowner education, floodproofing, flood forecasting)	Flooding from extreme events can harm water quality. Medium CC resiliency	Flooding of lots could negatively impact land use. Potential landscaping/ structure damage during flooding events.	No construction required. No regulatory obligations.	Highest potential benefit. No capital costs. Minor operation costs.	77%
FDC 22	Option 1	Upsize or construct new ditches and culverts (along Broadview St.)	Low CC resiliency. Reduce overland flooding.	No additional land requirements. Minor landscaping changes post-construction.	Requires upgrade of ditch/culverts. No additional O&M requirements.	High benefit: capital costs. No additional O&M costs.	**81%**
	Option 2	Non-structural solutions (homeowner education, floodproofing, flood forecasting)	Flooding from extreme events can harm water quality. Medium CC resiliency.	No changes to land use. Potential landscaping / house damages during flooding events.	No construction required. No regulatory obligations.	Highest potential benefit. No capital costs. Minor operation costs.	72%
FDC 23	Option 1	Upsize ditches and culverts or construct new (between Bellholme St.and York St.)	Low CC resiliency. Eliminate overland flooding.	May require expropriation to increase ROW for additional ditch capacity. Minor landscaping changes post-construction.	Requires upgrade of ditch/culverts. No additional O&M requirements.	Low benefit: capital costs. Minor additional O&M costs.	58%
	Option 2	Non-structural solutions (homeowner education, floodproofing, flood forecasting)	Flooding from extreme events can harm water quality. Medium CC resiliency.	No changes to land use. Potential landscaping / house damages during flooding events.	No construction required. No regulatory obligations.	Highest potential benefit. No capital costs. Minor operation costs.	**77%**

Note: CC = Climate Change

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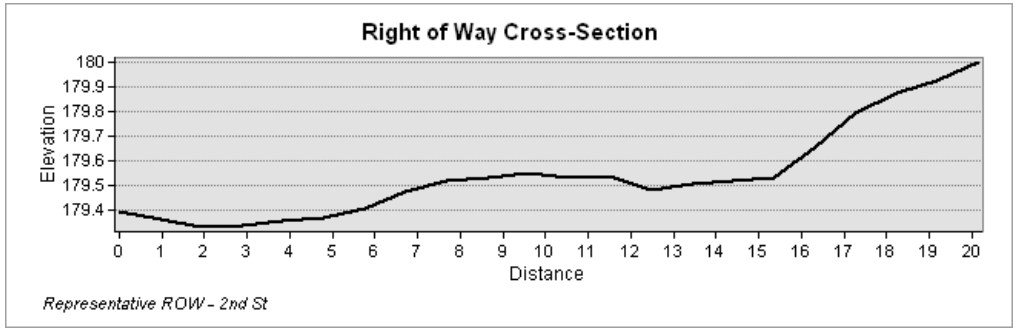
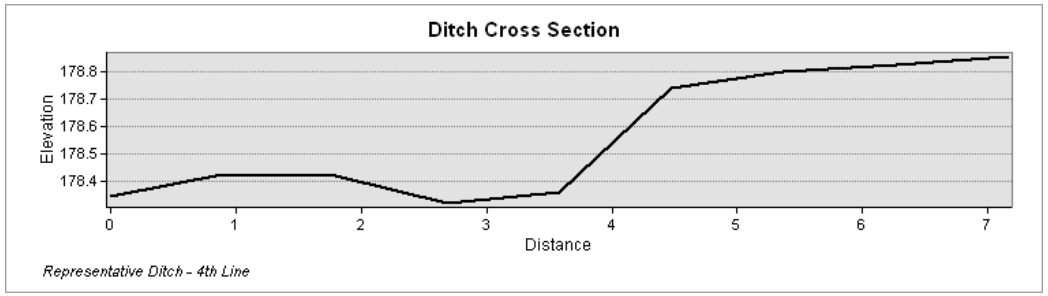
Preliminary Preferred Solutions

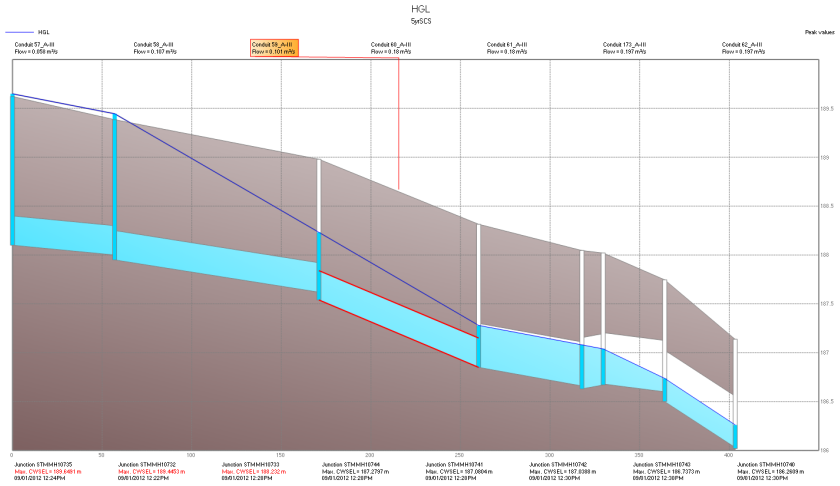
Summary of selected solutions for each identified flood damage centre

Proposed Solutions - Conceptual

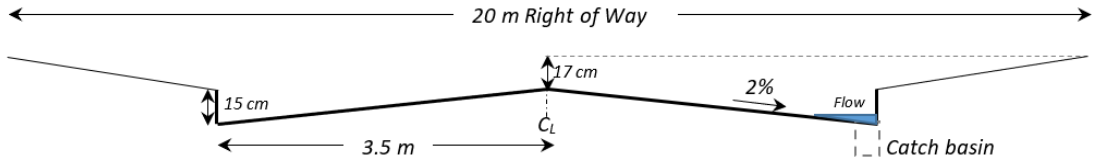
Existing



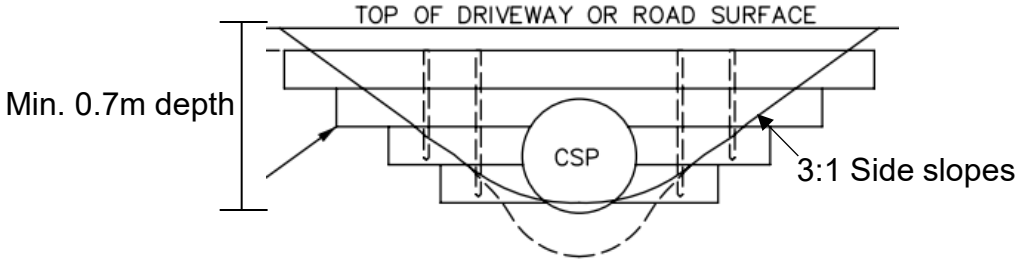


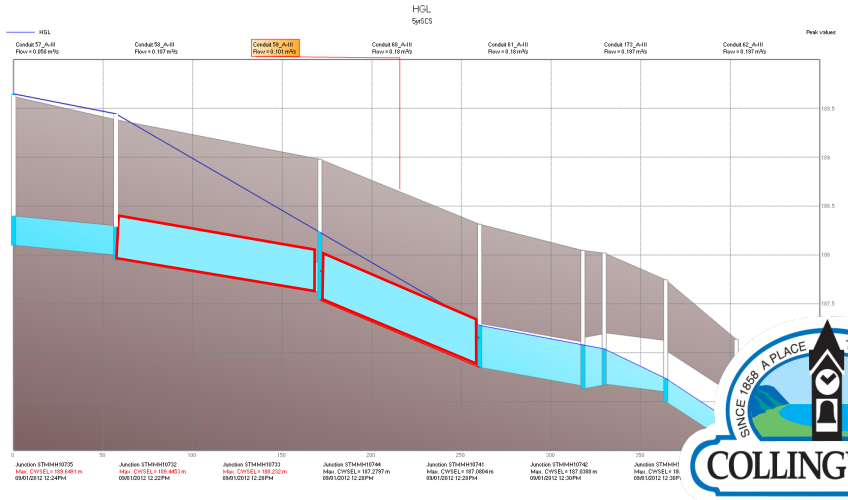


Proposed



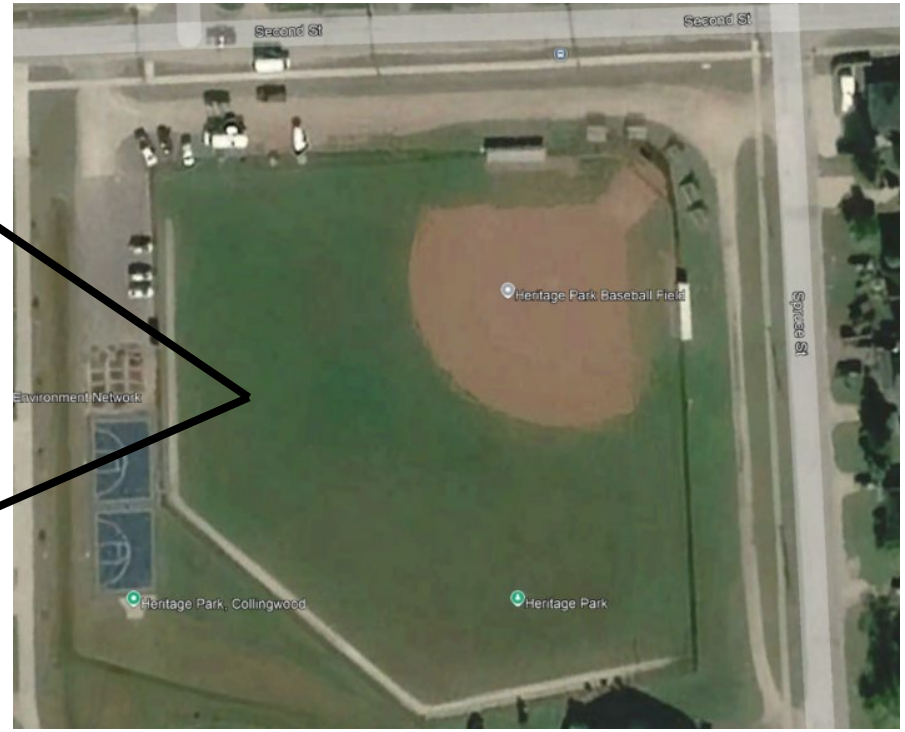
Typical Road Section with Curb





Proposed Solutions – Conceptual

Example underground storage configuration



Example stormwater pond

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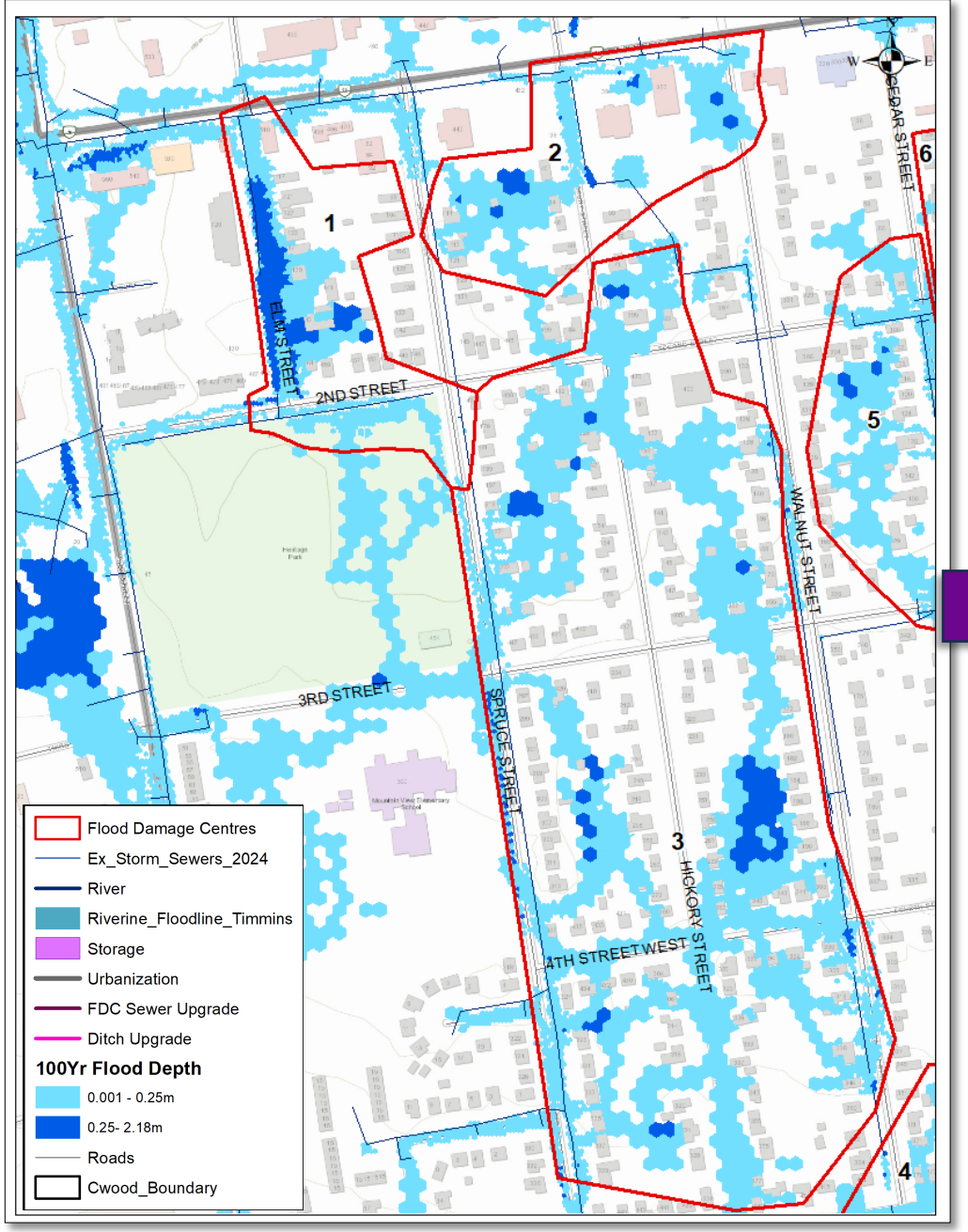
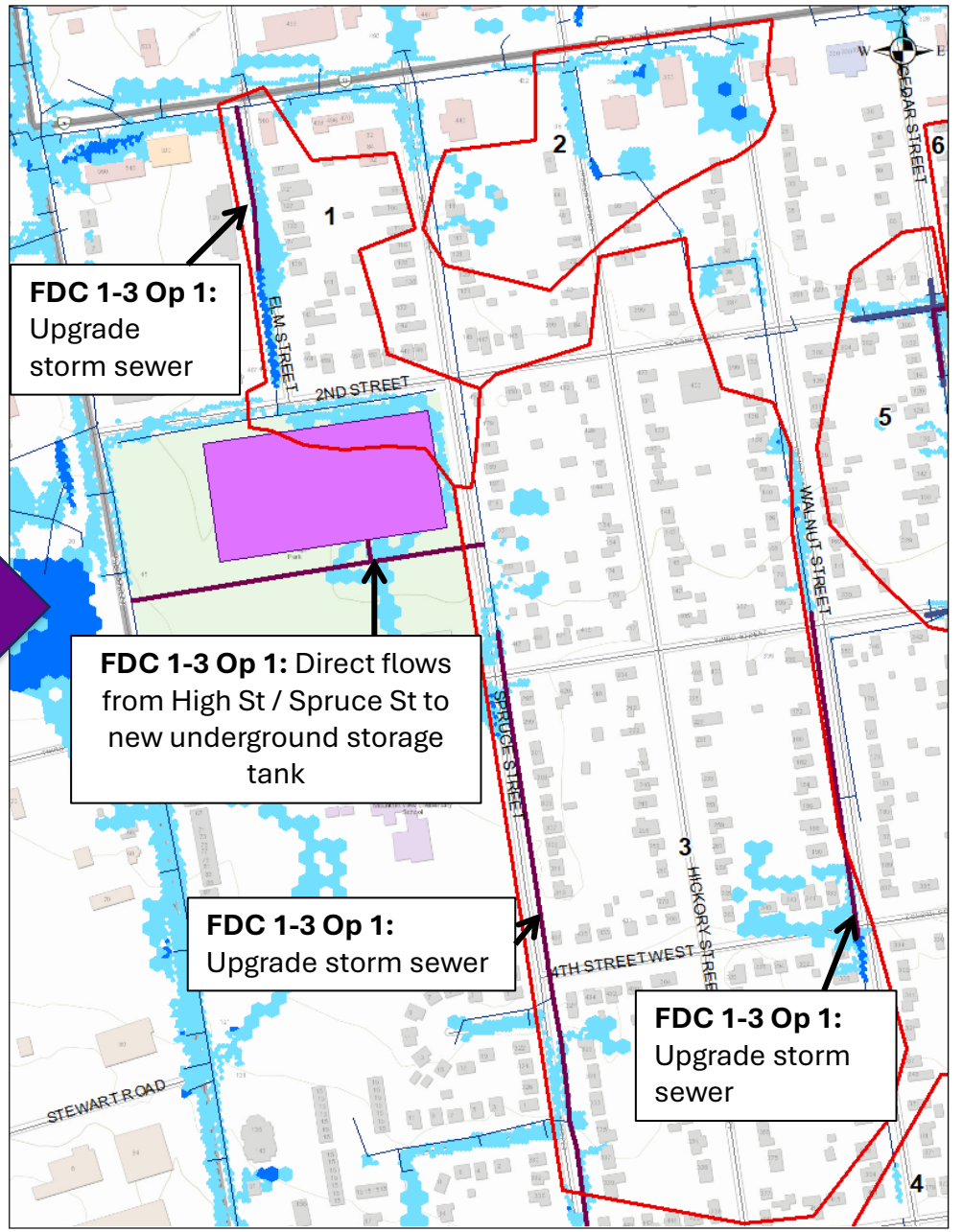
FDC 1-3 Preliminary Preferred Solutions & Flooding Comparison



