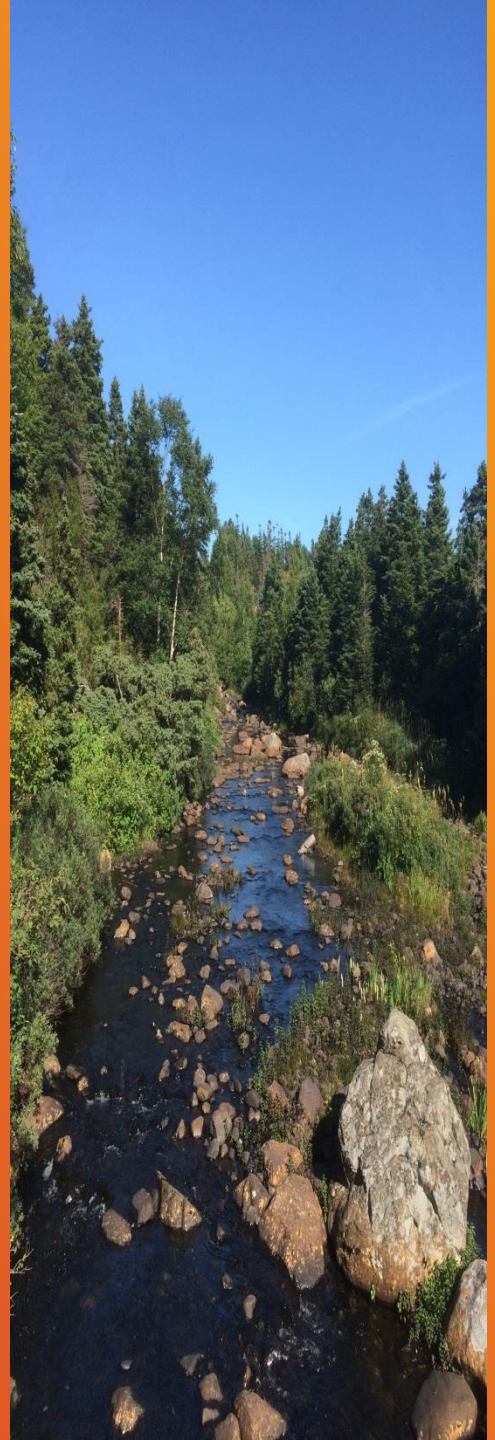
CLRA Conference

Flood vulnerability mapping in Conception Bay South, NL: The use of GIS in applying collaborative evidence based policies



October 14-19th, 2018

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Agenda

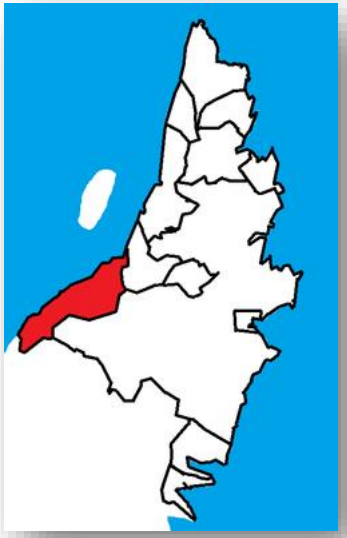
- Project Background
- Available Data
- Methodology Development
- Process
- Validation
- Benefits
- Outcomes
- Questions

Project Background

- Costal area with close to 30 000 people
- 6 major rivers that run through it, into Conception Bay.
- Watersheds not contained within the CBS boundary

- Affected by extreme flooding events (i.e Igor)

- Development friendly
- Forward thinking



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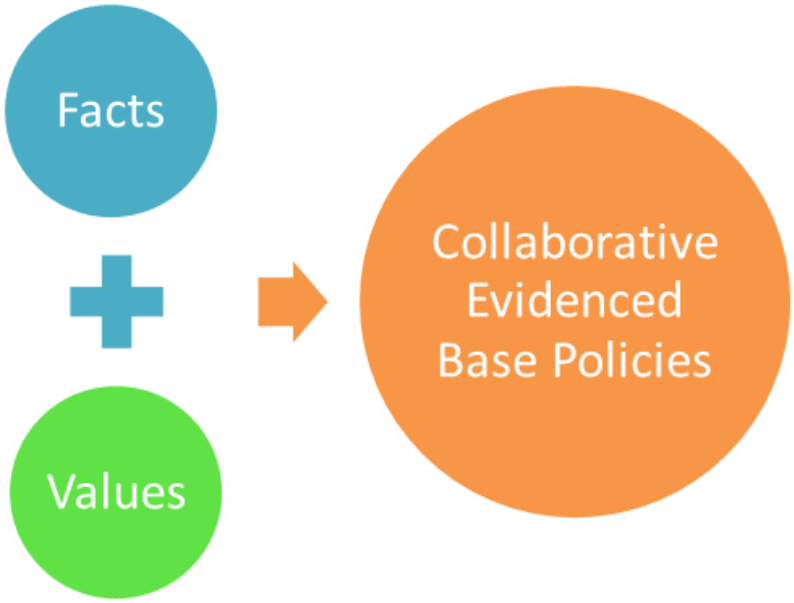
Goals

