

Floodplain Management A to Z: What Municipalities Need to Know

MNL 2023 Municipal Symposium: May 4, 2023

Paula Dawe: pauladawe@gov.nl.ca

Water Resources Management Division

Department of Environment and Climate Change

Outline

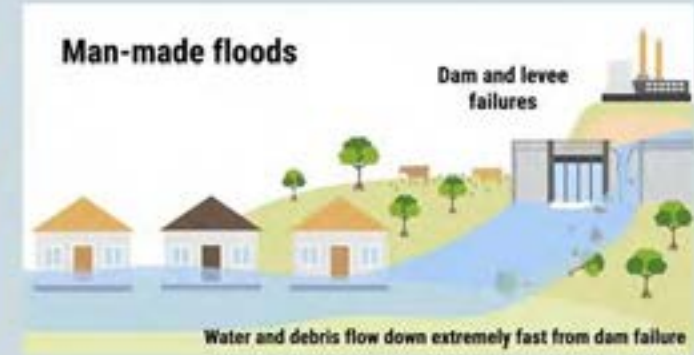
- Why Do We Have Floodplain Mapping?
- What is Involved in a Floodplain Mapping Study?
- How Does Floodplain Mapping Impact My Town?
- How Does Floodplain Mapping Impact Residents?

Why Do We Have Floodplain Mapping?

Types of Flooding



Groundwater flooding



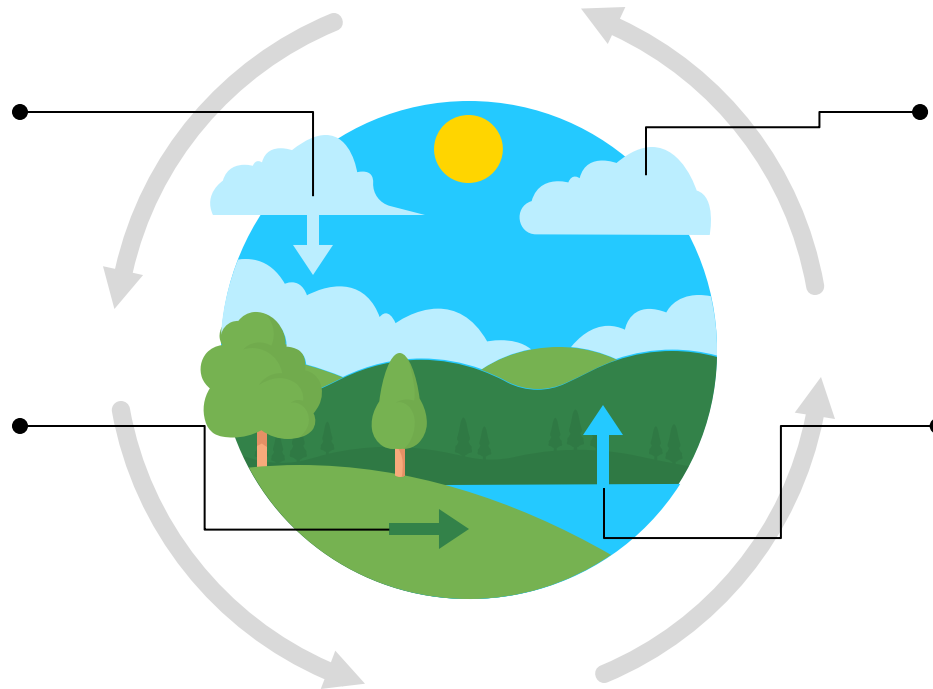
Flood Stats for NL

Flood Inventory

836 records of flood events in NL communities dating back to 1900

Deaths

37 documented deaths from flood and storm surge events since 1900



Cost of Floods

Annual average flood damage >\$16 million since 2000

Communities Experiencing Flooding

335 communities have experienced a flood event since 1900

Flood Stats for NL

Who's the Floodiest?

Eastern Region accounts for 56% of all flood events

Communities with Floodplain Mapping

41 communities have floodplain mapping

Floods per Year

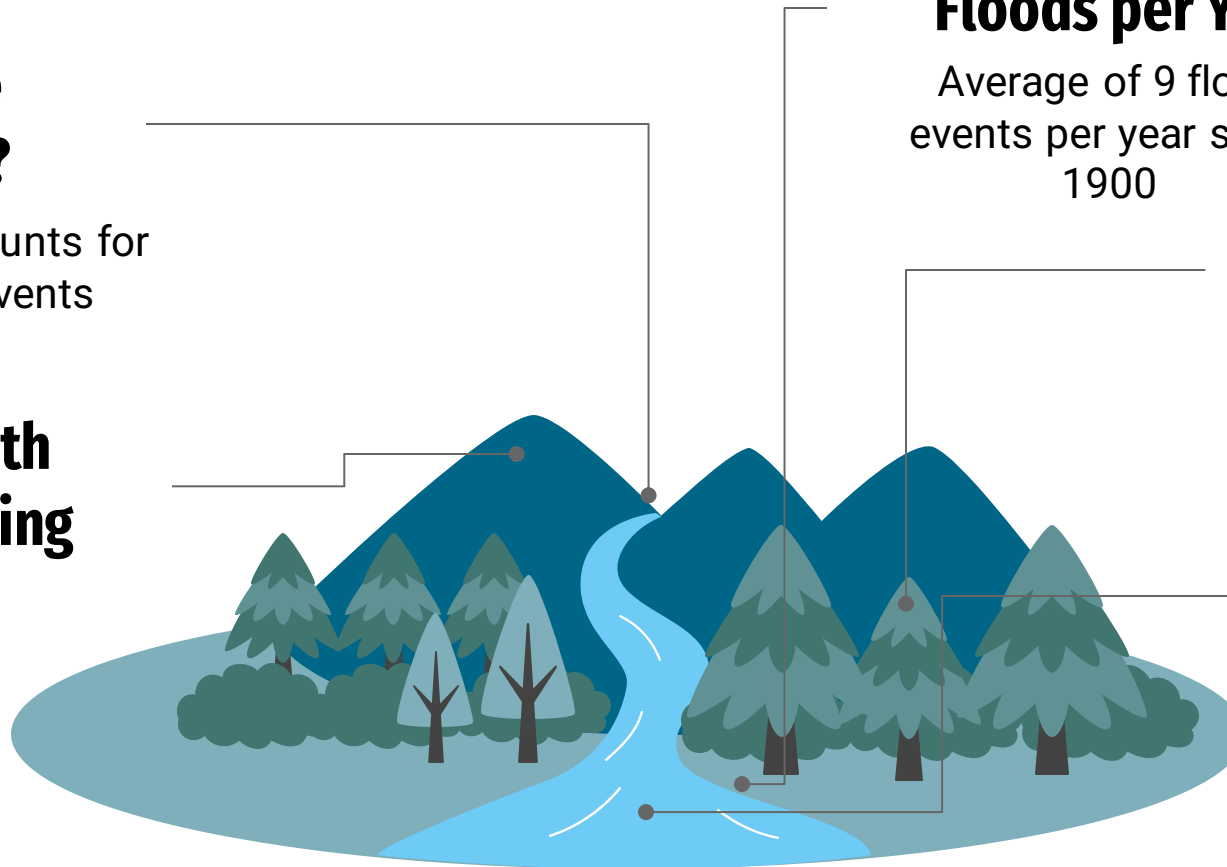
Average of 9 flood events per year since 1900

When Does it Flood?