‘Do Nothing’ Option



Preferred Project Implementation

FDC 4 Preliminary Preferred Solutions & Flooding Comparison

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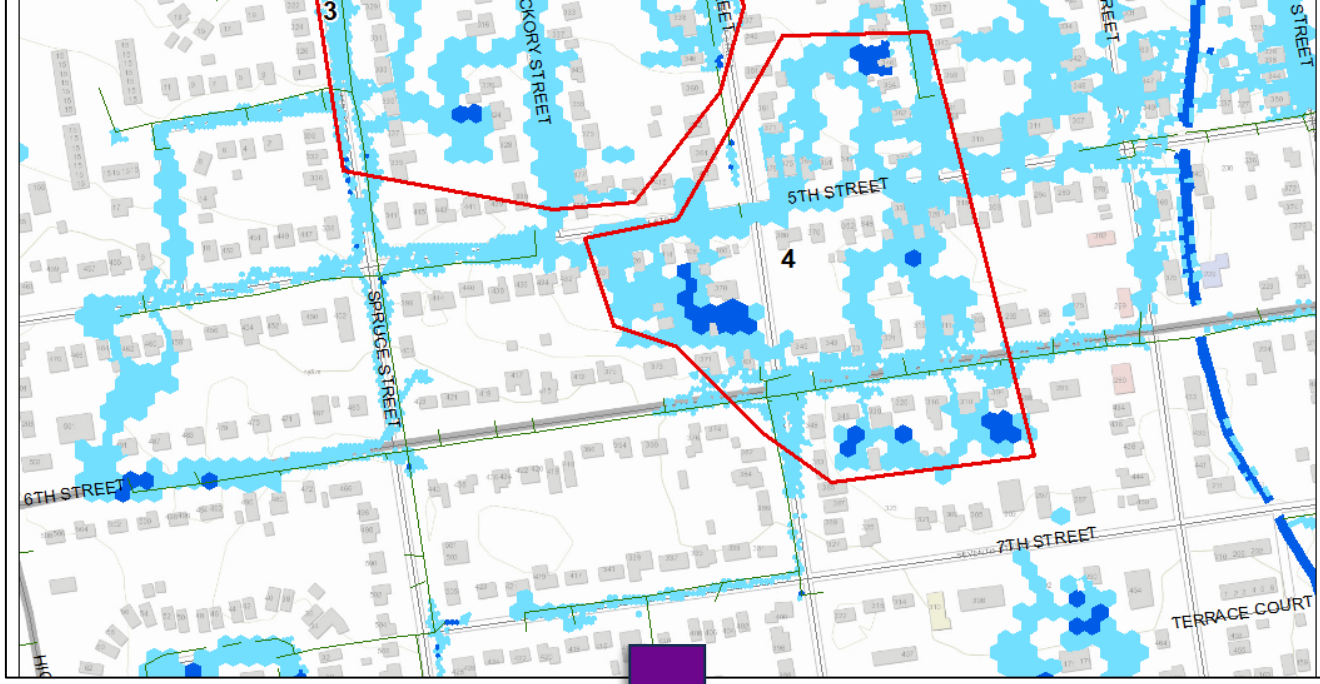
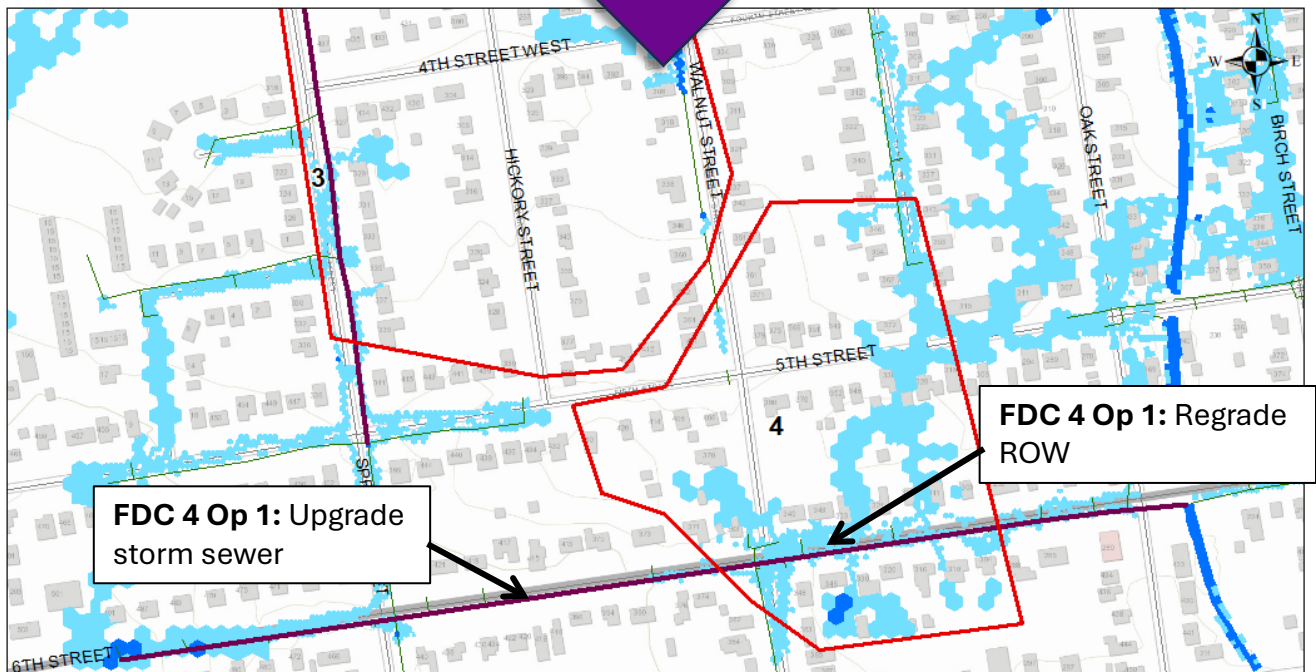
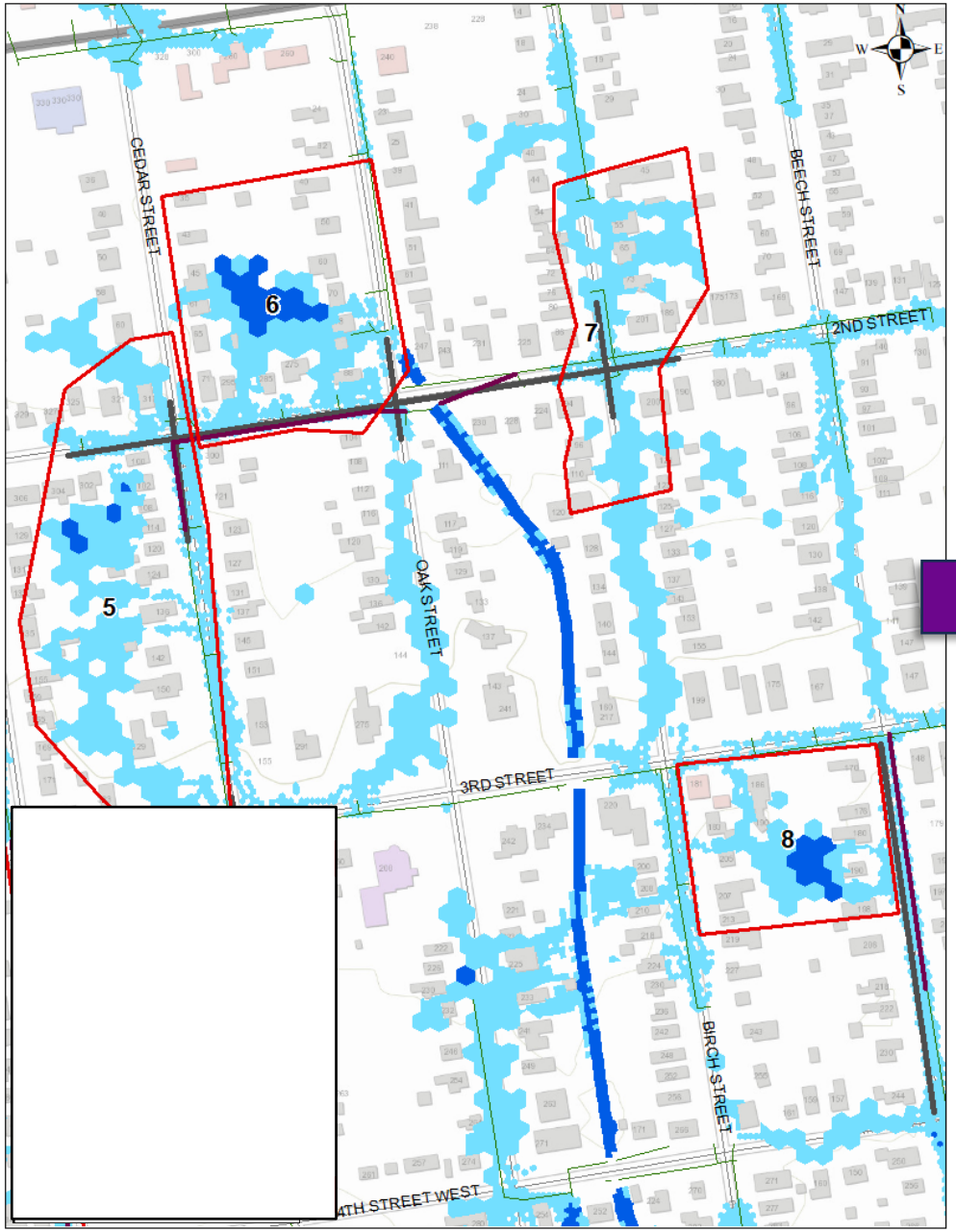