Develop policies and regulations to mitigate development on flood prone properties



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Available Data

- **Digital Elevation Model (DEM) – created from LiDAR collected in 2015**
- **Drainiage files – lakes, ponds, rivers, streams, wetlands**
- **Aerial Imagery –collected in 2015**
- **Anecdotal (from residents)**
- **Storm water management studies**
- **Claims from Disaster relief**
- **Literature Review/ Expert advise**

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Methodology Development

Variables

Slope, Elevation, Flow Accumulation, distance to drainage network, Land Cover Type

Calibration

Stormwater management plans, Literature Review/ Expert advise

Validation

Disaster relief, anecdotal, Stormwater management plans

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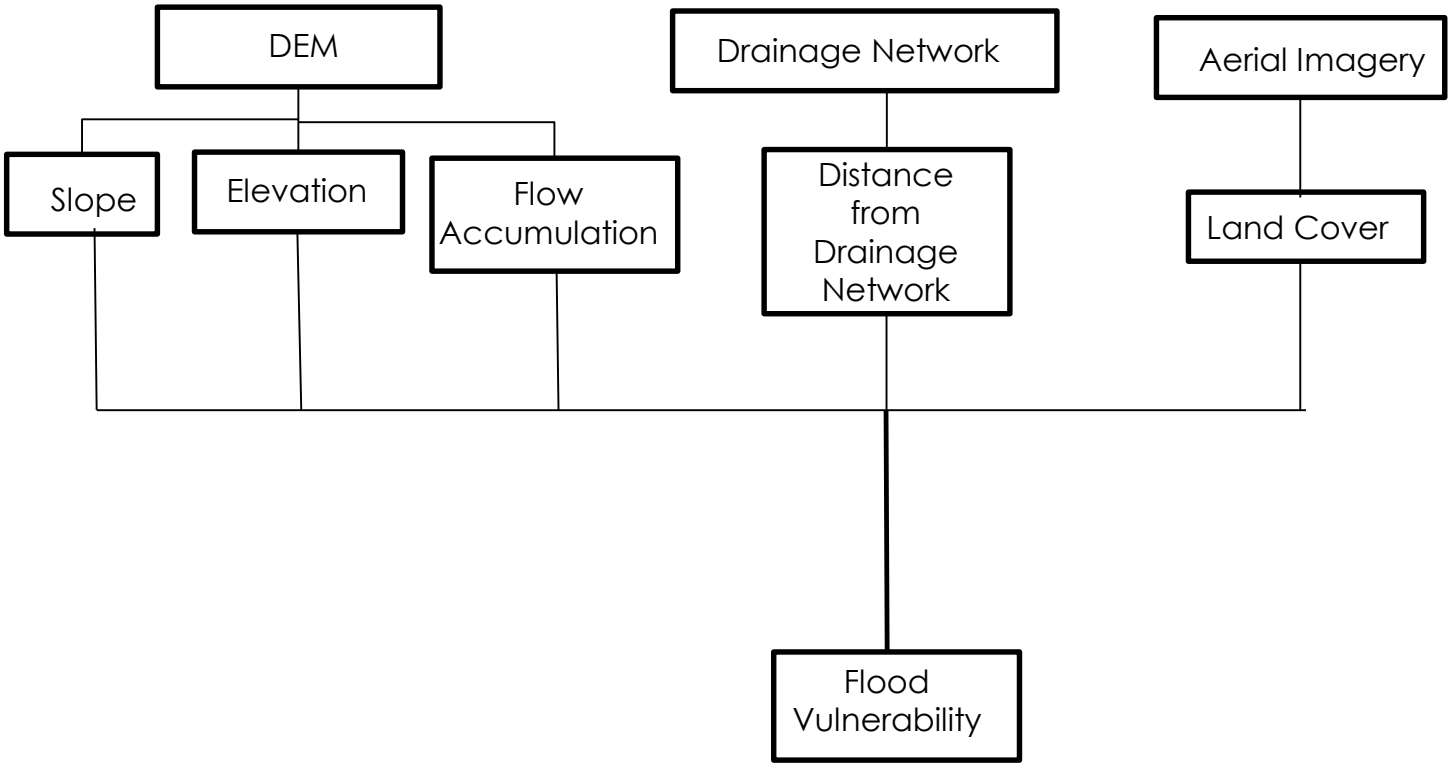
Process



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Process Cont'd

- **Each variable was classified and then ranked**
- **End product is the sum of the ranks for each 5mx5m cell (selected by looking at the semi variogram for each data type and the Moran's I value)**