35% of flood events occur in winter, 31% occur in fall

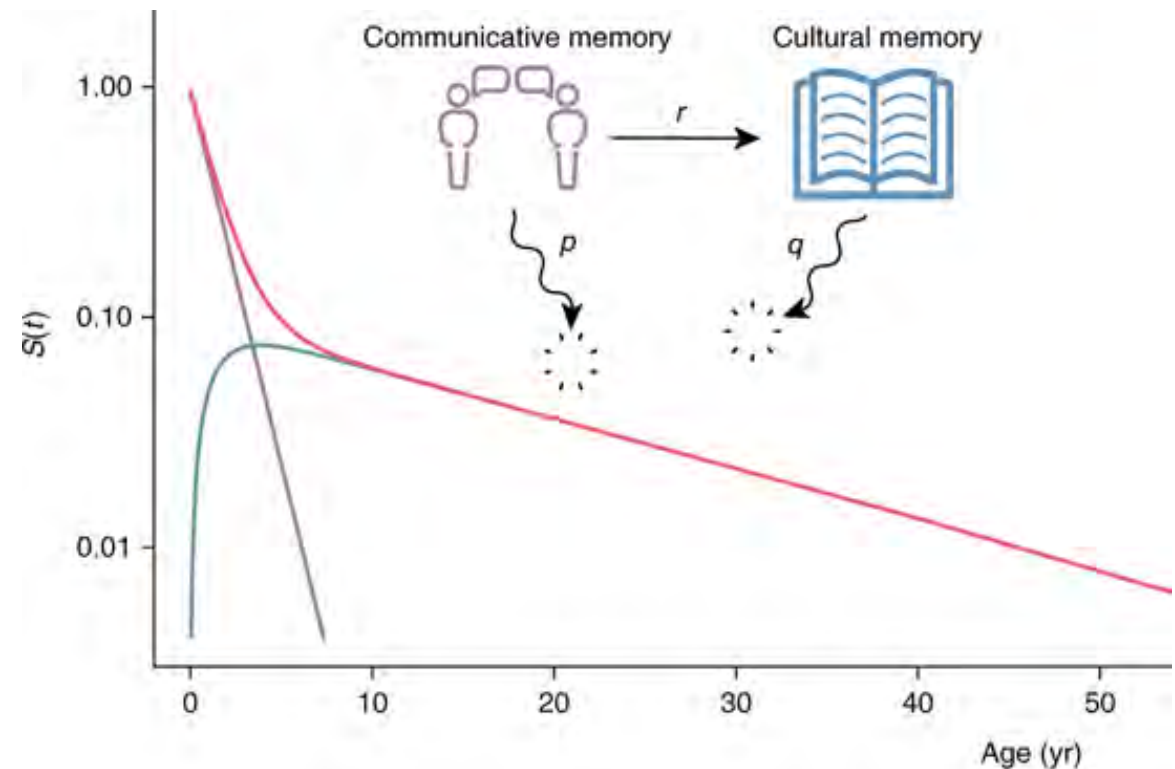
Why Does it Flood?

60% of flood events are triggered by rainfall events



Flood Memory

- Memories of flood events fade from collective memory after 7 years
- You cannot rely on folk memory to protect communities from extreme floods
- You have to document major floods to maintain awareness
 - Extent of flooding
 - Extreme adverse effects
- Necessary to keep reminding and teaching people about the occurrence of major floods, and about the increasing frequency of these events as a result of climate change



$S(t)$ is the sum of the attention something gets through both communicative (talking about it) and cultural memory (physically recording information)

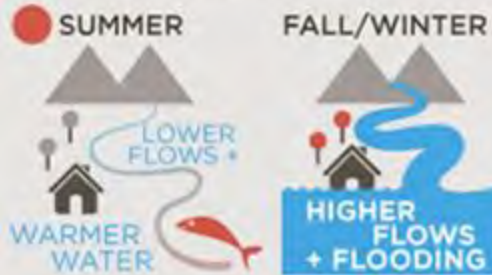
Its Going to Be Warmer, Wetter & Stormier in NL

INCREASED HEAT

By mid-21st century, temps are projected to rise 2-3 °C in Newfoundland and 3-4 °C in Labrador



EXTREME RIVER CONDITIONS



INCREASED OCEAN SURFACE TEMPERATURE

Warmer ocean means more intense storms & hurricanes



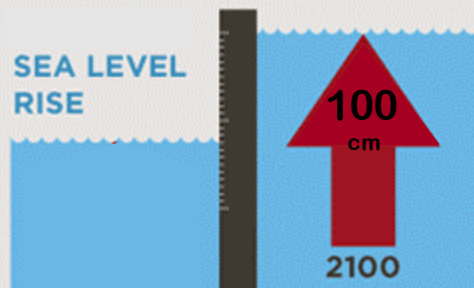
HEAVY RAIN EVENTS ARE INCREASING

12-33% increase in rain/snow by 2100



RIISING SEA LEVEL

SEA LEVEL RISE



LESS SNOW

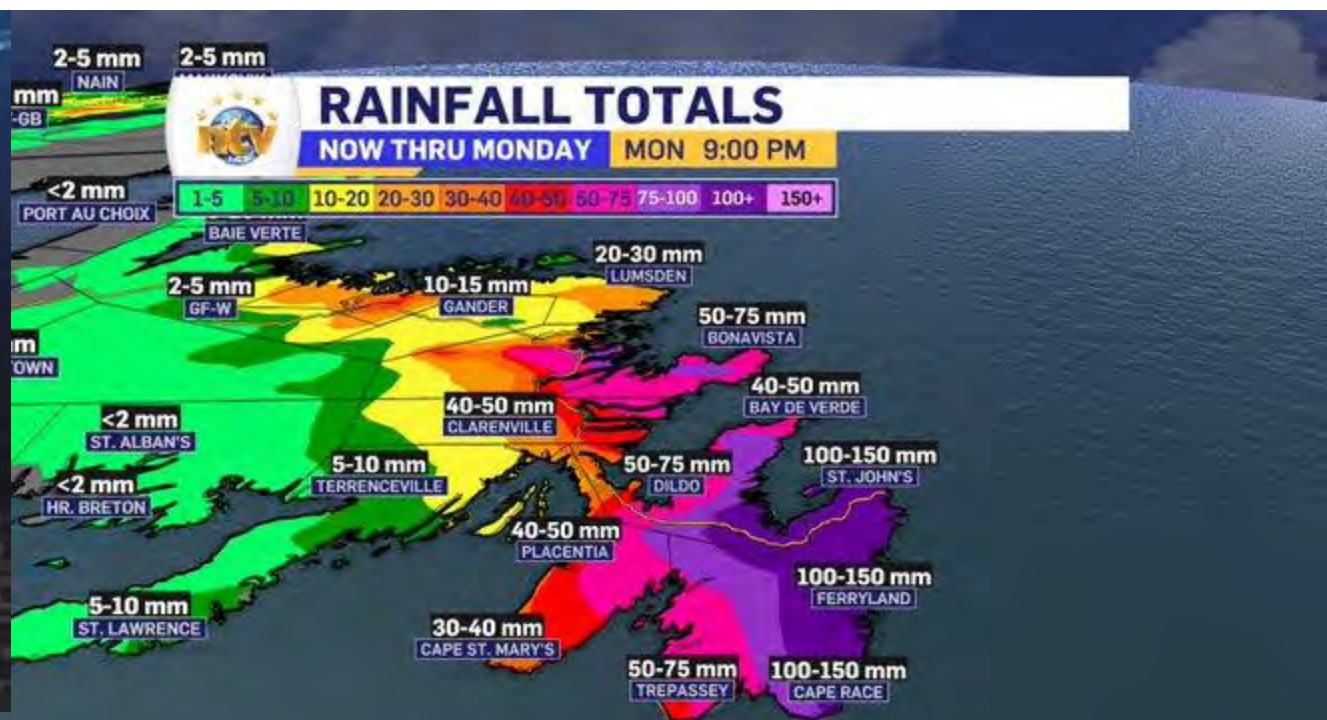
Less snowpack and earlier melting of snowpack



MORE FREQUENT COASTAL FLOODING

Increased frequency of storm surge events





Do You Have Pictures of Past Flood Events?