Preferred Project Implementation



FDC 5-8 Preliminary Preferred Solutions & Flooding Comparison



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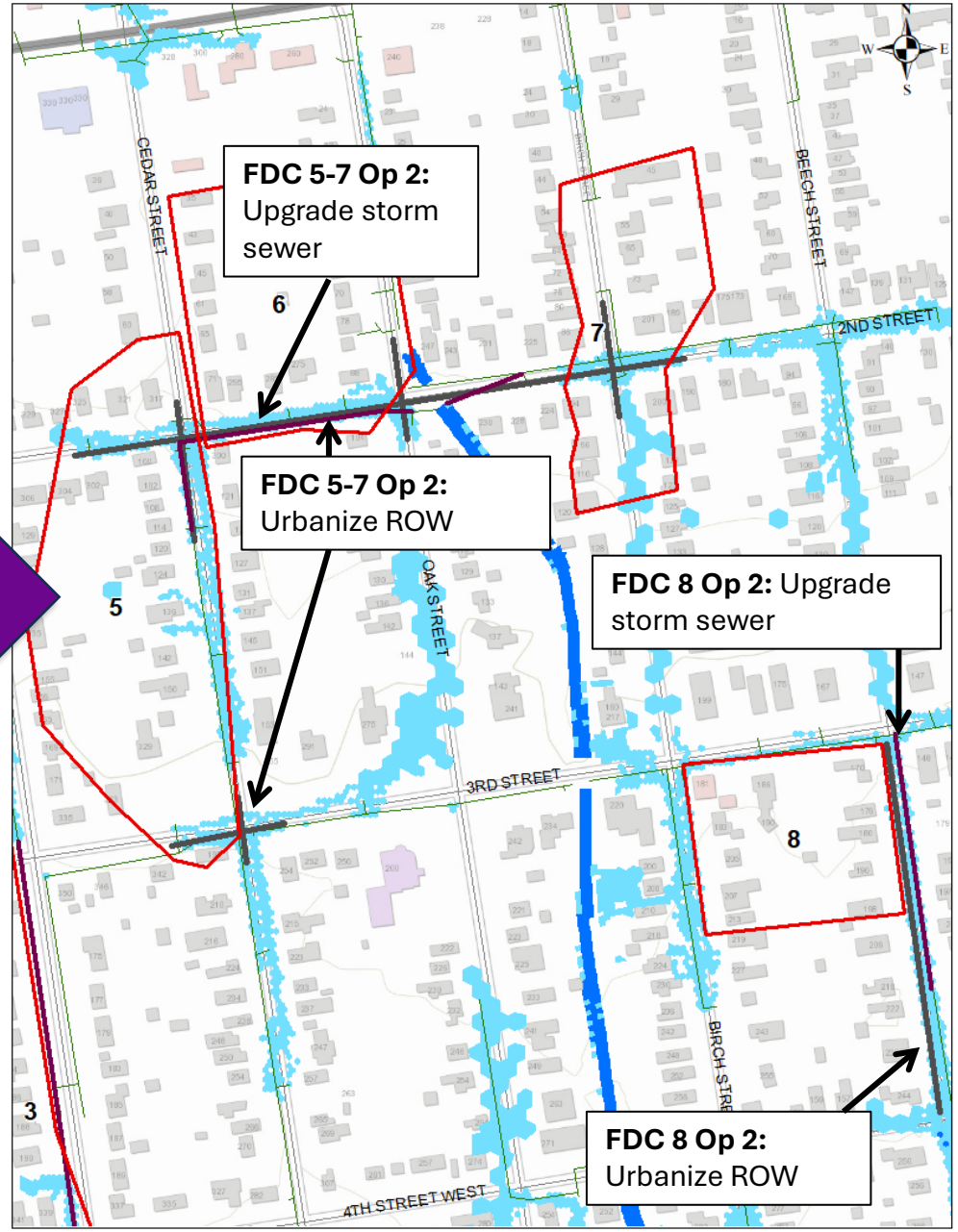
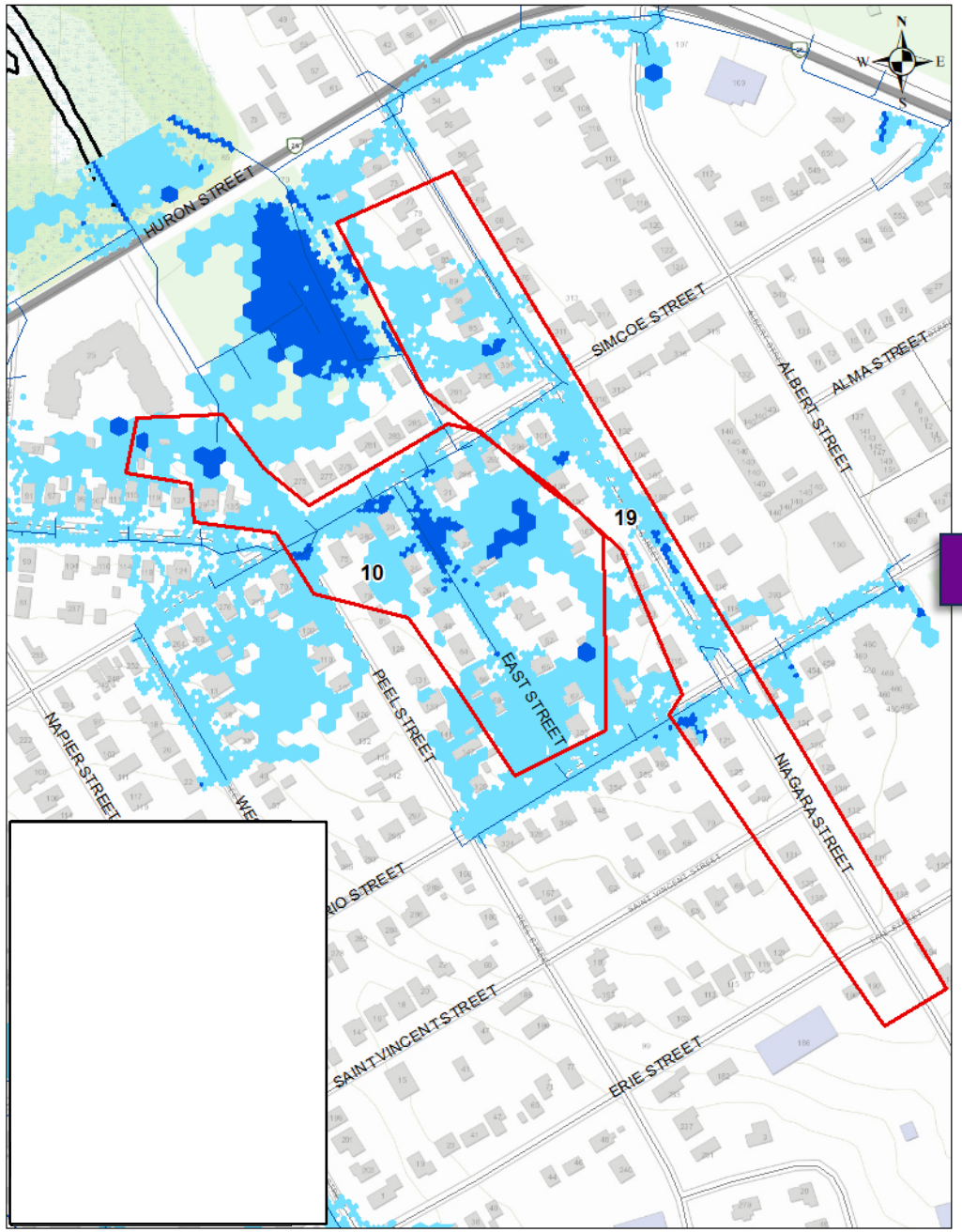


Preferred Project Implementation

FDC 10 & 19 Preliminary Preferred Solutions & Flooding Comparison



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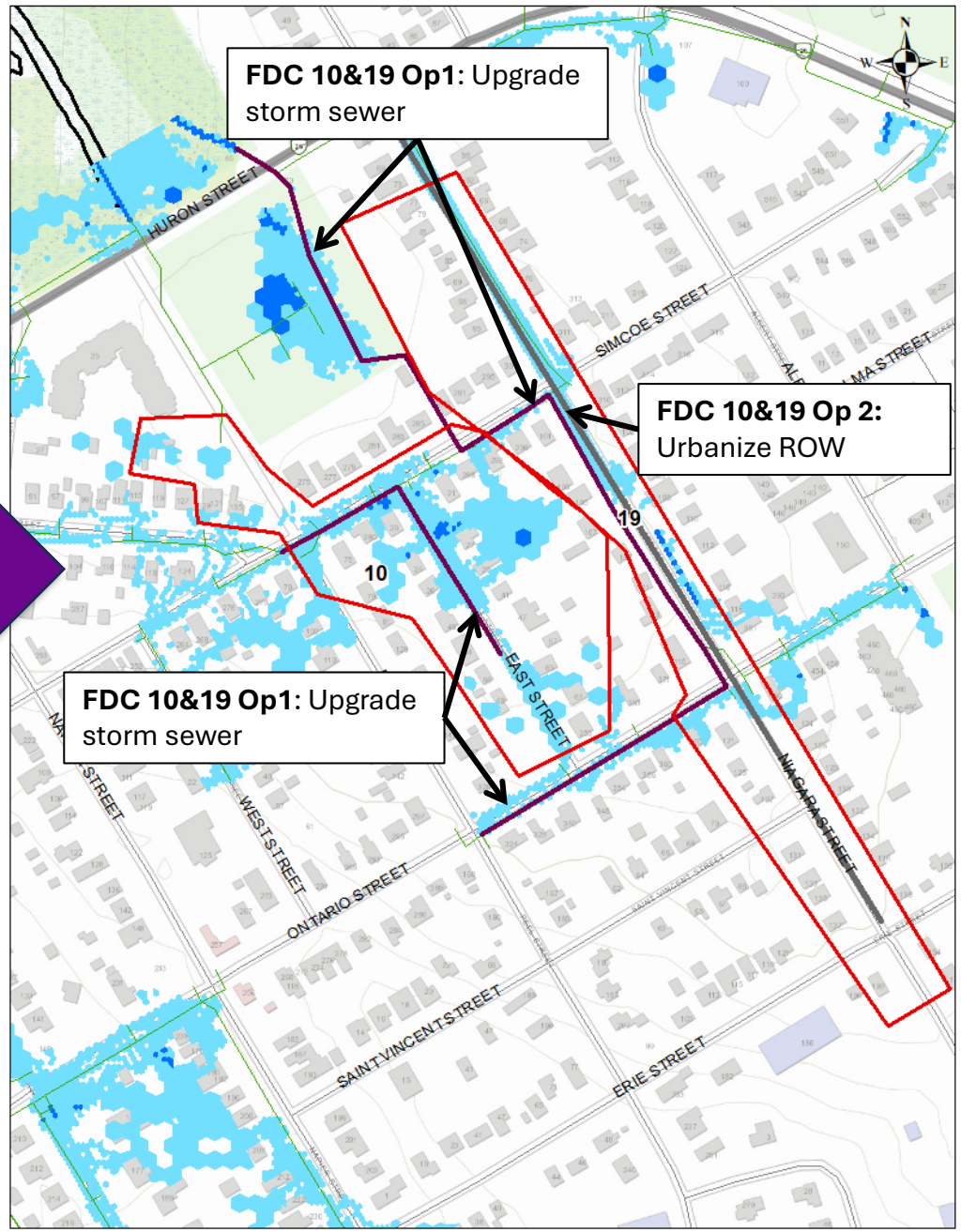
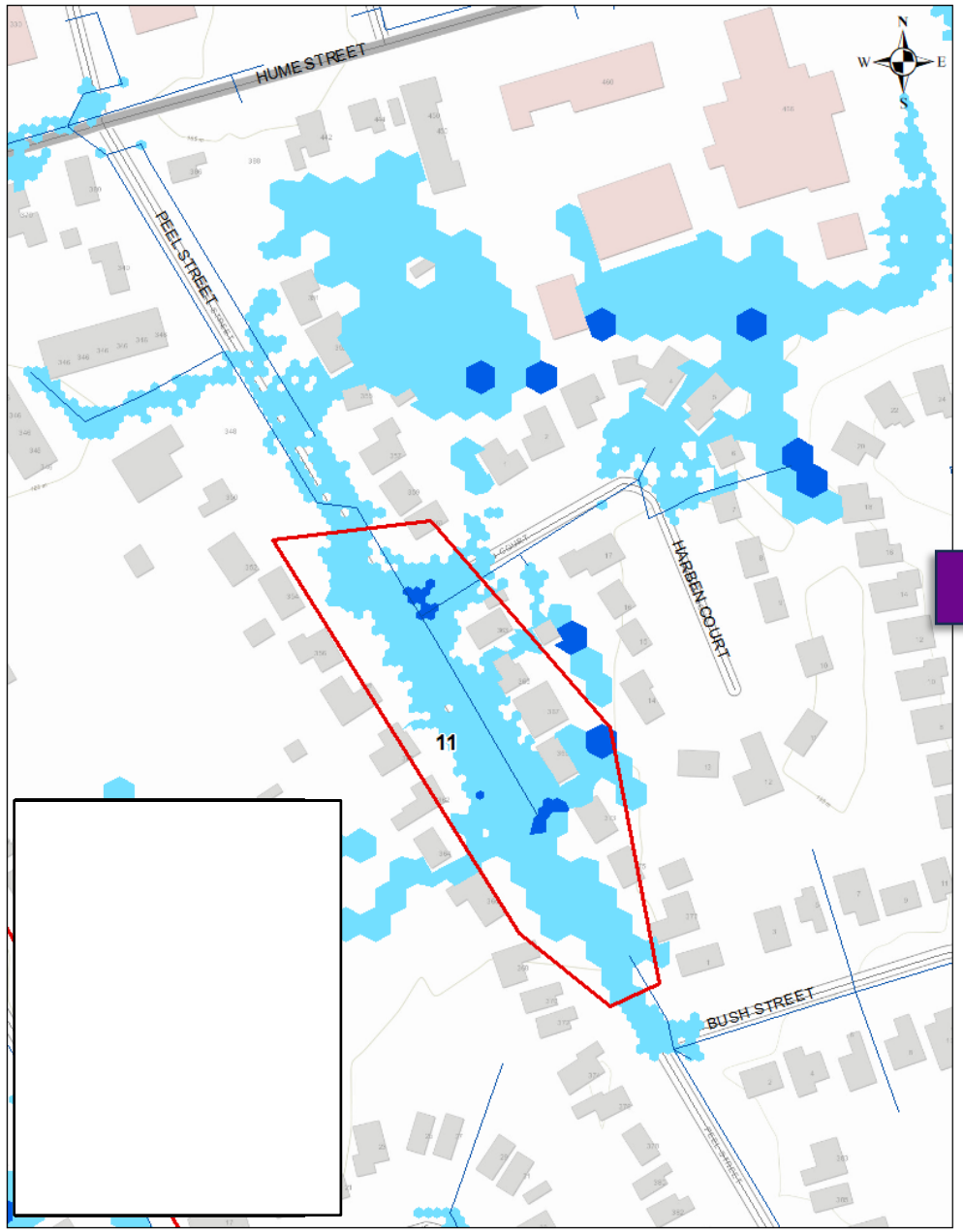