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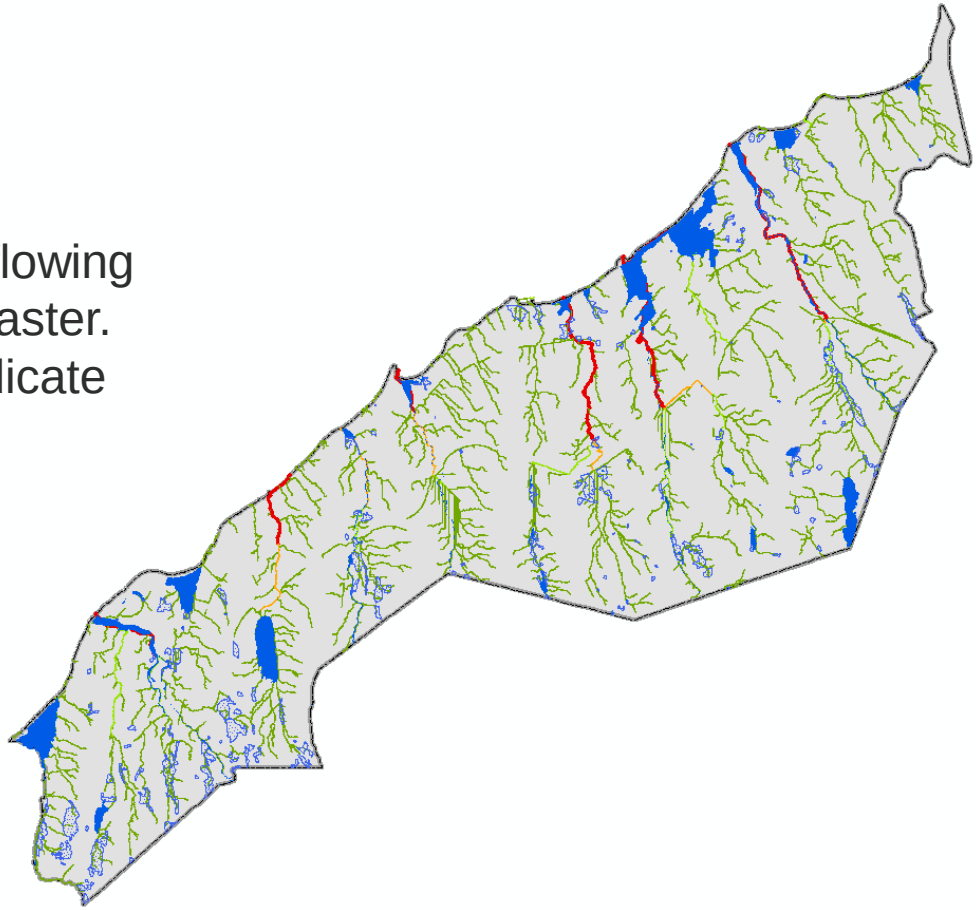
Flow Accumulation

*Accumulated flow sums the water flowing down-slope into cells of the output raster. High values of accumulated flow indicate areas of concentrated flow and consequently higher flood hazard.



Greater than 70 m from any flow accumulation	2
Within 70m of primary accumulation, within 50m of secondary accumulation, 30m of tertiary	4
Within 50m of primary accumulation, within 30m of secondary accumulation, within 15m of tertiary	6
Within 30m of primary flow within 15m of secondary accumulation	8
Within 15m of primary flow	10