Contact: Paula Dawe
pauladawe@gov.nl.ca
(709) 729-4048



Brigus, 1907



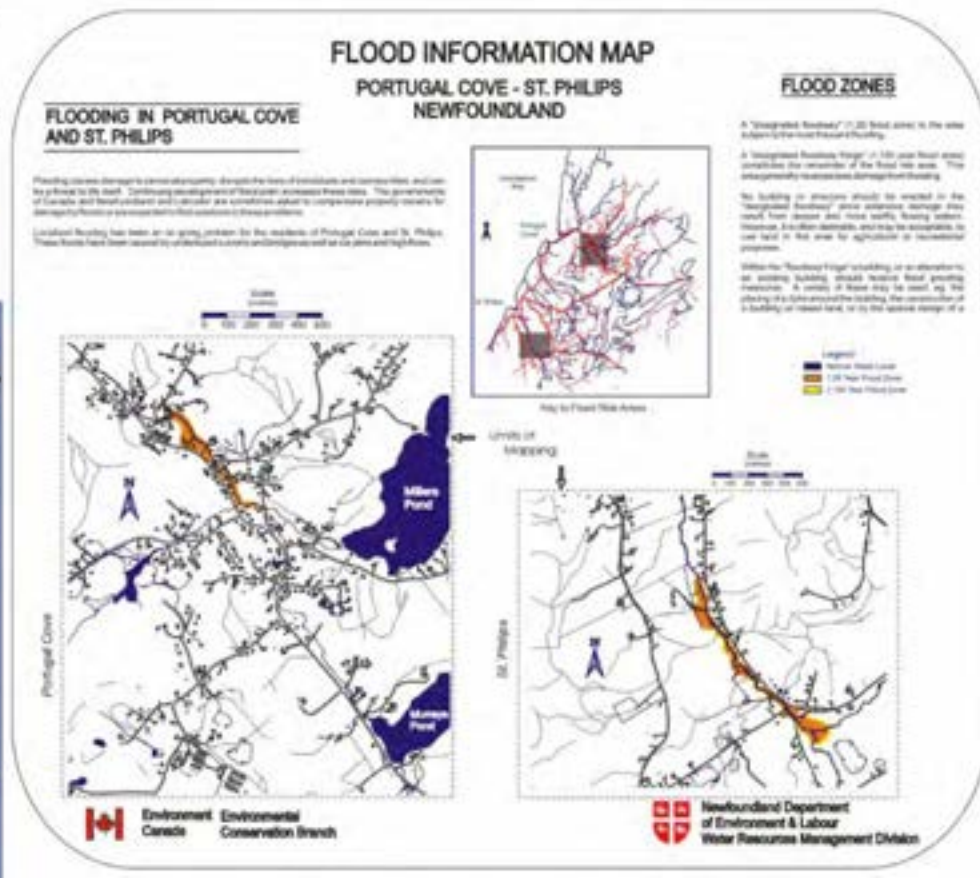
Badger, 1983



Port aux Basques, 2022

What is Involved in Floodplain Mapping?

Funding for Flood Studies



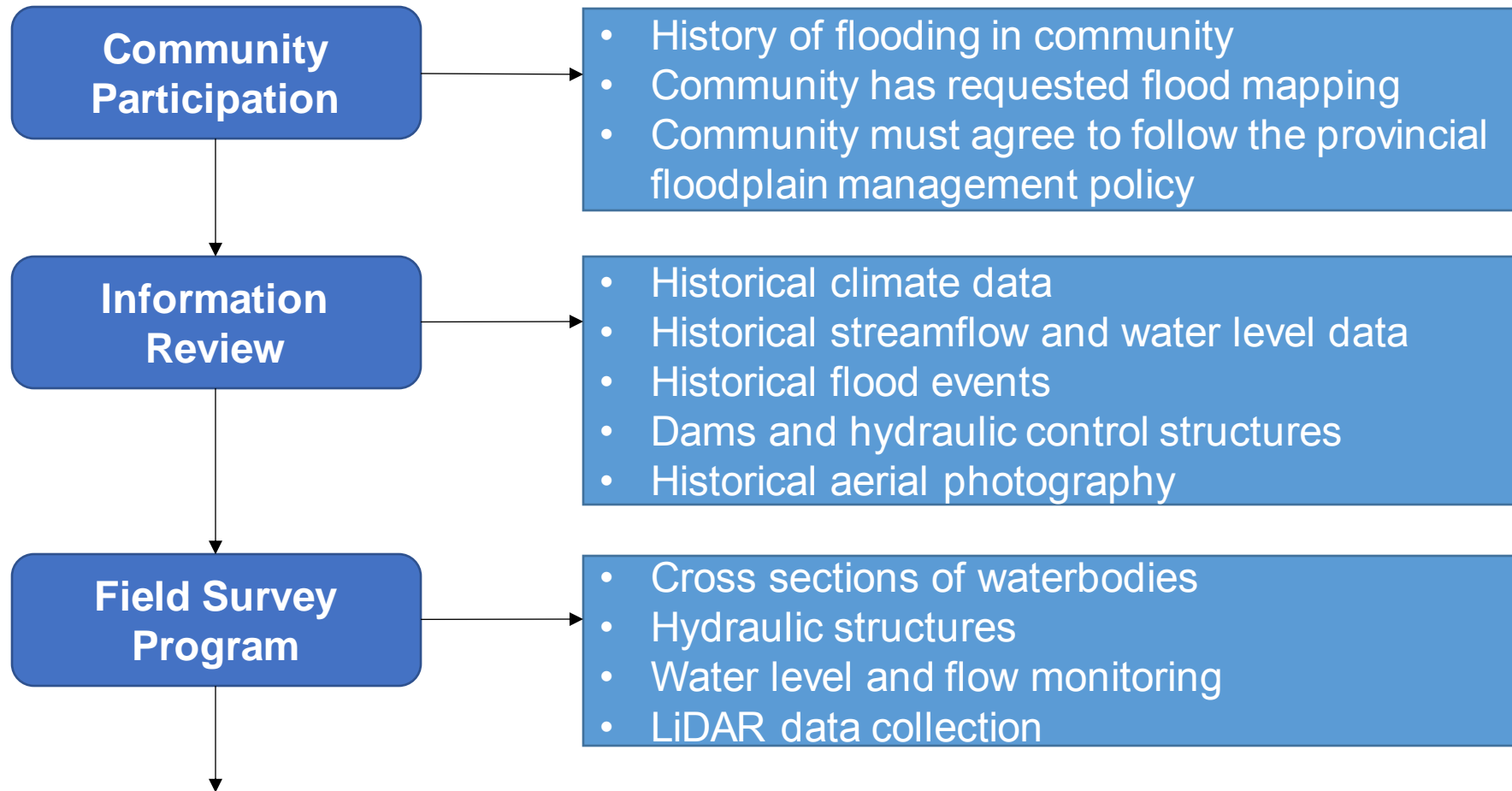
- 1981-1993 Canada-Newfoundland Flood Damage Reduction Program (CNFDRP)
 - First flood risk mapping study undertaken by province in 1984
- 1993-1996 Canada-Newfoundland "General Agreement Respecting Water Resource Management"
- Funded by province
- 2015-2020: National Disaster Mitigation Program (NDMP) 2022
- 2022- onwards: Federal Flood Hazard Identification and Mapping Program (FHIMP)