Preferred Project Implementation

FDC 11 Preliminary Preferred Solutions & Flooding Comparison



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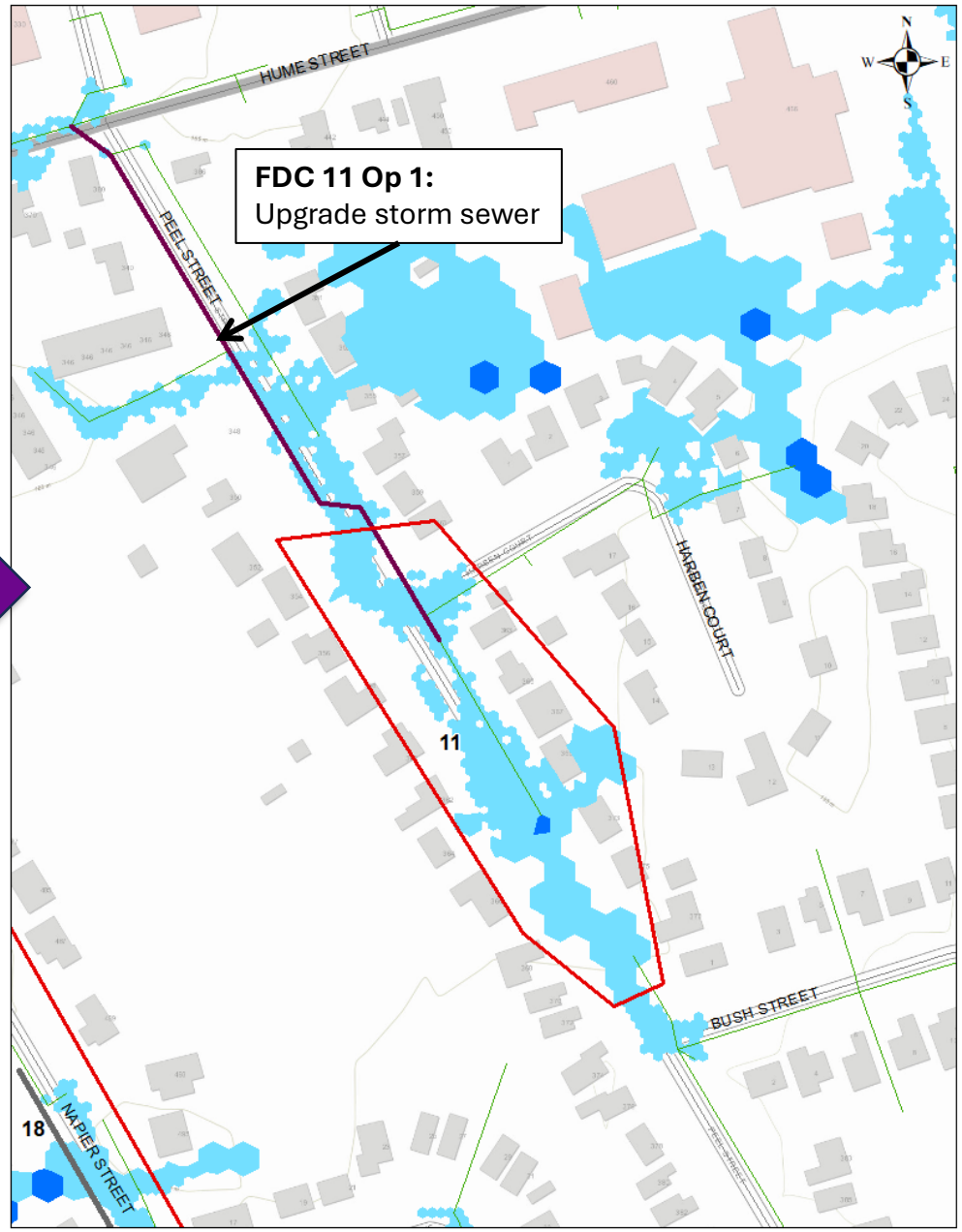
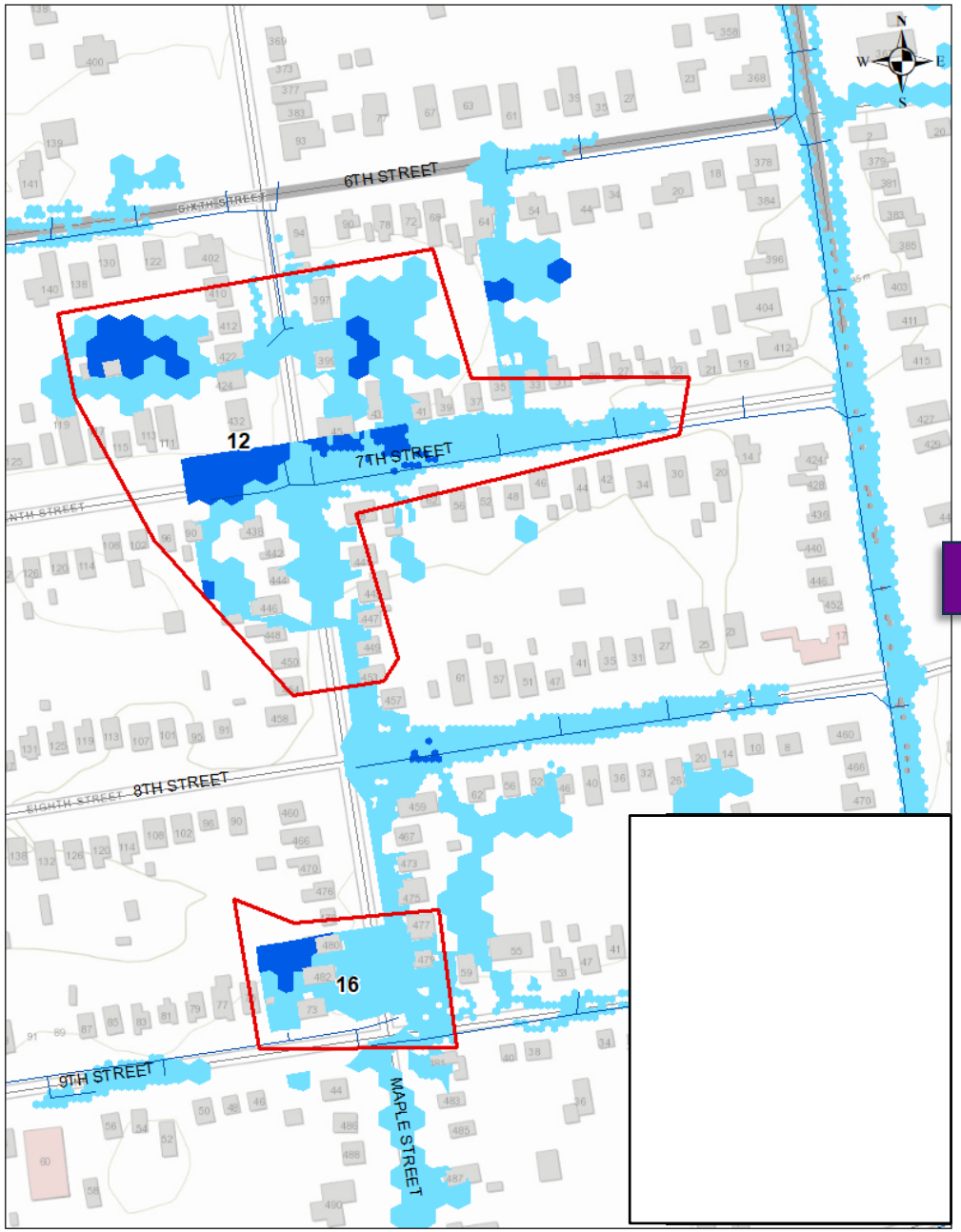


Preferred Project Implementation

FDC 12_16 Preliminary Preferred Solutions & Flooding Comparison



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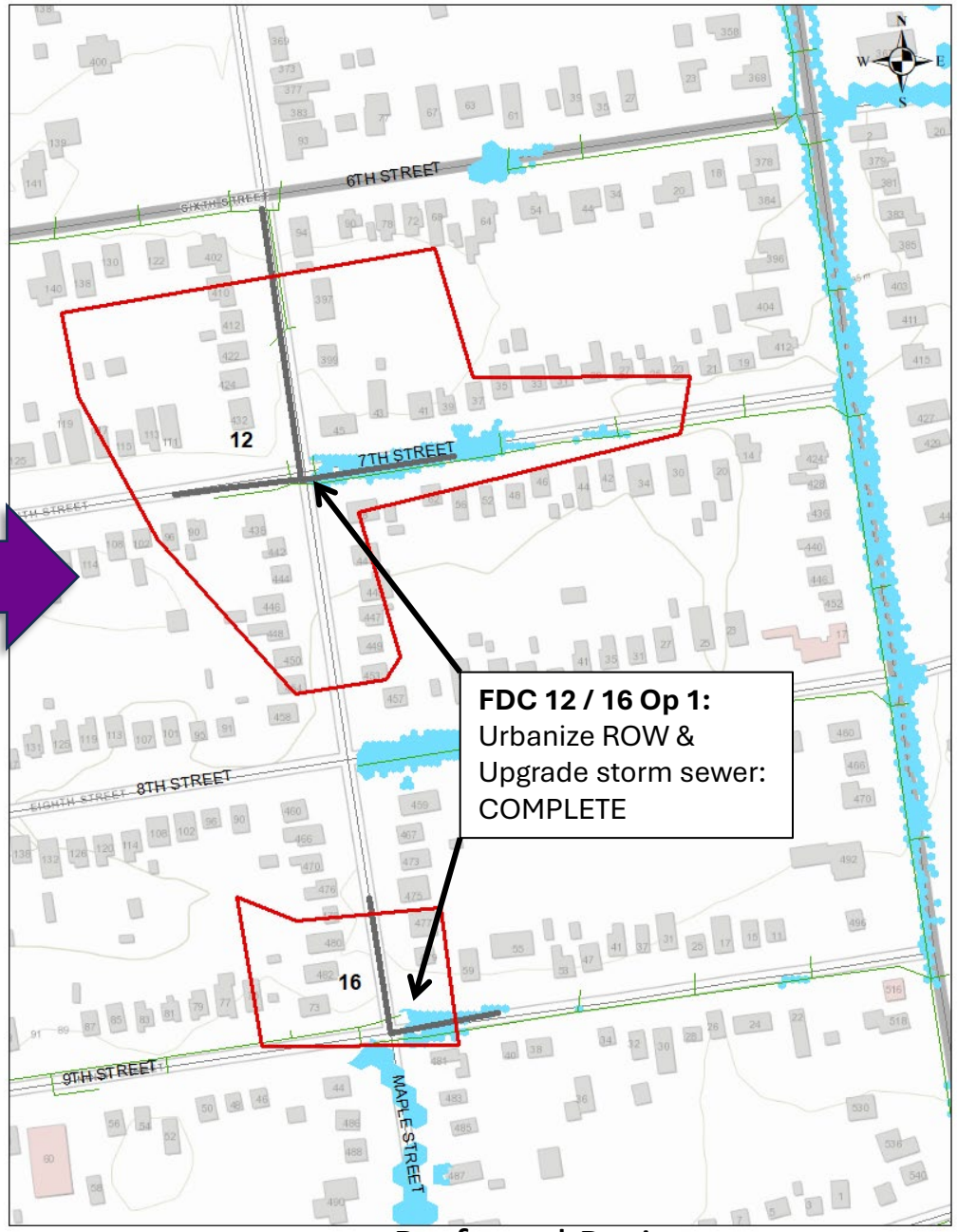
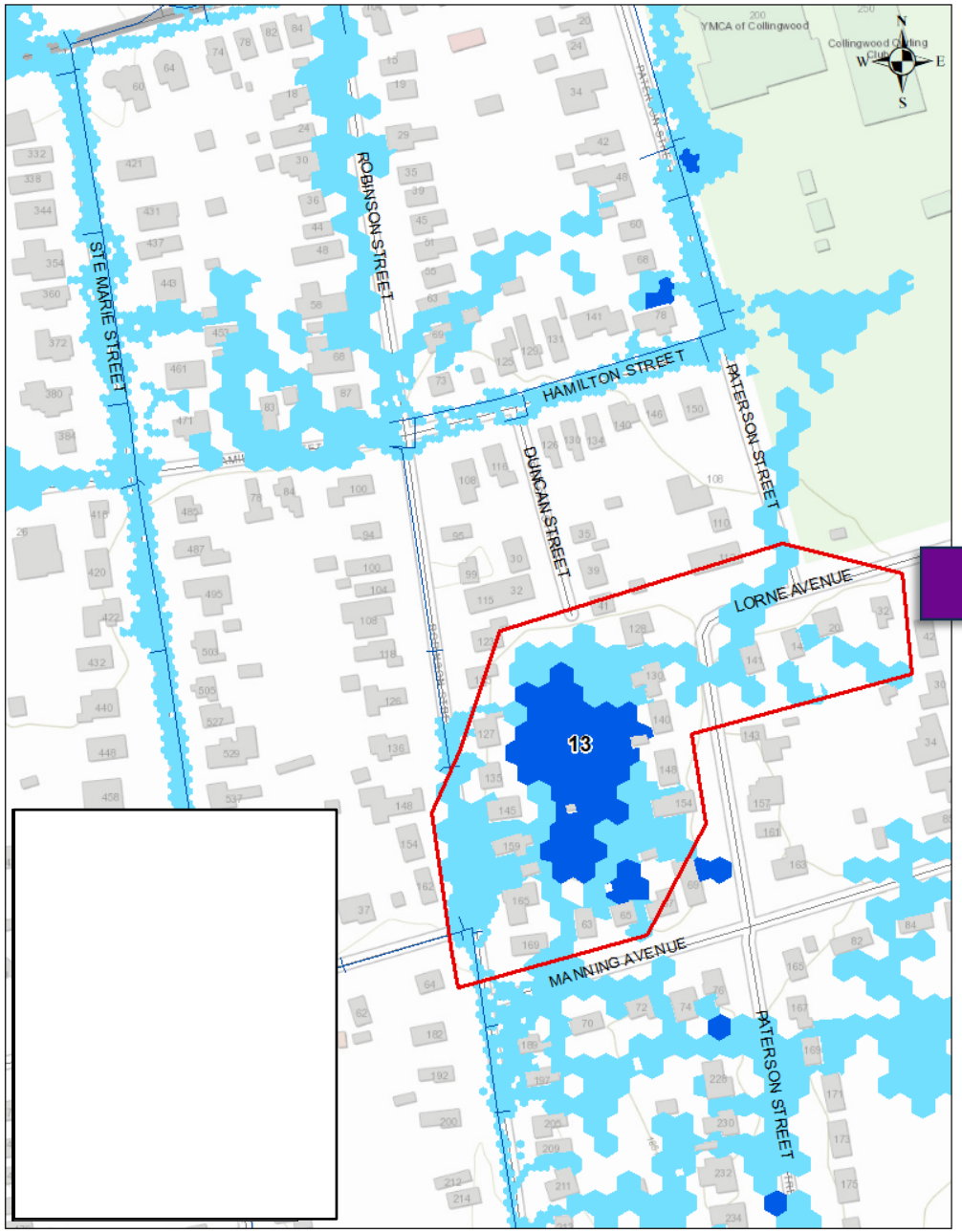