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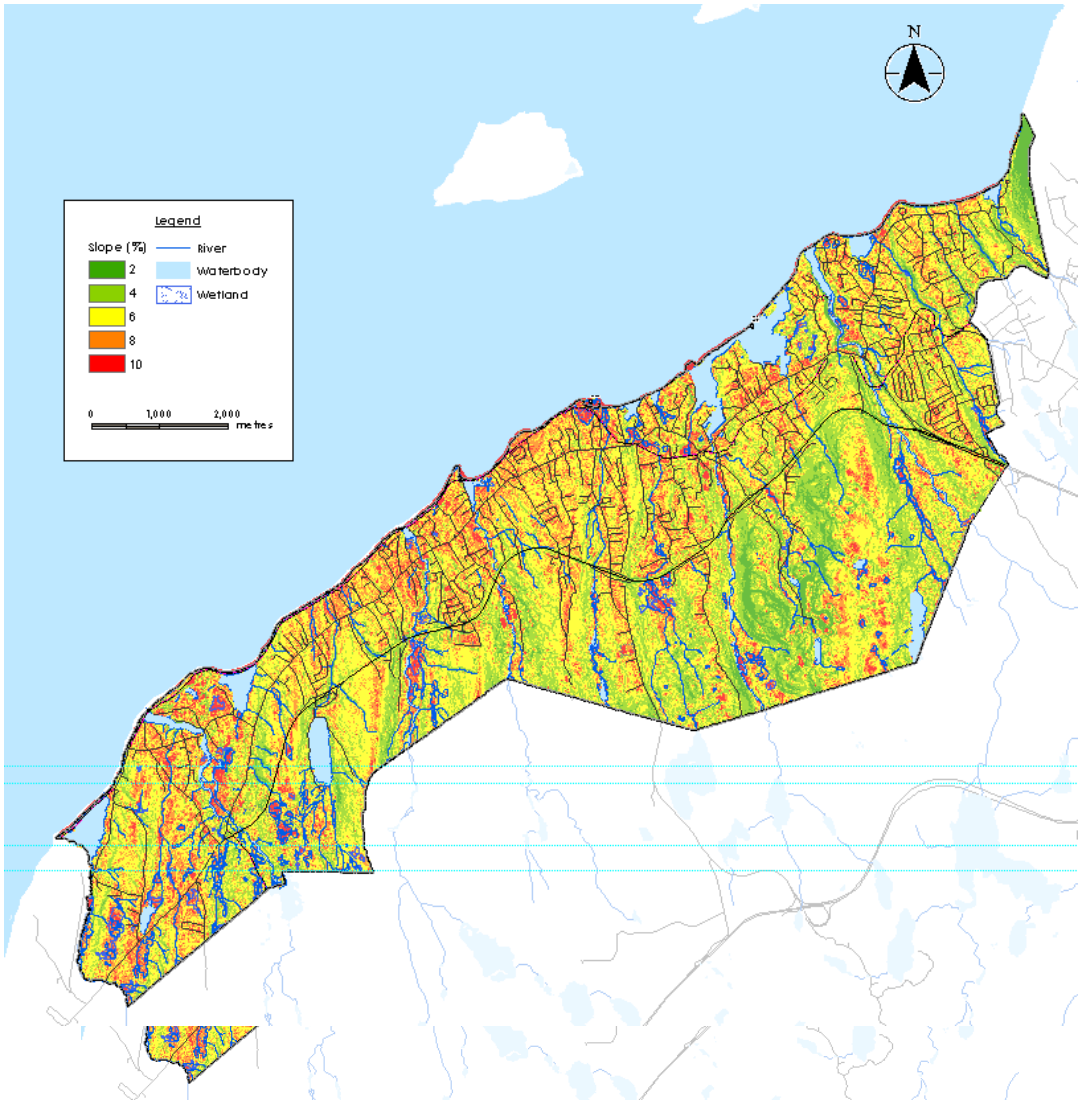
Slope

0-2	10
2-5	8
5-15	6
15-30	4
30-60	2

-Shallow sloped areas have a higher chance of flooding than steeper slopes



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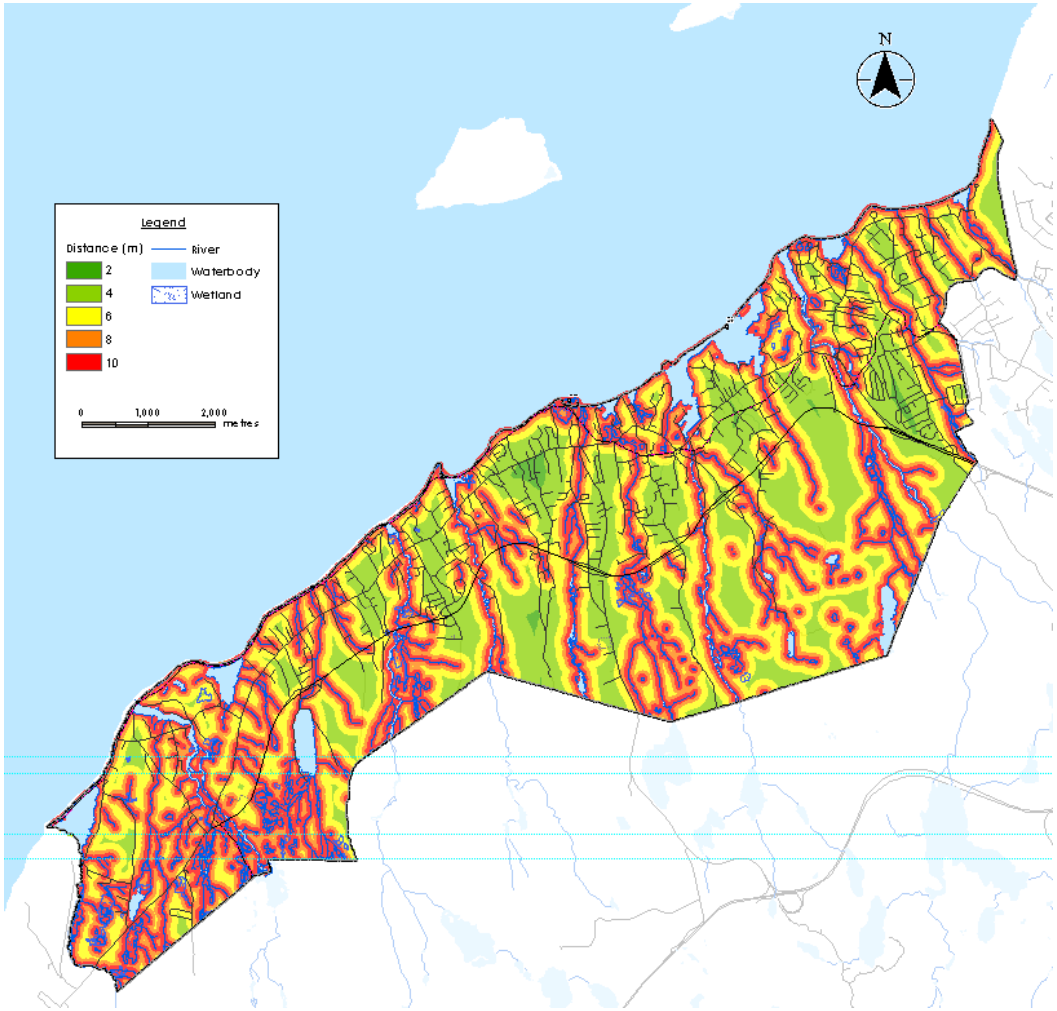
Proximity to Drainage Network