Flood Mapping Menu

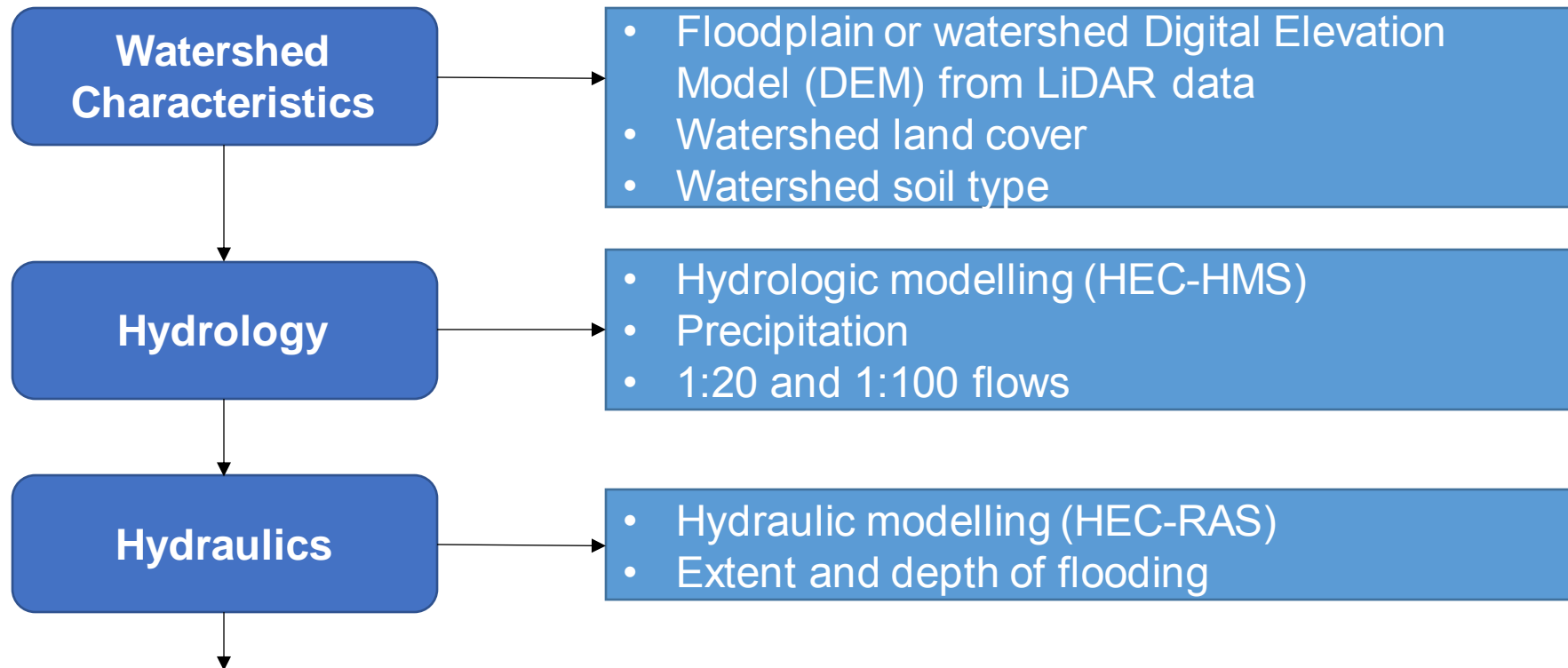
1. Event Likelihood
 - 1:20, 1:100 AEP, return period
2. Climate Change
 - Change in discharge, sea level rise
3. Topography
 - LiDAR, DEM, flood defenses
4. Land cover
 - Aerial photos, satellite imagery
5. Future Land Use
6. Infrastructure Assessments
 - Culverts, bridges
7. Hazard Mapping
 - Depth and velocity
8. Coastal Storm Surge and Waves