Preferred Project Implementation

FDC 13 Preliminary Preferred Solutions & Flooding Comparison



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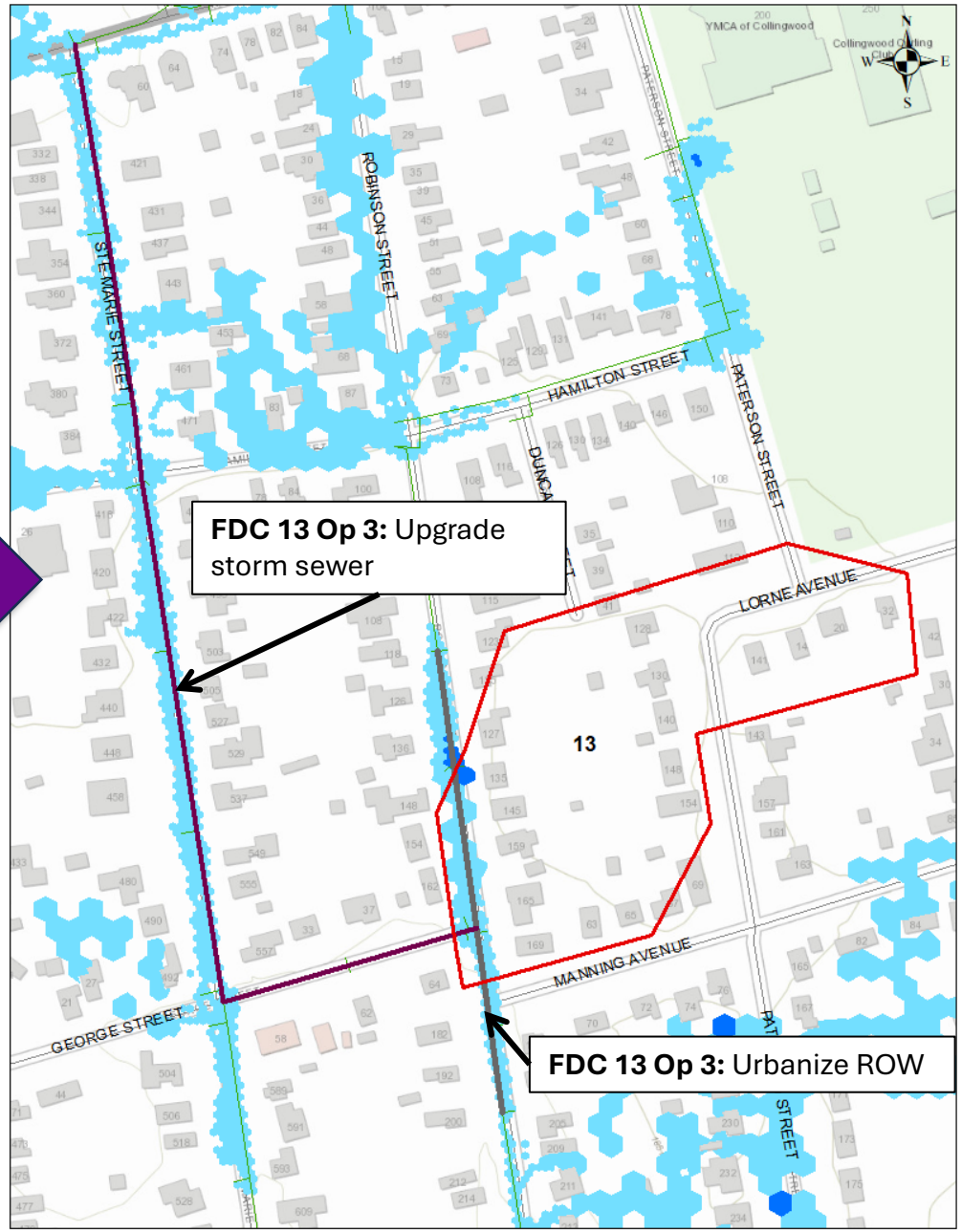
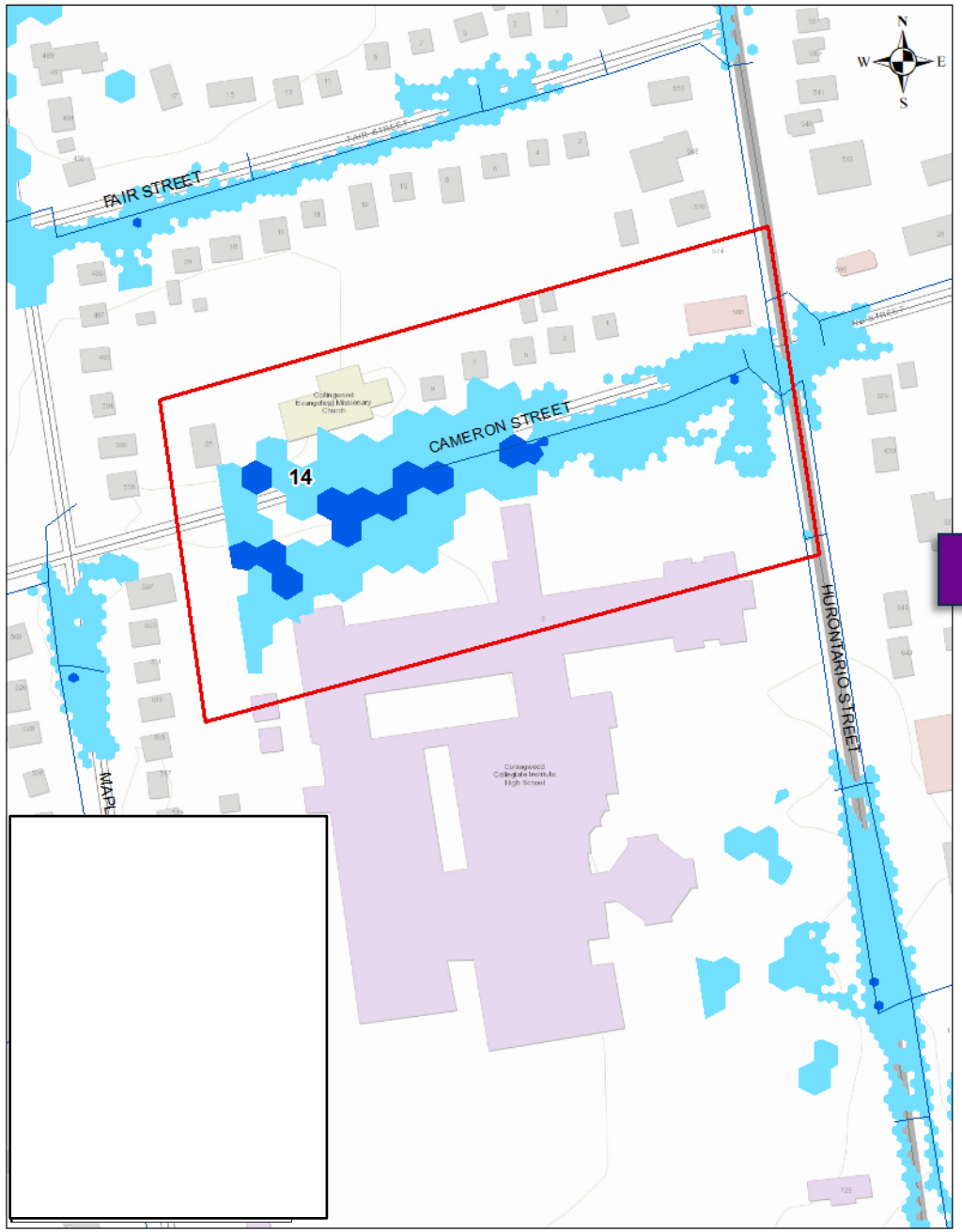


Preferred Project Implementation

FDC 14 Preliminary Preferred Solutions & Flooding Comparison



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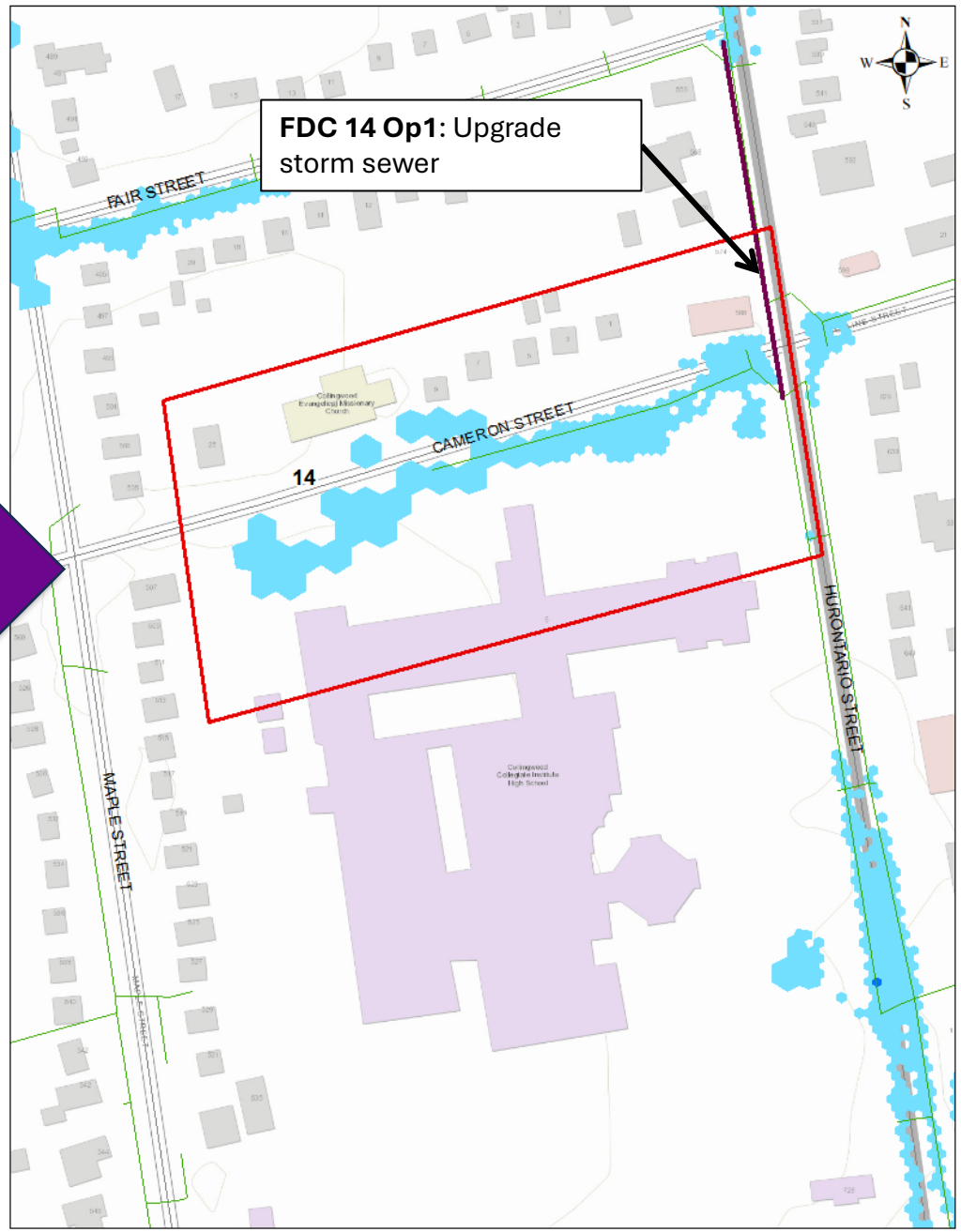
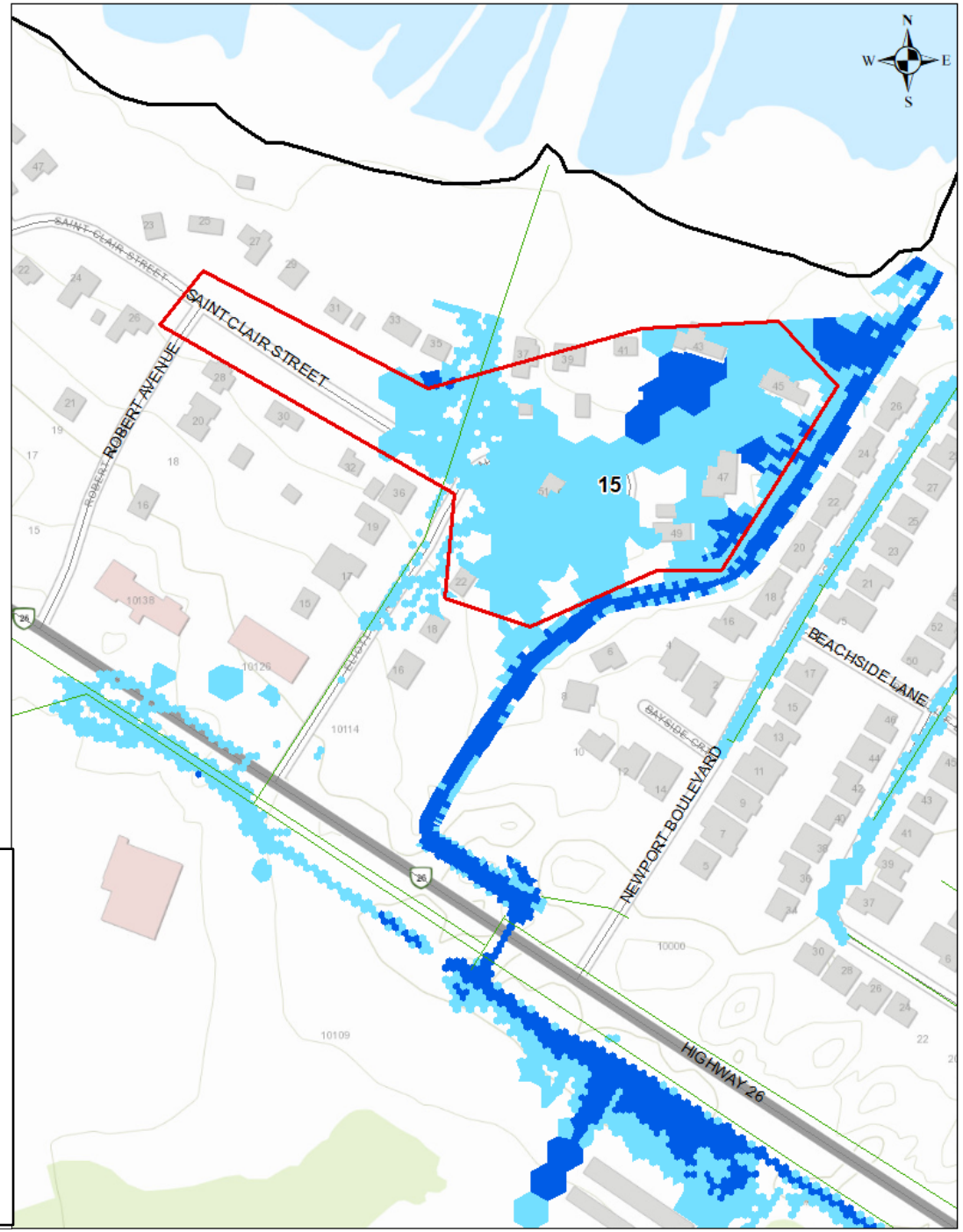


Preferred Project Implementation

FDC 15 Preliminary Preferred Solutions & Flooding Comparison

Preferred Project Implementation – No Capital Project Proposed

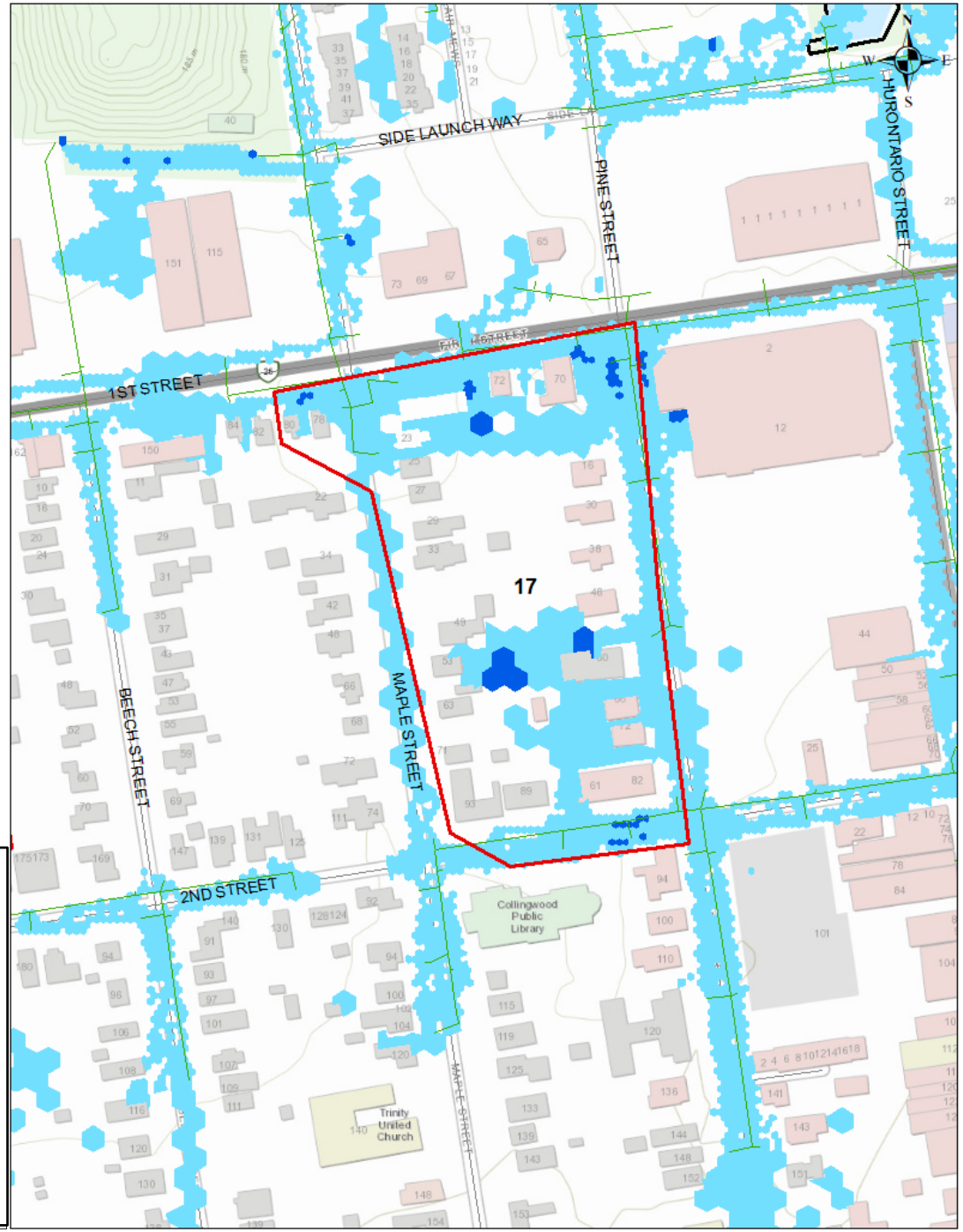
- Evaluated capital projects were determined to be infeasible.
- Preferred solution includes education for temporary / permanent flood proofing measures by homeowners.