0-50	10
50-100	8
100-200	6
200-300	4
300-500	2



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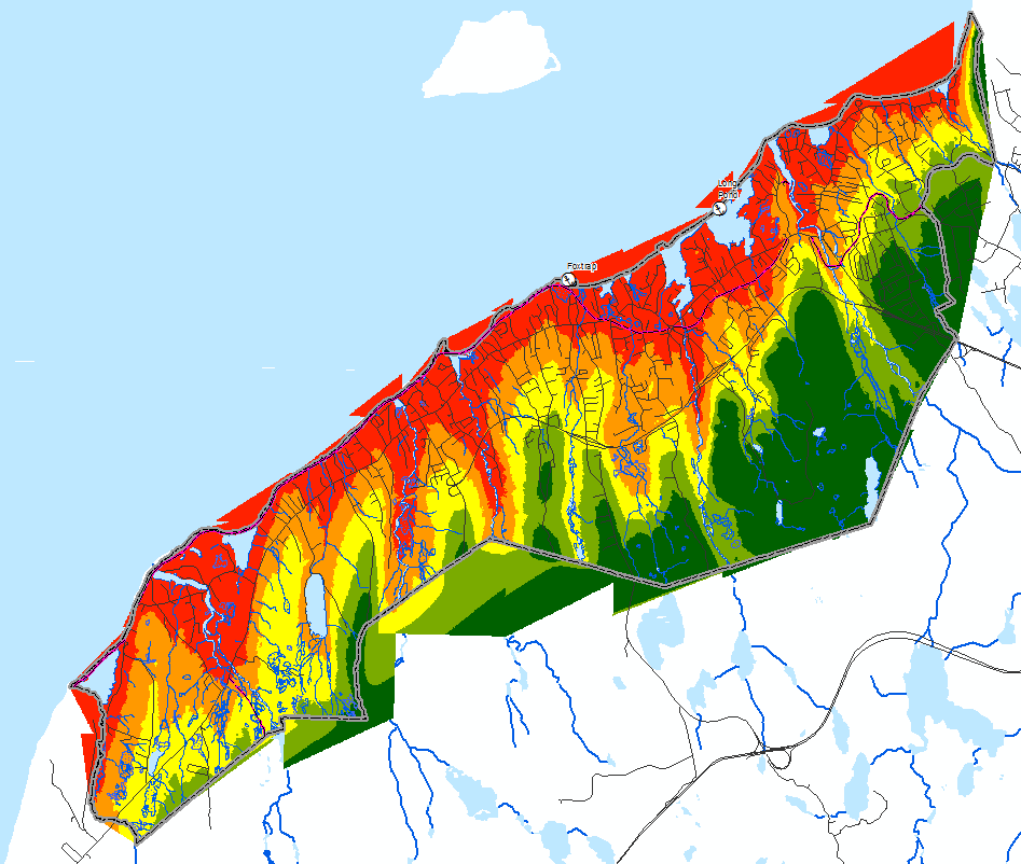
Elevation