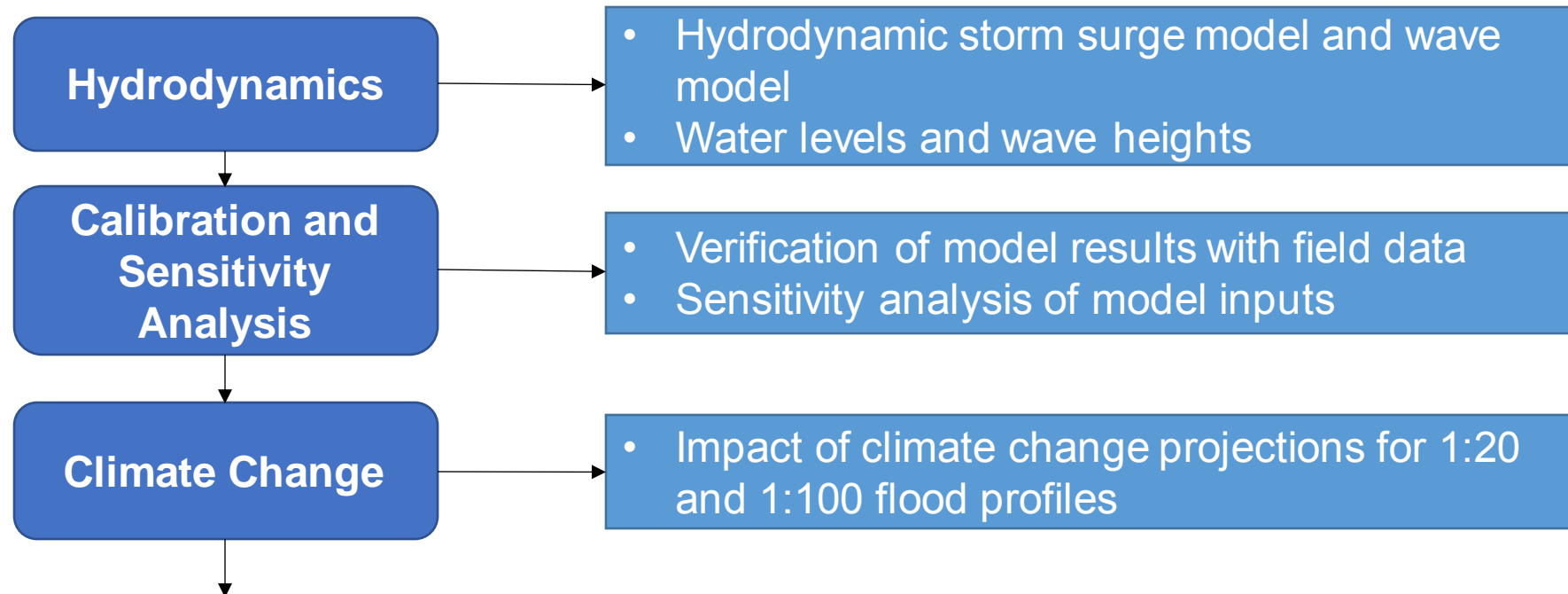
Flood Extent Mapping Process: 1



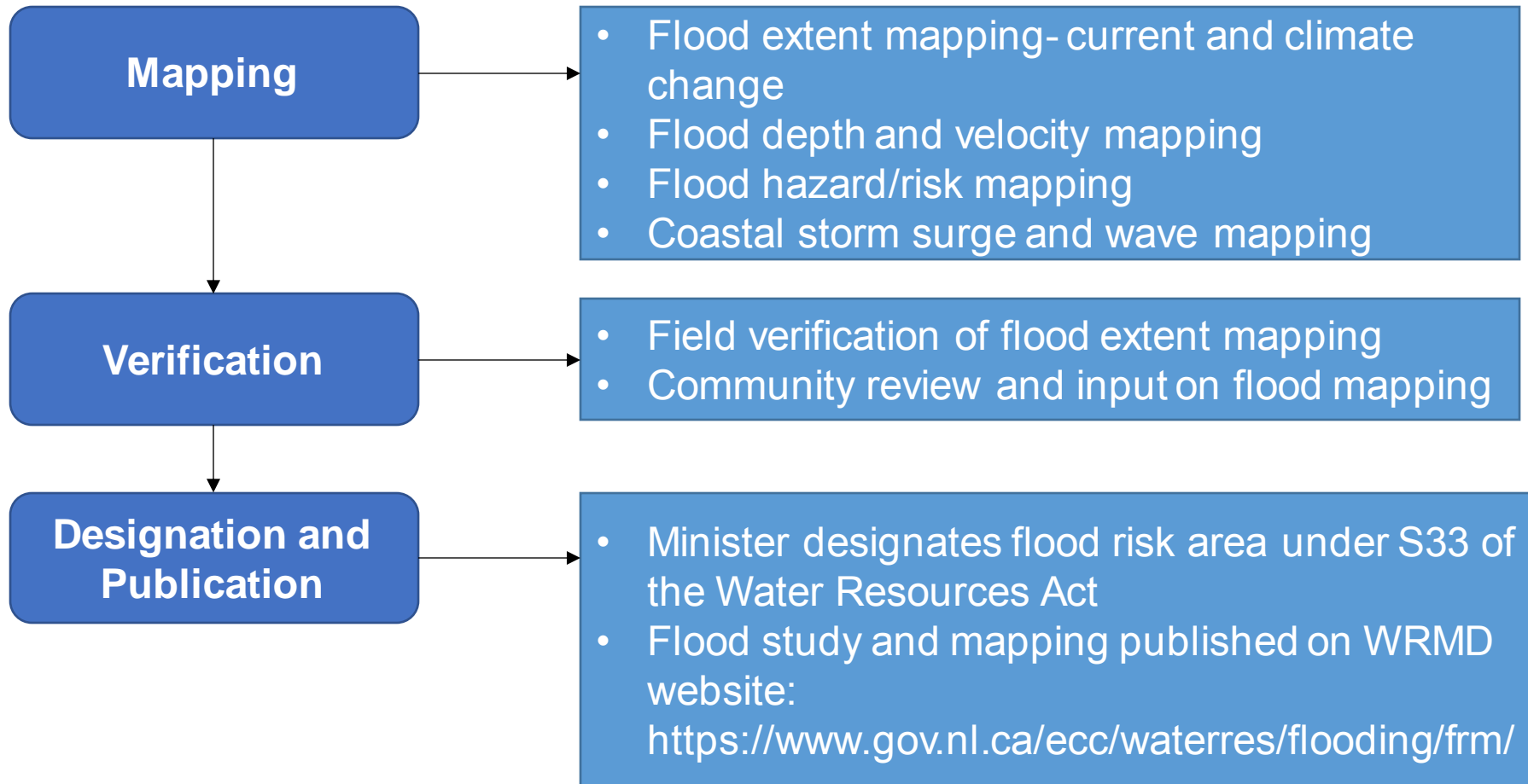
Flood Extent Mapping Process: 2



Flood Extent Mapping Process: 3



Flood Extent Mapping Process: 4



Deliverables

1:20 and 1:100 AEP floodplain maps

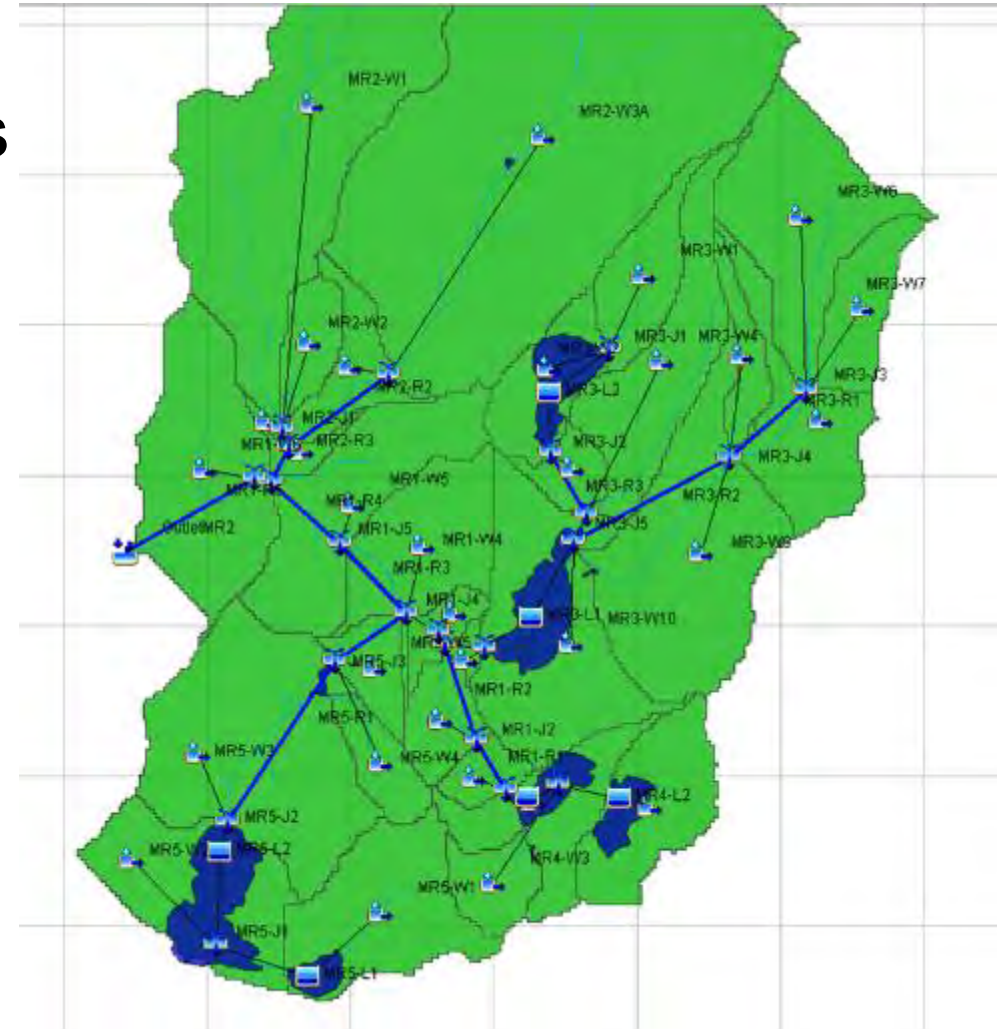
1:20 and 1:100 AEP Climate Change floodplain maps