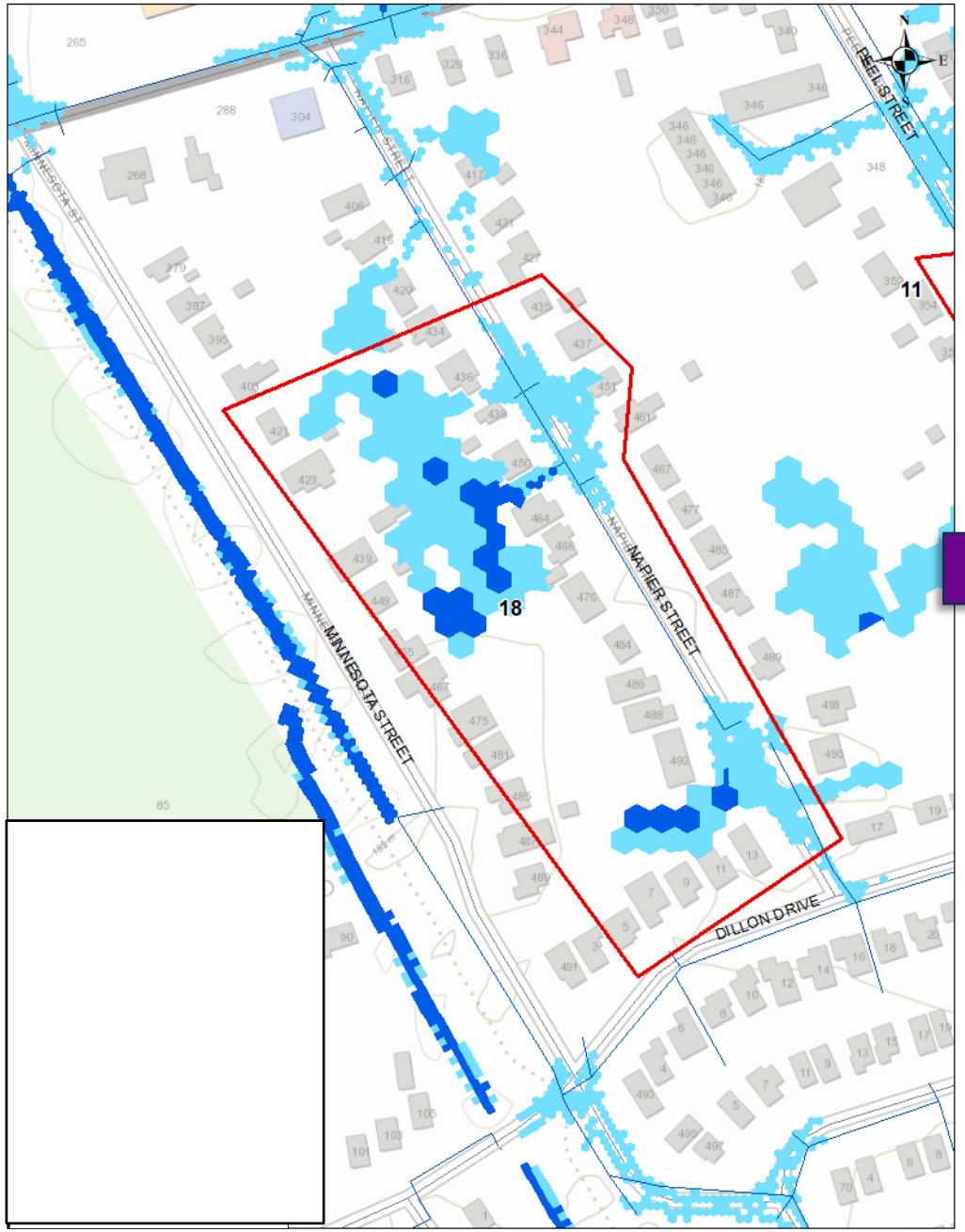
FDC 17 Preliminary Preferred Solutions & Flooding Comparison

Preferred Project Implementation – No Capital Project Proposed

- Evaluated capital projects were determined to be infeasible.
- Preferred solution includes education for temporary / permanent flood proofing measures by homeowners.



FDC 18 Preliminary Preferred Solutions & Flooding Comparison



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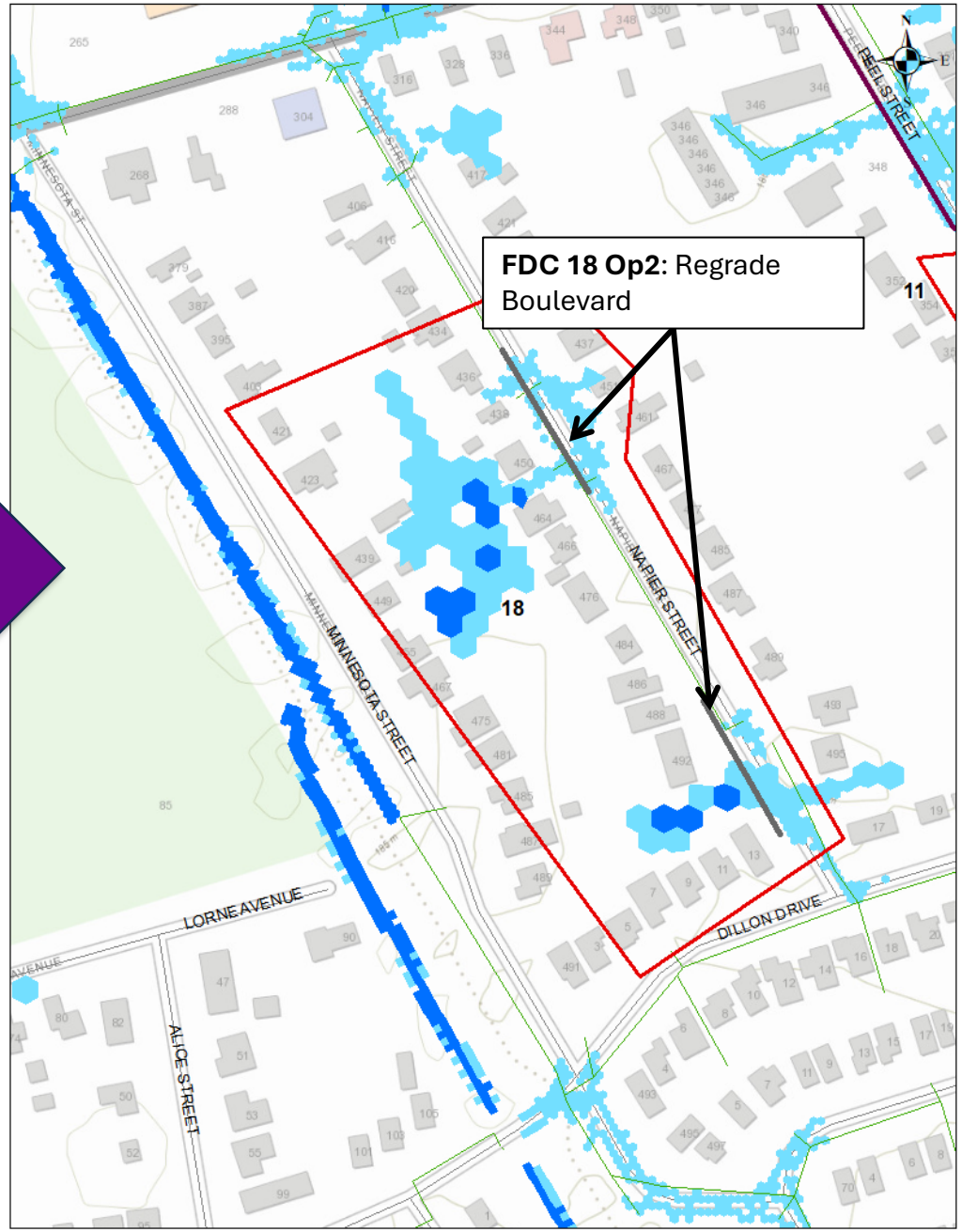
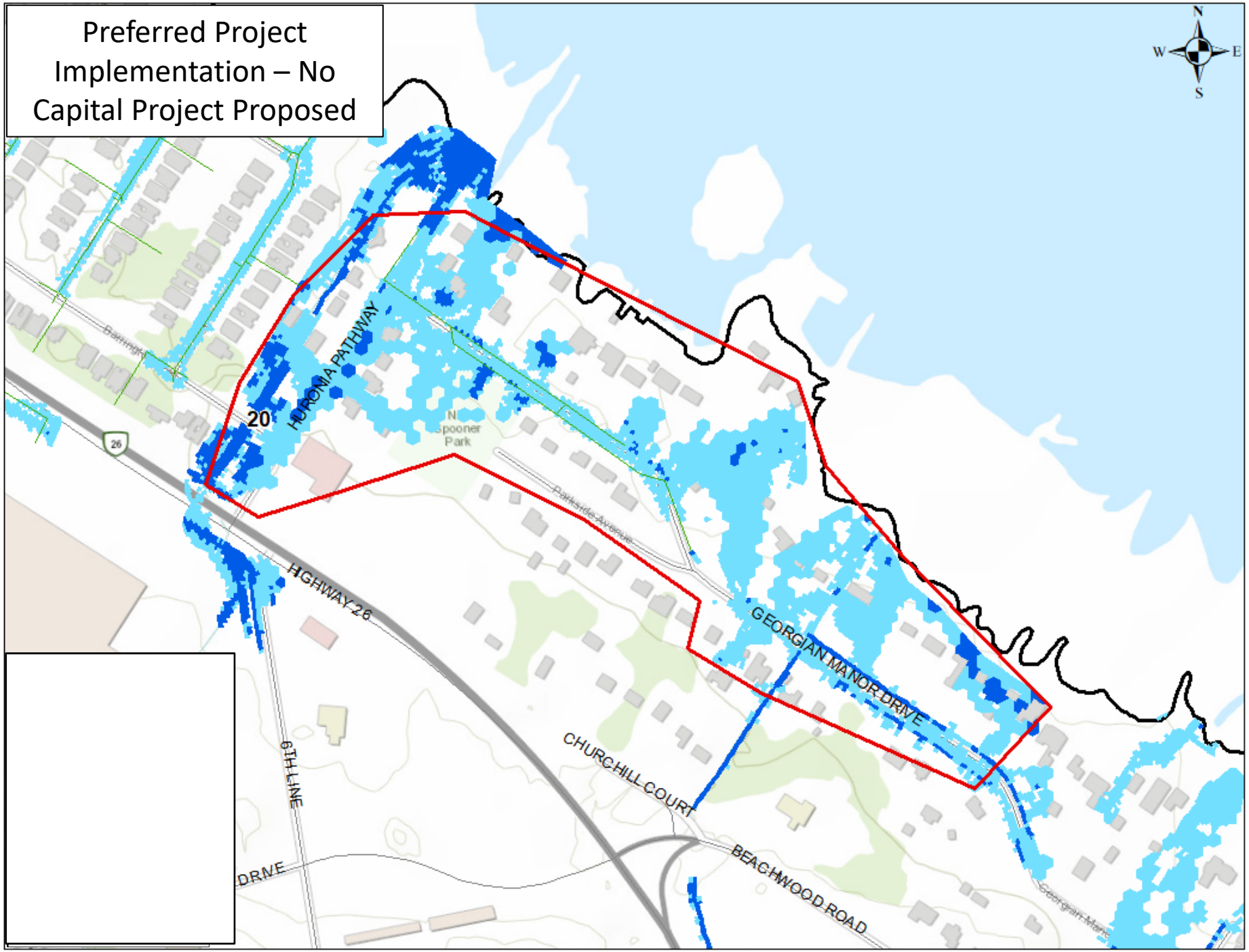


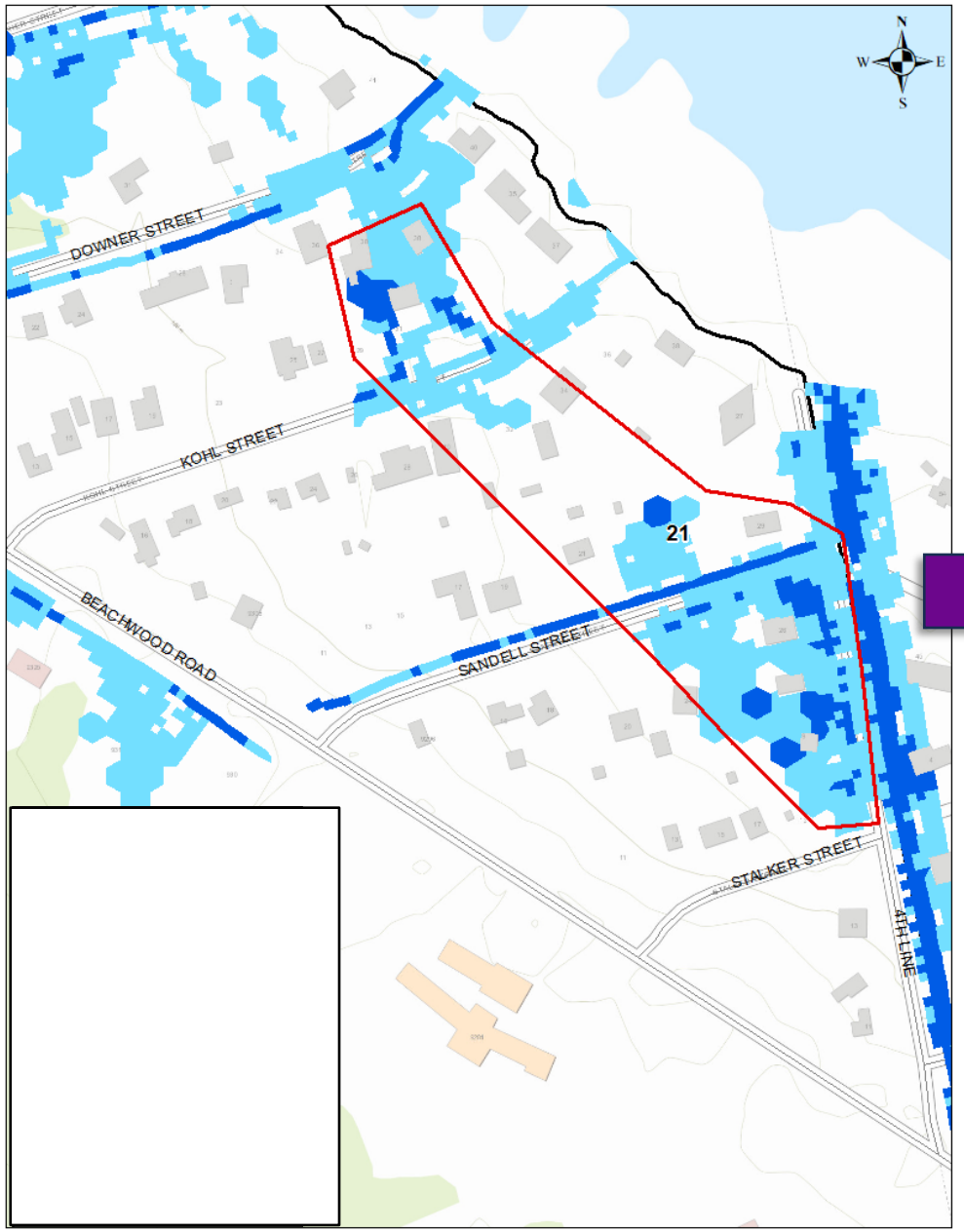
Preferred Project Implementation

FDC 20 Preliminary Preferred Solutions & Flooding Comparison

- Evaluated capital projects were determined to be infeasible.
- Preferred solution includes education for temporary / permanent flood proofing measures by homeowners.