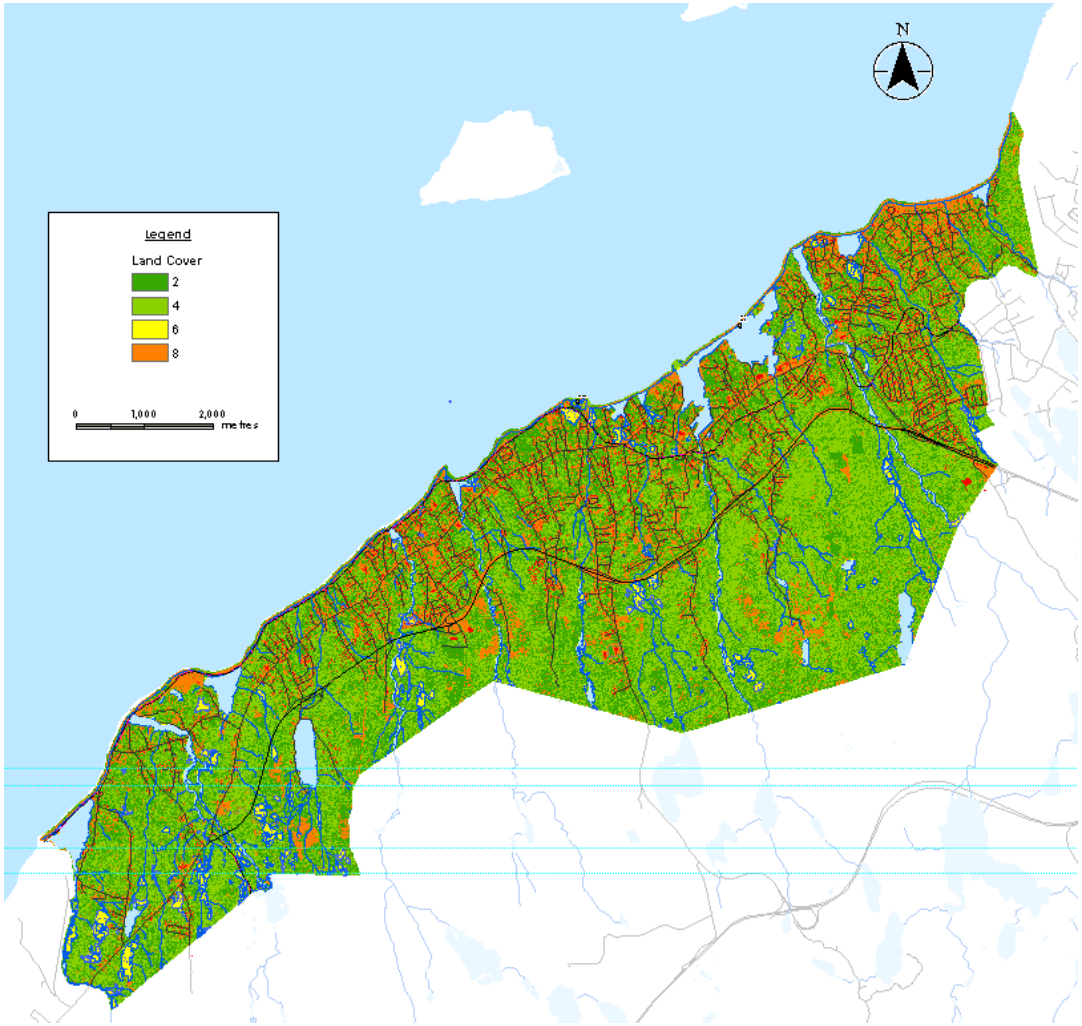
Elevation

Range	Rank
0-25	10
25-50	8
50-75	6
75-100	4
100+	2



Land Cover

Urban /cleard land	8
Wetland	6
Low Vegetation	4
Mixed Forest	2



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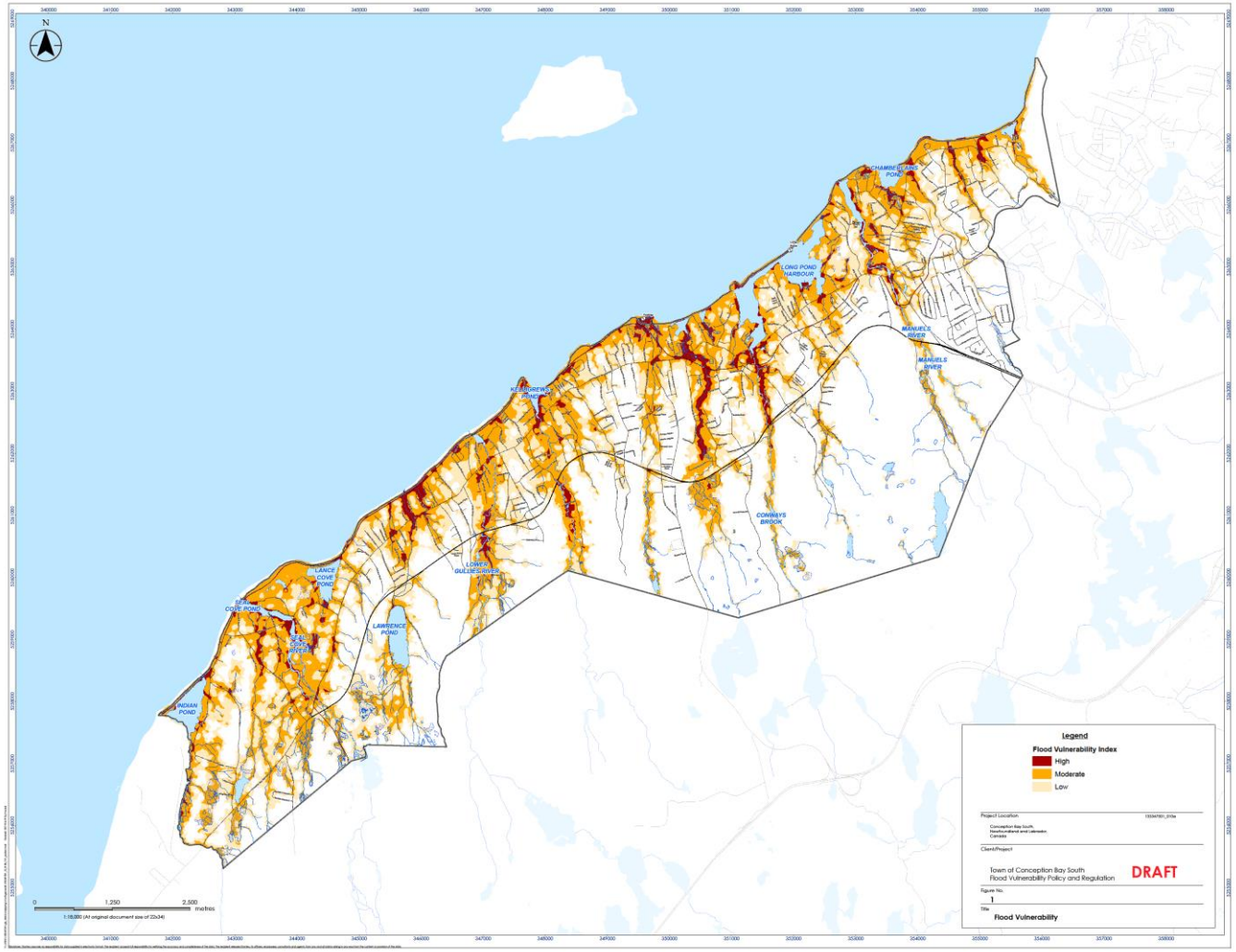