1:20 and 1:100 inundation depth and velocity mapping

1:20 and 1:100 hazard mapping

+ Report, Appendices, Model and Data

<https://www.gov.nl.ca/ecc/waterres/flooding/frm/>



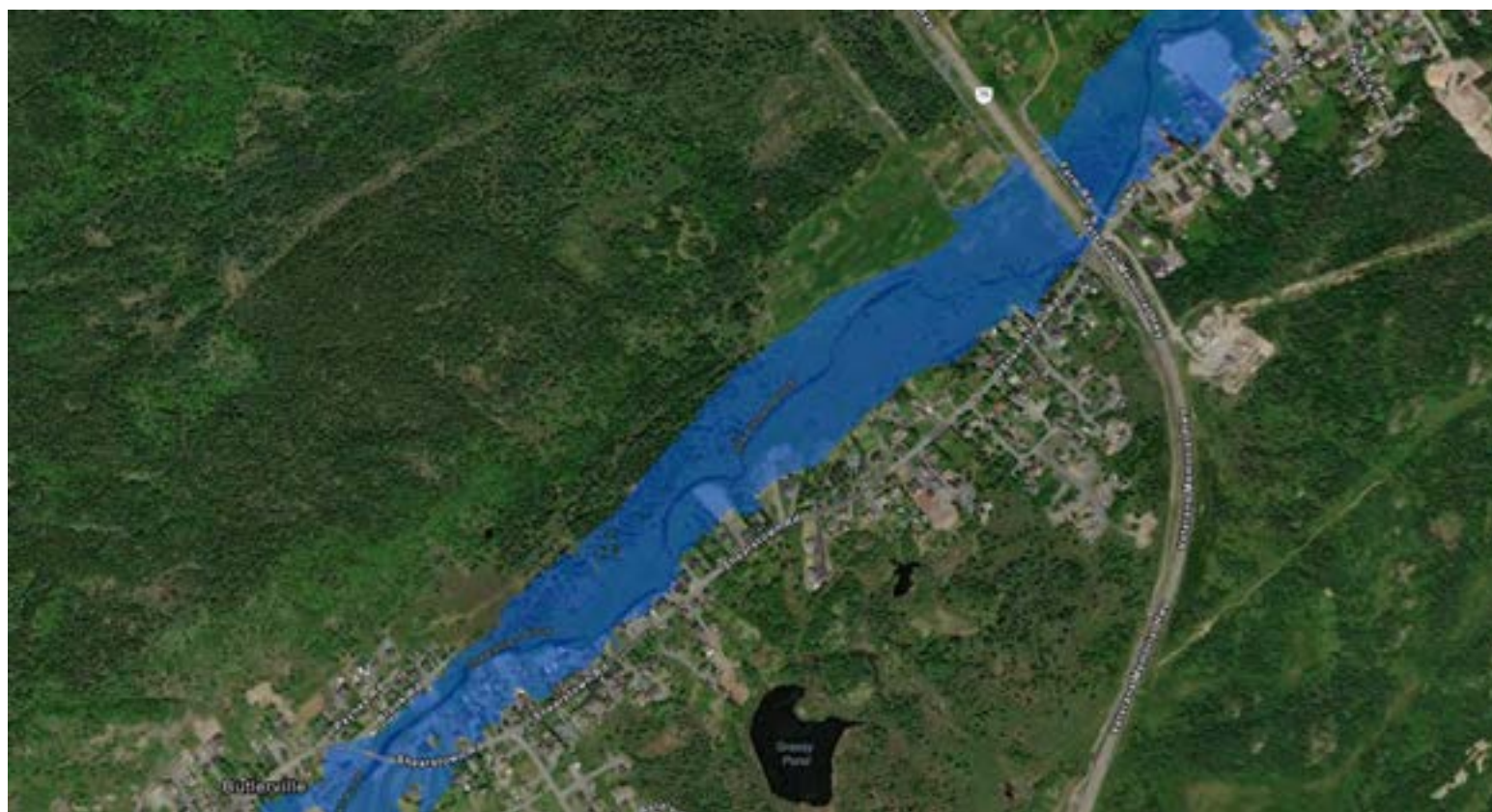
1:20 Flood Mapping



1:100 Flood Mapping



1:100 Climate Change Flood Mapping



Climate Change








Table 8.2 Comparison of Peak Instantaneous Flows for Current and Future (2050) Climate Conditions

Location	HEC-HMS Element	Drainage Area	Return Frequency	Existing Climate	Projected Climate	Difference
		(km ²)	(yrs)	(m ³ /s)	(m ³ /s)	(%)
PT1	MR1-J6A	17.00	1:20	25.2	32.9	31
			1:100	39.1	50.9	30
PT2	MR1-J3A	6.50	1:20	10.6	14.5	37
			1:100	17.2	23.2	35
02ZM006	MR2-W3A	3.63	1:20	5.1	6.5	27
			1:100	7.8	9.9	27
PT3	BC2-J1	0.67	1:20	1.8	2.1	17
			1:100	2.3	2.7	17
PT4	GC1-J5A	2.41	1:20	4.9	6.0	22
			1:100	7.2	8.9	24
PT5	BR1-J8A	34.59	1:20	10.4	13.9	34
			1:100	17.4	22.8	31