FDC 21 Preliminary Preferred Solutions & Flooding Comparison



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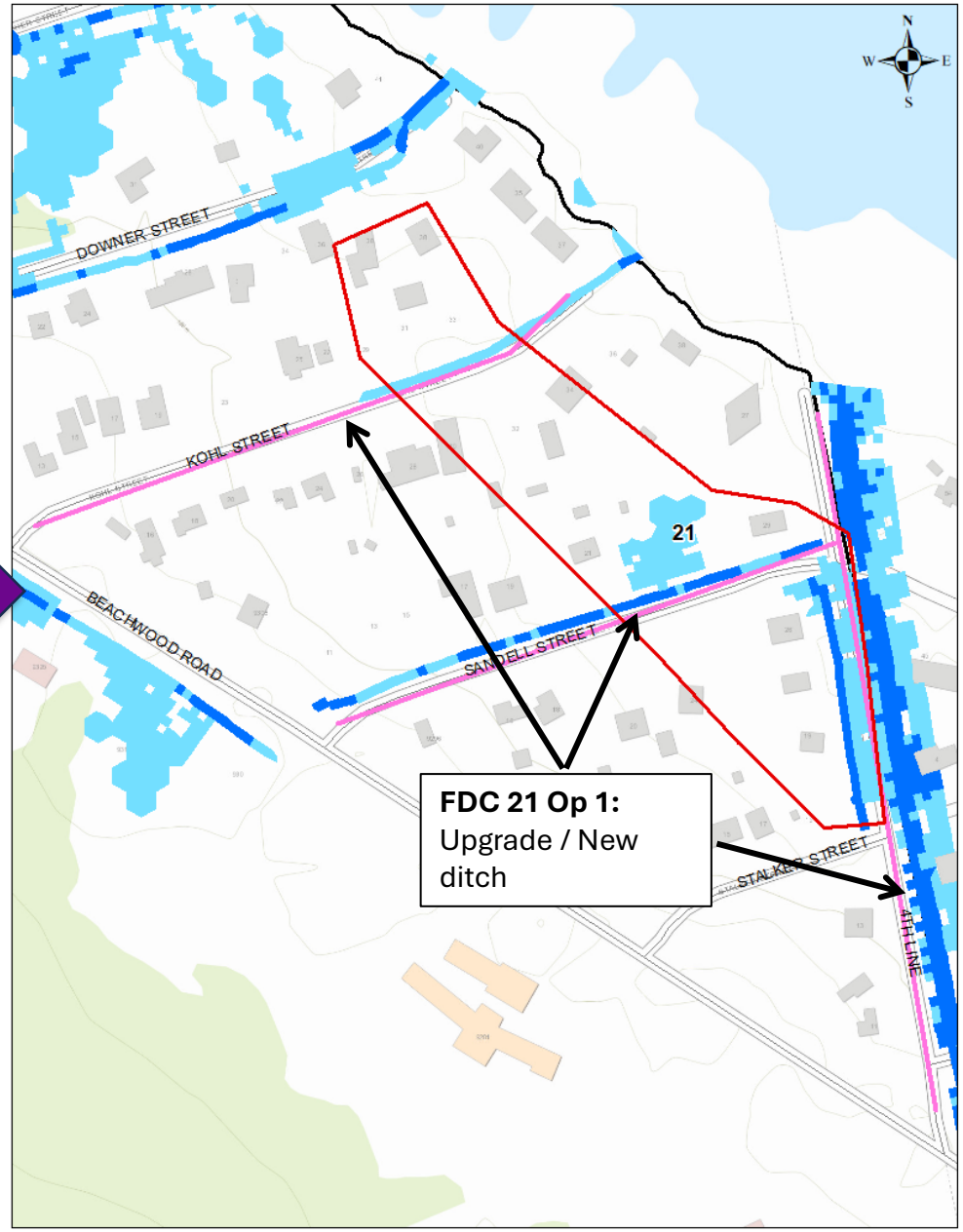
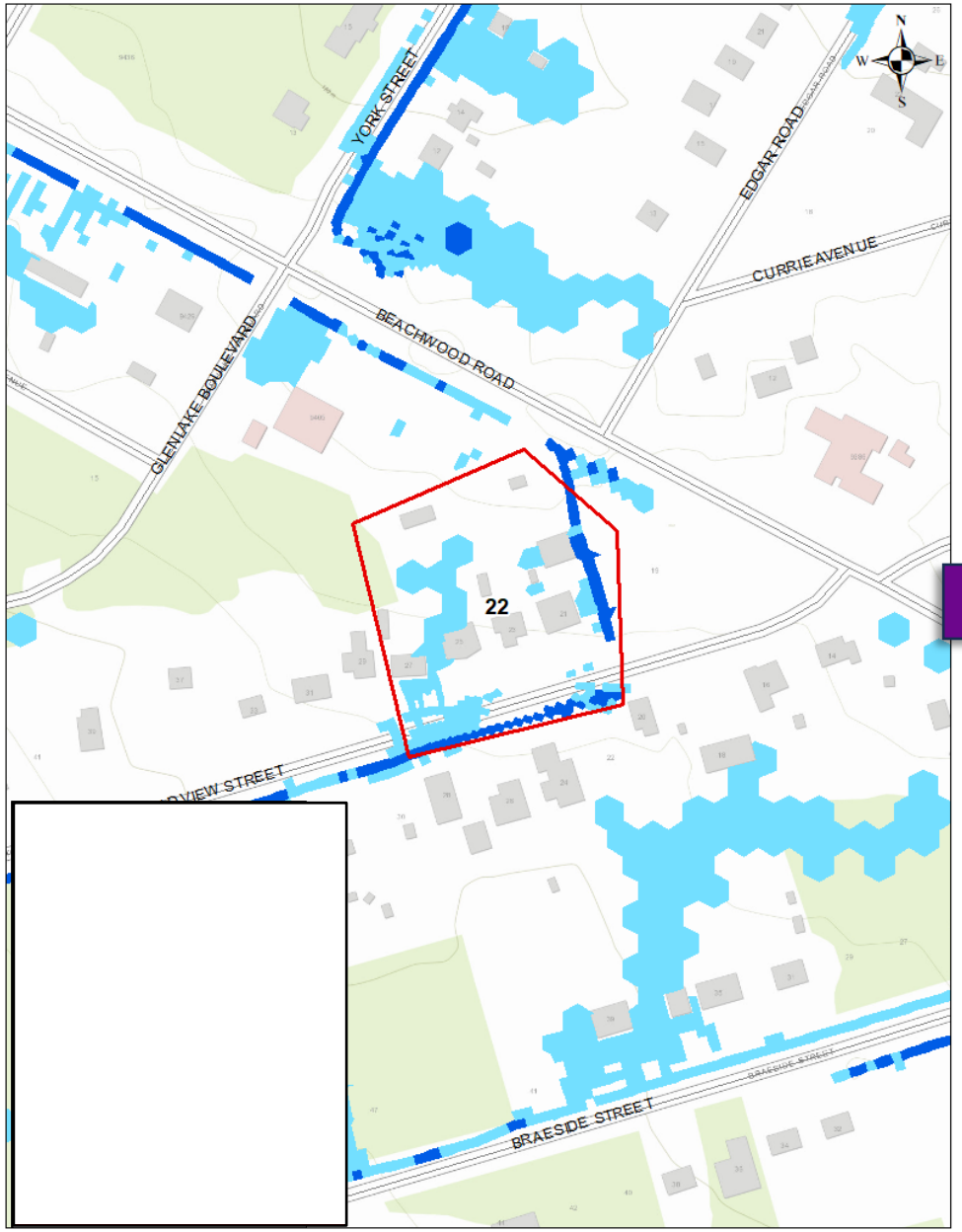


Preferred Project Implementation

FDC 22 Preliminary Preferred Solutions & Flooding Comparison



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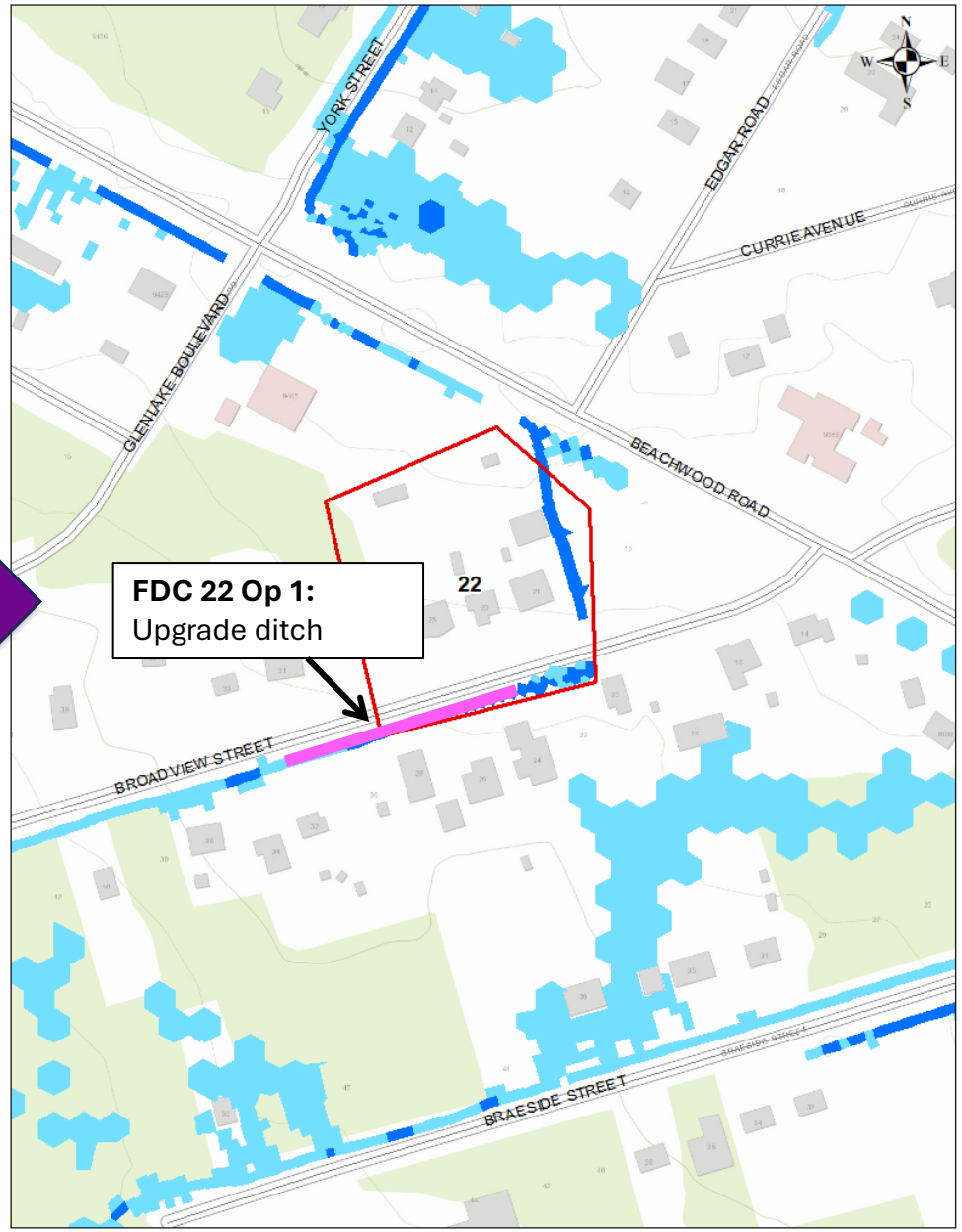
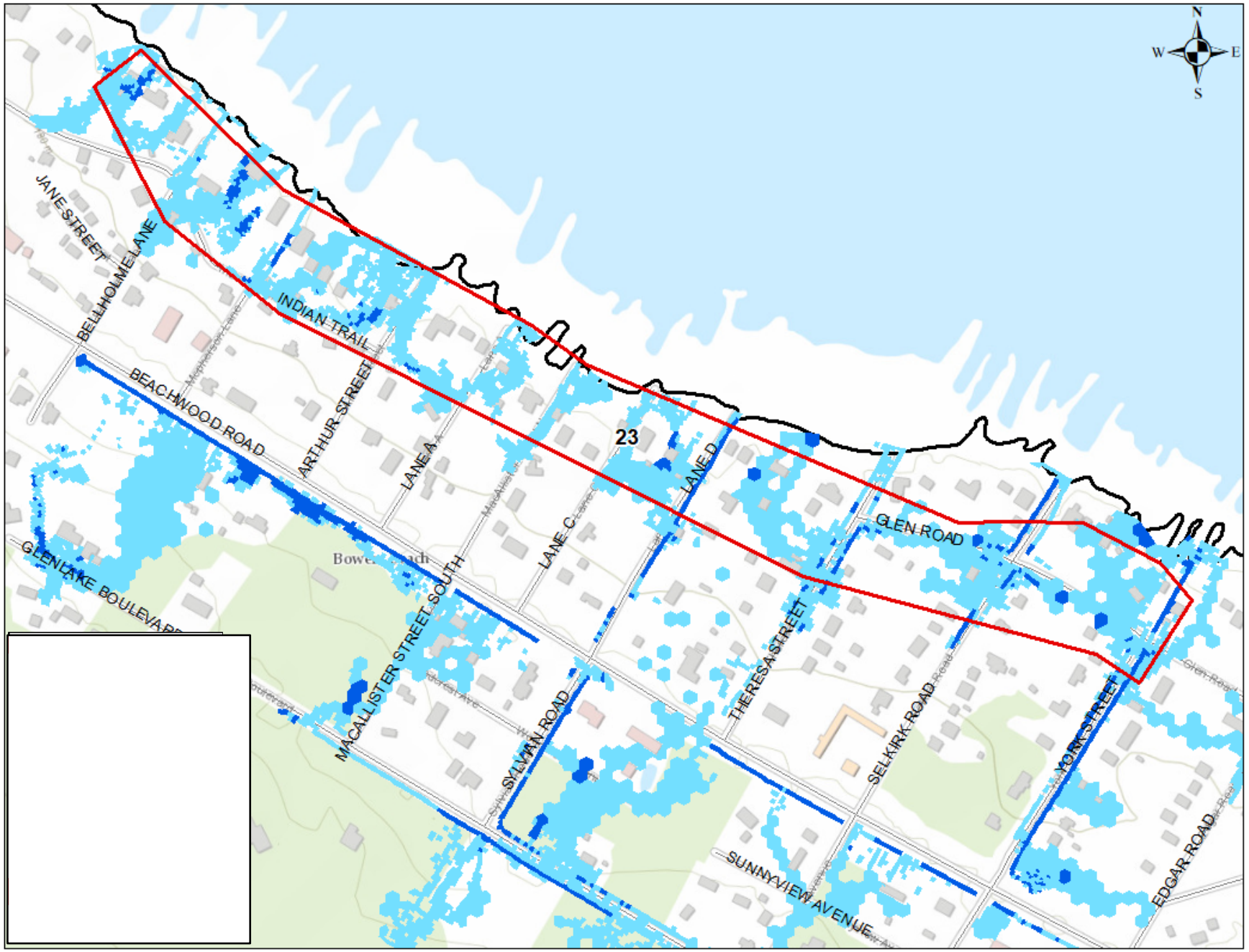