Final Flood Vulnerability Map



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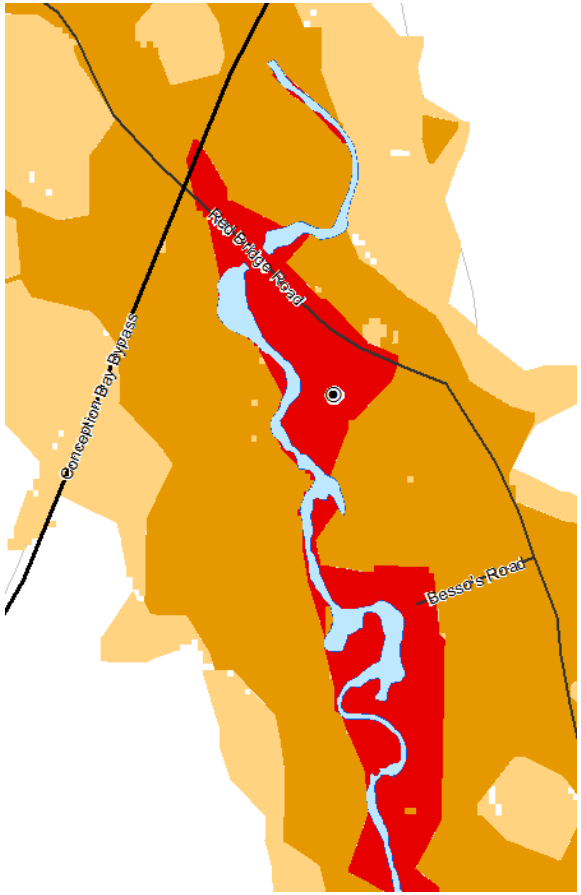
Conception Bay South Byp
Conception Bay South Byp
Red Bridge Rd
Sgt Ned Mugent Park