Due to climate change, flow will increase by 17-37%

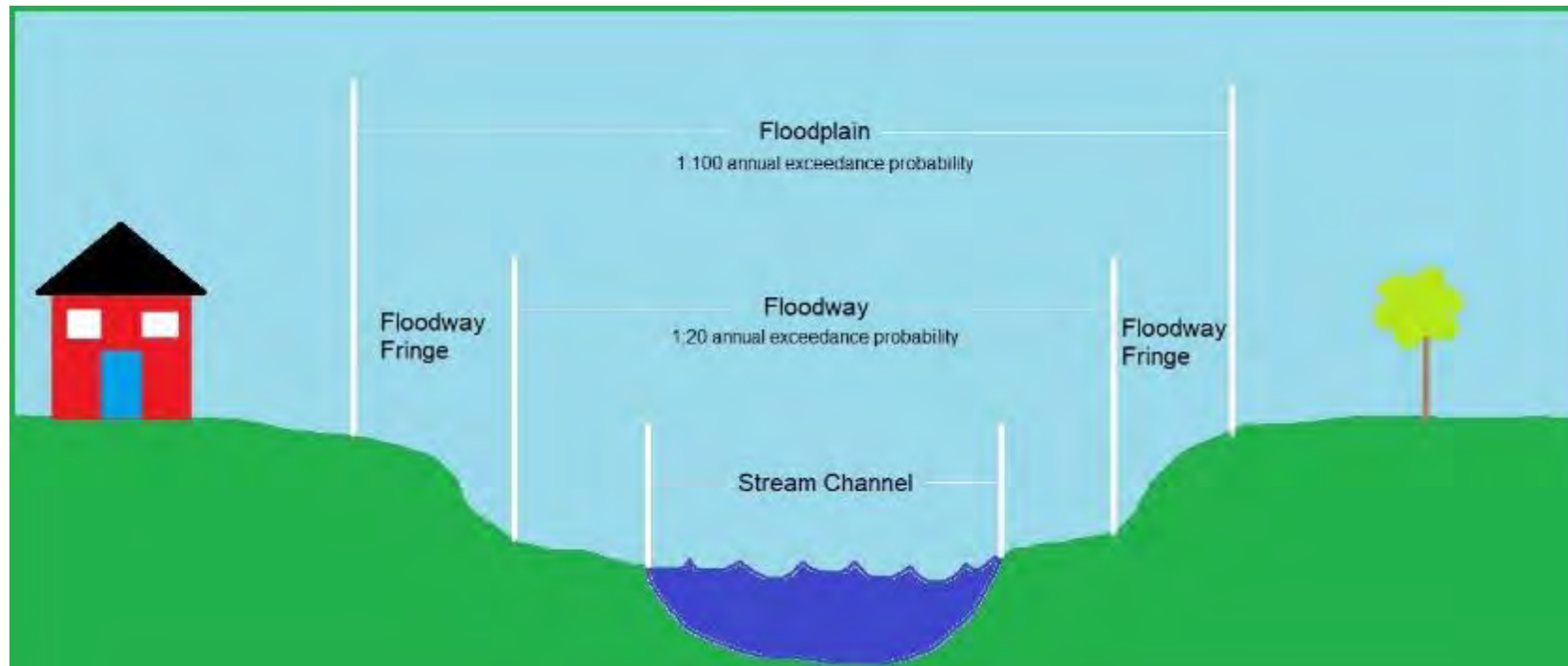
1:100 CC Flood Hazard Map

LEGEND:

-  River/Creek Centreline
-  Limit of Mapping
-  Municipal Boundary
-  Low - Caution
-  Moderate - Danger for Some
(Includes children, the elderly, and the infirm)
-  Significant - Danger for Most
(Includes the general public)
-  Extreme - Danger for All
(Includes the emergency services)



The Floodplain



- Floodplain is 1:100
- Floodway is 1:20

Category	Where Flood Plains are Designated			
	All Flood Plains	Floodway (1:20 year Zone)	Floodway Fringe (1:100 year Zone)	Climate Change Flood Zone
Temporary alterations	Permitted	Permitted	Permitted	Permitted
Non-structural uses	Permitted	Permitted	Permitted	Permitted
Structures related to use of water resources	Permitted	Permitted	Permitted	Permitted
Minor structural or other projects	Permitted	Permitted with conditions*	Permitted with conditions*	Permitted with conditions*
Other structures not used primarily for residential	Permitted with conditions*	Permitted with conditions*	Permitted with conditions*	Permitted with conditions*
Industrial Uses related to shipping (marine only)	Permitted with conditions*	Permitted with conditions*	Permitted with conditions*	Permitted with conditions*
Other industrial and commercial	Not Permitted	Permitted with conditions**	Permitted with conditions*	Permitted with conditions*
Institutional	Not Permitted	Not Permitted	Not Permitted	Not Permitted
Residential and other institutional	Not Permitted	Not Permitted	Permitted with conditions*	Permitted with conditions*
Hydraulic Structures	Permitted	Permitted	Permitted	Permitted

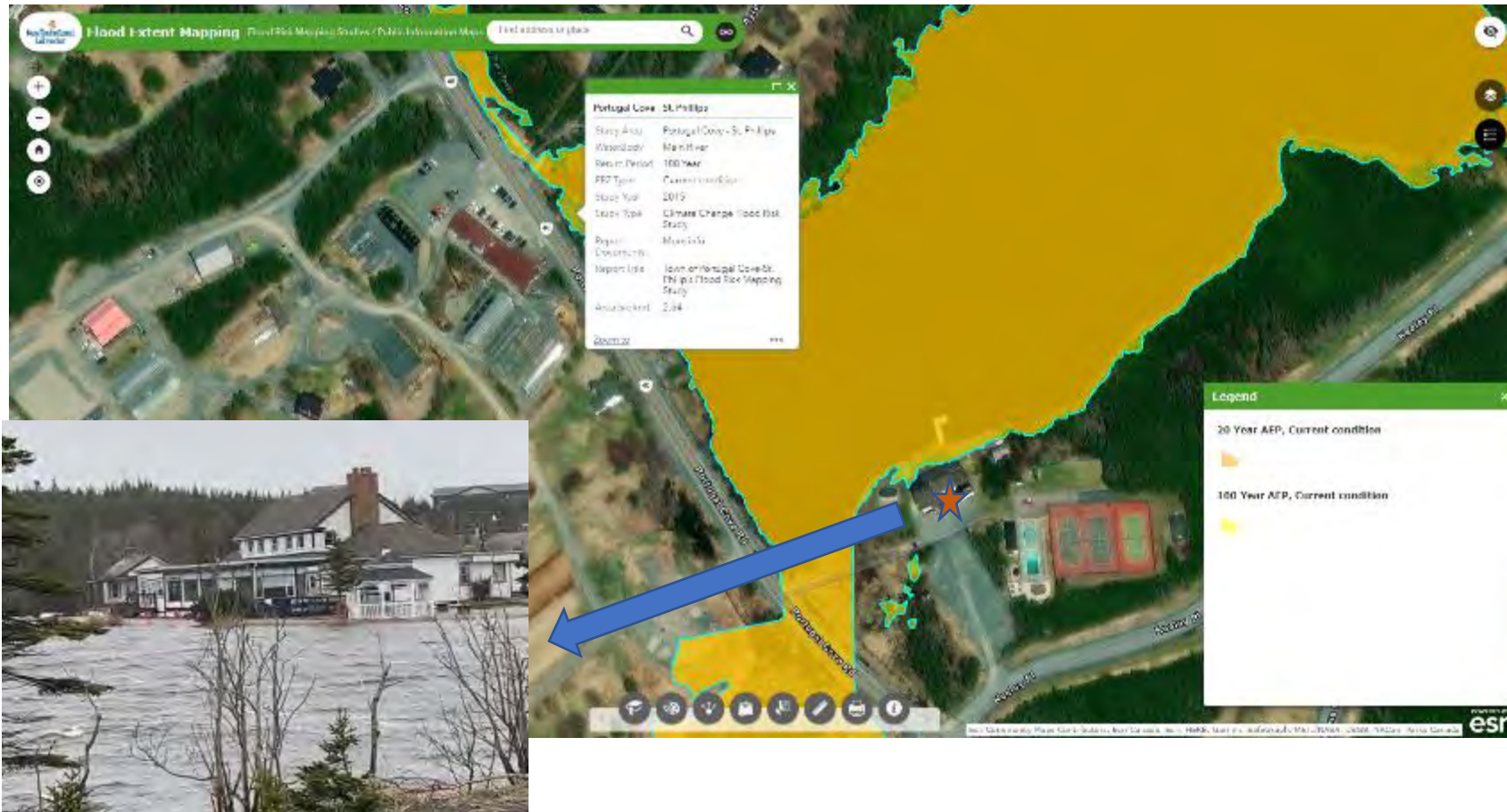
Floodplain Policy

- Section 33 of the Water Resources Act allows the Minister to designate flood risk areas
- Policy for Flood Plain Management regulates development in flood risk areas
 - <https://www.gov.nl.ca/ecc/water/res/regulations/policies/flood-plain/>
- Urban and Rural Planning Act allows municipalities to develop municipal plans and development regulations
- Towns can adopt flood risk zones in their municipal plan

Objectives of Floodplain Management Policy

- To prevent loss of human life and avoid personal hardships
- To minimize flood damage to properties, infrastructure and the environment
- To restrict activities which would degrade water resources
- To maintain the natural capability of waterways to convey flood flows
- To minimize disruption of transportation, social and business activity
- To minimize costs to the taxpayers of Newfoundland and Labrador

Publication of Flood Extent Mapping



- All FRM studies, maps and GIS files are available on WRMD website:
 - <http://www.mae.gov.nl.ca/waterres/flooding/frm.html>
- Flood Extent Mapping Application:
 - [Flood Extent Mapping \(arcgis.com\)](http://arcgis.com)
- Land Use Atlas:
 - <https://www.gov.nl.ca/landuseatlas/details/>

How Does Floodplain Mapping Impact My Town?