Preferred Project Implementation

FDC 23 Preliminary Preferred Solutions & Flooding Comparison

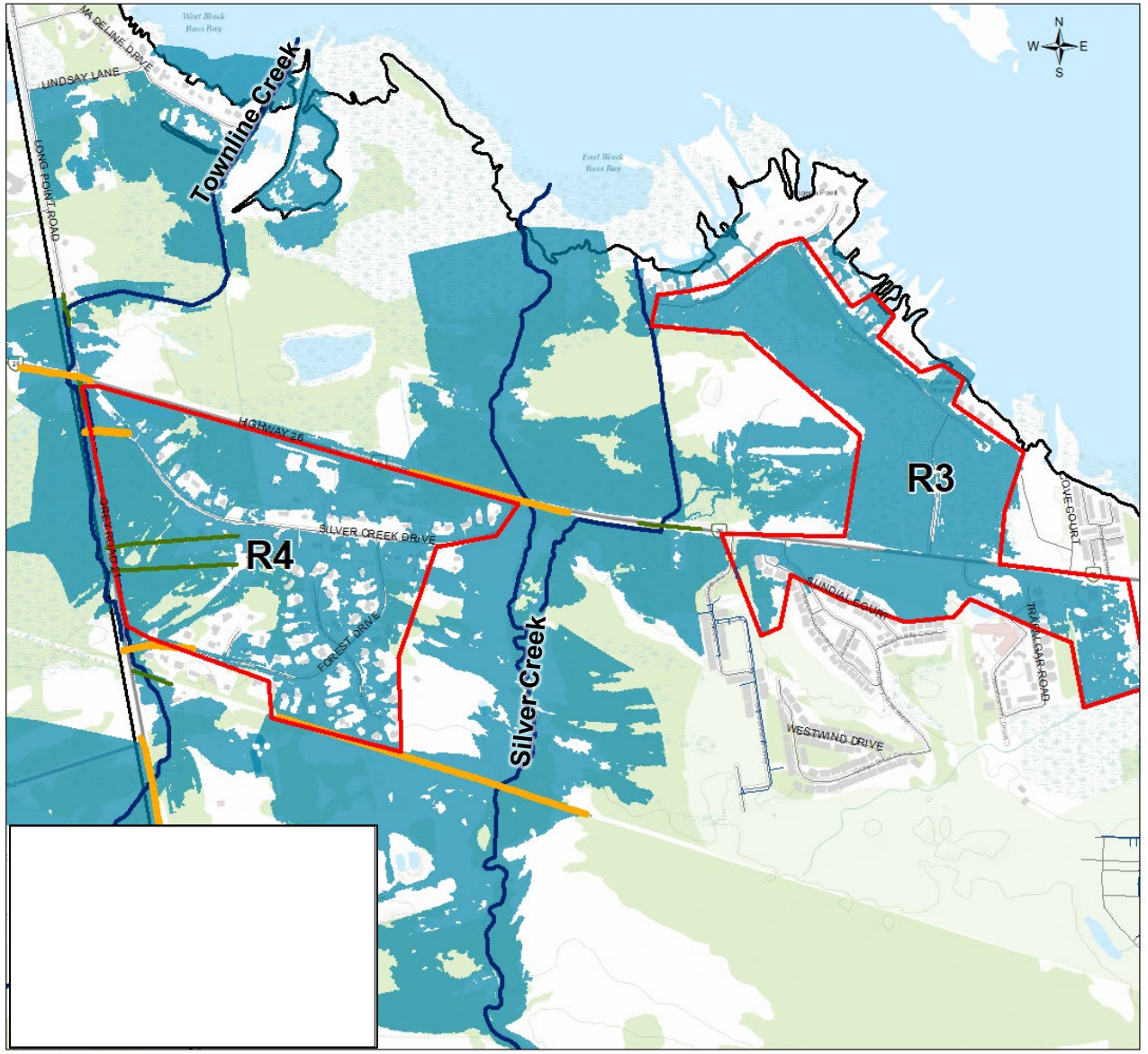
Preferred Project Implementation – No Capital Project Proposed

- Evaluated capital projects were determined to be infeasible.
- Preferred solution includes education for temporary / permanent flood proofing measures by homeowners.



Riverine FDCs

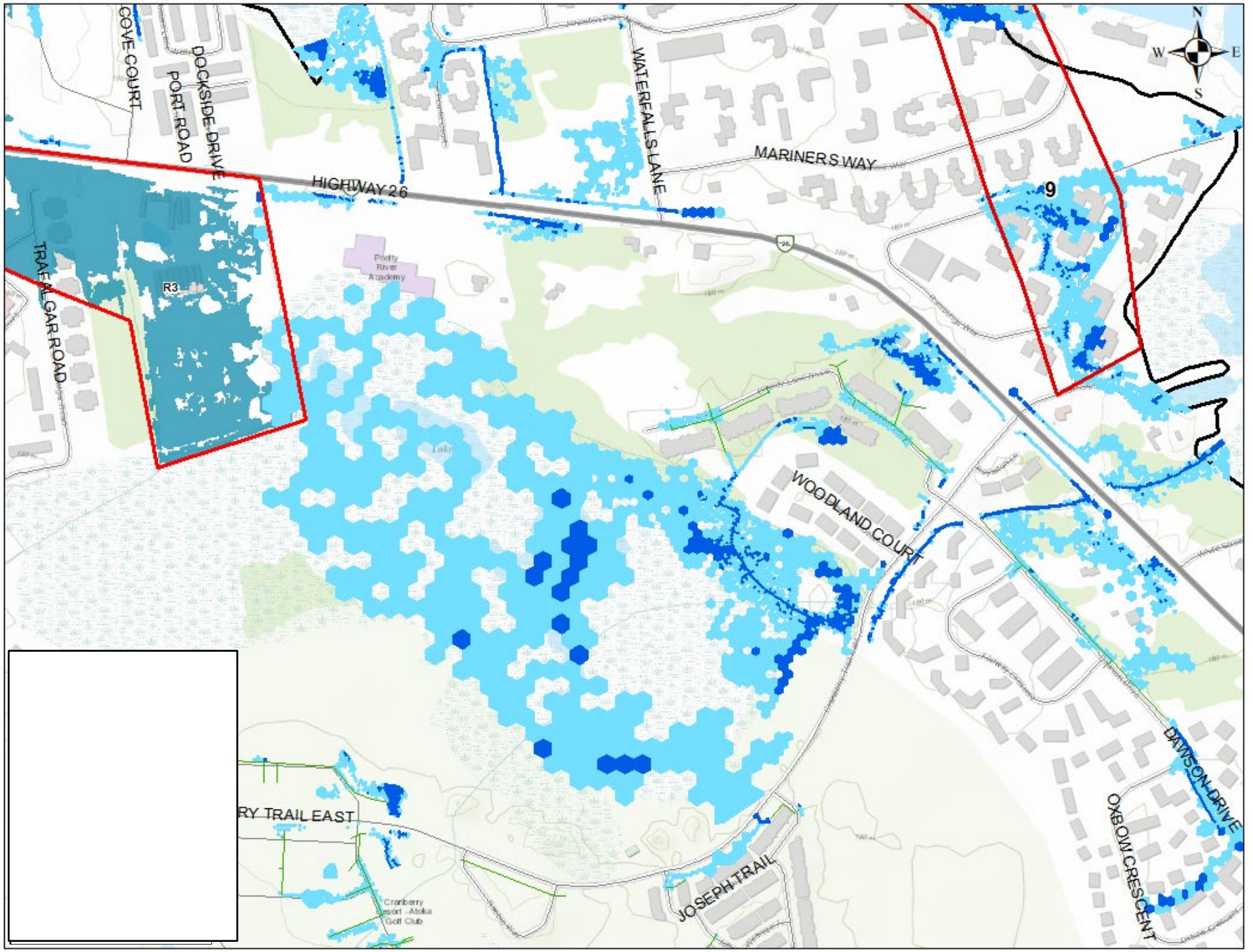
- Proposed solutions to mitigate flooding remain as long list alternatives
  - Proposed long-list solutions will be assessed in future Town / Conservation Authority projects and/or as development driven projects
- Upgrades to deficient riverine crossings to meet Provincial standards have been assessed. Proposed upgrades include:
  - Upgrading Silver Creek crossing Georgian Trail;
  - Upgrading Silver Creek crossing @ Highway 26;
  - Upgrading Townline Creek crossing @ Grey Rd 21 (U/S);
  - Upgrading Townline Creek crossing @ Forest Drive;
  - Upgrading Townline Creek crossing @ Silver Creek Dr; and,
  - Upgrading Townline Creek crossing @ Highway 26.



Other riverine systems do not have deficient bridge crossings, and therefore no projects are recommended

Cranberry

- Cranberry Marsh and downstream watercourse were assessed.
- Under design conditions, there are no capacity concerns causing surface water flooding.
- Ongoing inspections and maintenance of outlets and the creek are recommended.
- Micro Drainage Study to address residents' concerns is also recommended.



Preferred Solutions Project Summary

FDC	Project Description
1, 2, 3	Construct underground storage in Heritage Park and divert storm flows from High St. & First St. to the storage facility. Outlet to sewers on Spruce St, as required. Upgrade sewers on Elm, Spruce and Walnut St. to meet Town standards.
4	Upgrade storm sewers as part of Sixth St reconstruction. ROW grade should be updated to prevent spilling of flow into private lots, as possible.
5, 6, 7	Upgrade storm sewers that are deficient for the 5-year event. Urbanize the ROW along Second St. & Third/ Cedar St. intersection with curb. ROW grade should be updated to prevent spilling of flow into private lots, as possible.
8	Upgrade storm sewers that are deficient for the 5-year event. Urbanize the ROW along Beech St. with curb. ROW grade should be updated to prevent spilling of flow into private lots, as possible.
9	Open communication with the Condo Corp. about modelled results and potential options to address flooding (capital projects/ education).
10, 19	Upgrade sewers along Simcoe and East St to convey 100yr storm. Urbanize the ROW along Niagara St. between Erie St. and Huron St.
11	Upgrade storm sewers on Peel St as part of the road reconstruction program. ROW grade should be updated to prevent spilling of flow into private lots, as possible.
12	Project constructed. Sewers upgraded/ extended as part of road reconstruction program and curb added.
13	Upgrade storm sewers that are deficient for the 5-year event. Urbanize the ROW along Robinson St. with curb. ROW grade should be updated to prevent spilling of flow into private lots, as possible.
14	Upgrade storm sewers on Hurontario St. as part of the road reconstruction program and curb added.

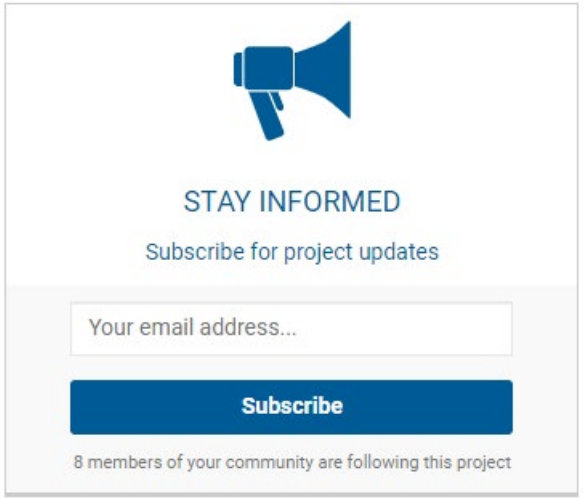
Preferred Solutions Project Summary continued

FDC	Project Description
15	Develop a homeowner education program about long-term floodproofing options (permanent), as well as for extreme events (temporary). Ensure flood forecasting is ongoing and accurate and communicated to homeowners, as relevant. Upgrade storm sewers that are deficient for the 5 year event.
16	Project constructed. Sewers upgraded/ extended as part of road reconstruction program.
17	Develop a homeowner/ business owner education program about long-term floodproofing options (permanent), as well as for extreme events (temporary). Ensure flood forecasting is ongoing and accurate and communicated to homeowners, as relevant. Upgrade storm sewers that are deficient for the 5 year event.
18	Regrade the Boulevard in select spots along Napier St to prevent spilling into lots, as possible.
20	Develop a homeowner education program about long-term floodproofing options (permanent), as well as for extreme events (temporary). Ensure flood forecasting is ongoing and accurate and communicated to homeowners, as relevant. Upgrade storm sewers that are deficient for the 5 year event.
21	Upgrade ditches along Kohl / Sandell St. Construct new ditch along west side of 4th Line.
22	Upgrade ditches along Broadview St.
23	Develop a homeowner education program (involving insurance industry organizations) about long-term floodproofing options (permanent), as well as for extreme events (temporary). Ensure flood forecasting is ongoing and accurate and communicated to homeowners, as relevant.

General Recommendations

1. Coordinate riverine flooding studies with the NVCA (e.g. Oak Street Canal);
2. New study to address micro-drainage issues (surface and ground water) and respond to public concern regarding the Cranberry development area;
3. Insurance industry advisory workshop and consultations to explore collaborative solutions and opportunities for the municipality and homeowners;
4. Meet with FCM Green Municipal Fund to explore favorable funding and financing possibilities under their new Adaptation/Resilience stream, including support for creative partnerships with private capital (e.g. autonomous rainwater harvesting);
5. SWM Standard Updates – Implement recommendations from the SWM Master Plan regarding best practices and in accordance with the Town's Consolidated Linear Infrastructure Environmental Compliance Approval;
6. Implement residential lot drainage protection and basement flood preparedness education for identified knowledge gaps among residents regarding sump pump management and other potential surface water flood related risks, with the participation of the Intact Centre on Climate Change Adaptation, affiliated with the University of Waterloo;
7. Assess impact of new mapping on ADU program and how each recommended FDC solution will benefit the Town's affordable housing master plan implementation, through use of available geospatial tools;
8. Leverage homeowner receptiveness to lot-level technologies and LID practices as part of municipal stormwater planning (water quality benefits, smaller storm events); and,
9. If implementing stormwater charges, use verifiable data from smart technologies and insurance industry consultation and data analysis to support development of appropriate credits for mitigation efforts.

How Are You Involved?



- Engage Collingwood engage.collingwood.ca/swmmp
  - Subscribe for project updates
  - Ask a question anytime
- Public comment period on the PIC ends April 4, 2025
- 30 Day Public Review Period for Draft Report
- Email the project contacts:

Stuart West, P. Eng.
Project Engineer, Infrastructure – Growth & Development
Town of Collingwood
Email: swest@collingwood.ca

Josh Maitland, P. Eng.
Consultant Project Manager

Greenland Consulting Engineers
Email: jmaitland@grnland.com

Next Steps

1. Incorporate PIC and Agency comments into the Final Design Concept Selection;
2. Project prioritization of final FDC solutions;
3. Provide recommendations to guide implementation (e.g., climate change inclusion to development standards, maintenance program(s), further studies, potential partnership/funding opportunities etc.);
4. Finalize the Stormwater Management Master Plan and Publish Notice of Study Completion;
5. Place the Class EA Report on file with the MECP and Town for public review and comment for a period of 30 days; and,
6. Proceed to Implementation (Detailed Design & Construction) **– OUTSIDE THE SCOPE OF THIS STUDY**

Thank You For Your Time

Questions?