Conception Bay Bypass
Red Bridge Road
Besso's Road

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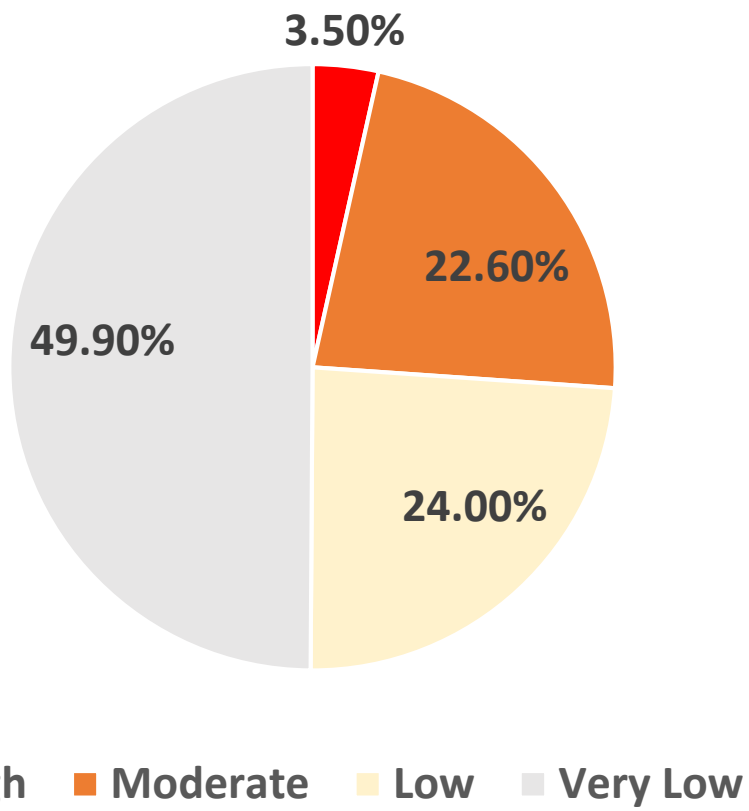
Flood Vulnerability - Area

FVI Class	Area (km²)	Total Area of CBS (km²) [water excluded]	Percent of total Area
High	2.08	59.38	3.50
Moderate	13.44		22.63
Low	14.34		24.15



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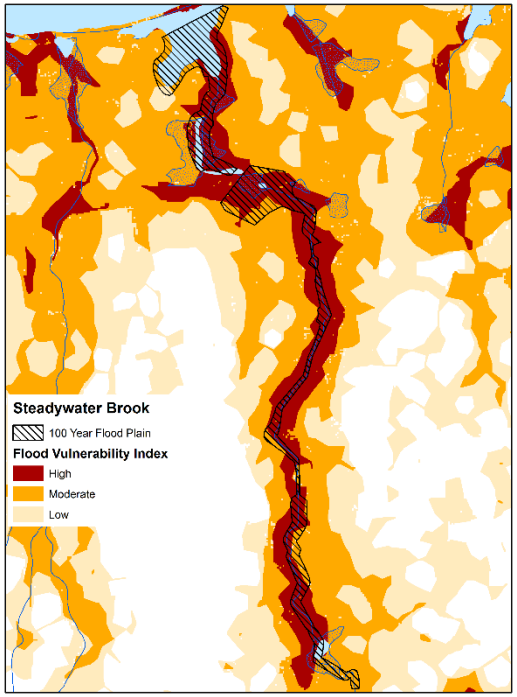
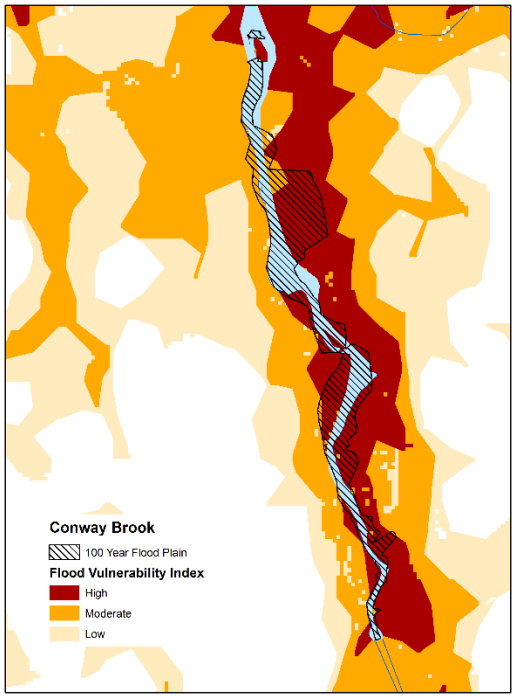
Validation

Disaster Relief and Anecdotal Data –
90% of locations indicated as having past flooding are within the High Flood Vulnerability Area

Stormwater Management Plans – 80% overlap between 100 year flood plain and High Flood Vulnerability Area





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Benefits

- **Adaptability: Variables/ranks can be weighted based on changing values within the community**

- **Scalability: Can be site specific (i.e property boundary), or looked at for an entire development/planning area (averages over space)**

- **Updatability: Can be easily updated when new data is collected. Relational database.**

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Outcomes

- **Flood Vulnerability map and data layers**
- **Recommend Policy Amendments**
  - **19 total**
- **Recommend changes/updates to development regulation**
  - **5 total**

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Questions

THANK YOU!

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