Implications for Town

- Town agreed to follow the province's policy for floodplain management for designated flood risk areas
 - Have accepted tradeoff between flood risk and development
- Town will have reduced vulnerability to:
 - Flood damage to property and infrastructure
 - Loss of life, injury and personal hardship
 - Costs of emergency assistance, clean-up and remediation



Land Use Planning

- Floodplain can be left undeveloped or only low consequence development allowed, such as parks and walking trails
- Areas for future community development such as new subdivisions can be located outside of the floodplain



Changes to Municipal Plan

- Adopt flood zones into municipal plan
- Development regulations for the new flood zones
- Process initiated with the Department of Municipal and Provincial Affairs (MAPA), Local Governance and Land Use Planning Division
 - Several legislative steps to the process laid out in the Urban and Rural Planning Act
 - Public consultation component through which the public can receive notification that their property is in a designated floodplain
- Adopt a net zero runoff policy to ensure that any new developments do not result in net increases of stormwater discharge to rivers and streams in the community



Municipal Infrastructure



- Upgrade infrastructure (culverts and bridges) that have been identified as not having sufficient capacity from the flood study
- Consider construction of flood mitigation measures to protect the community and structures from flooding (e.g., retaining walls, river diversions, dykes or berms to confine extreme flood flows to the river channel)
- Assess the buildings and infrastructure that will be affected by the 20 and 100 year floods
- Develop a municipal stormwater drainage system for the town
- Reduce infiltration and inflow into sanitary sewers
- Ensure stormwater sewer systems have sufficient capacity
- Apply for funding

Property Assessments



Municipal Assessment
Agency Inc.

- Assessed property value may be affected once a municipality has adopted the designated floodplain in their municipal plan
- Factors that may affect the assessment include
 - Change in land use zone
 - How much land is affected by the floodplain designation
 - What type of development is allowed
- Municipalities can engage the Municipal Assessment Agency (MAA) to reassess homes located in the designated floodplain
- A change in assessed property values may have an impact on property taxes

Further Action by Town

- Raise public awareness of newly developed flood risk mapping
- Refer any development applications or building permits within the designated floodplain to the WRMD
- Incorporate flood hazard maps into the municipal Emergency Management Plan
- Periodic updating of floodplain mapping

Enter
Municipal Logo
Here
(If available)

The (Enter Municipal Name Here)

**(Regional) Municipal Emergency
Management Plan**
Template Version: 1.0 (December 2018)

This version was adopted by council on
insert date here

Approved date of council meeting where this version was adopted:

Anything highlighted in Grey in this MEMP is for explanatory
purposes and must be deleted/changed prior to approval by council.

How Does Floodplain Mapping Impact Residents?

Floods Impact Property and People



Am I in the Floodplain?



[Flood Extent Mapping \(arcgis.com\)](https://arcgis.com)

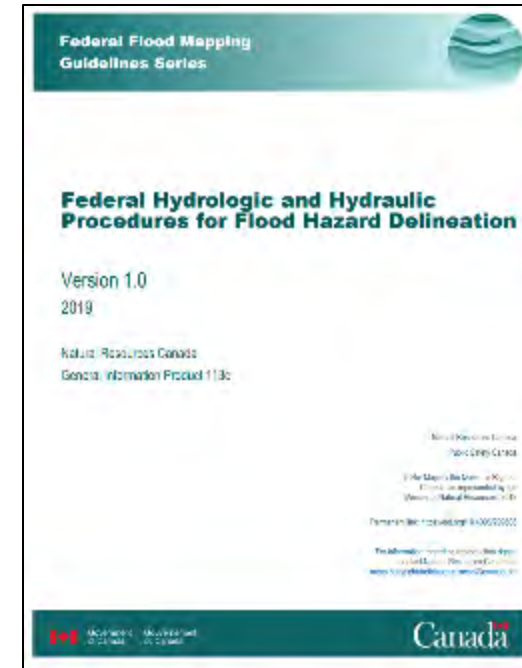
Common Questions & Comments

Do I have to move if my home is located in the floodplain?

- No, existing homes are considered grandfathered

I do not agree that my property is located in the floodplain.

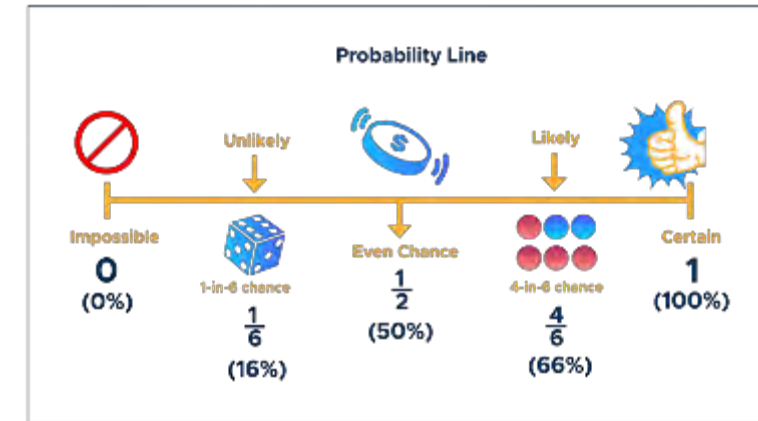
- Mapping has been developed by professional engineers following industry-standard methodologies
 - <https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/dsstr-prvntn-mtgn/ndmp/fldpln-mppng-en.aspx>
- Any issues with the flood mapping produced should be brought to the attention of the town, province, and engineering consultant responsible for the mapping



Common Questions & Comments

What is the risk my property might flood?

- 5% probability that you may experience flooding in any given year in a 1:20 year flood zone
- 1% probability that you may experience flooding in any given year in a 1:100 year flood zone
- A home with a 30 year mortgage in a 1:100 year floodplain
 - At least a 26% chance home will be flooded over this 30 year period



Common Questions & Comments

What can I do to protect my home against flooding?

- Use appropriate floodproofing measures
- Guidance on how to floodproof your property:
<https://www.gov.nl.ca/ecc/files/waterres-flooding-floodproofing-protect-your-home-against-flooding-.pdf>
- A property owner is responsible for floodproofing their own property



Common Questions & Comments

Will I be able to get home flood insurance?

- Insurance companies offer different types of flood insurance (e.g., flood caused by plumbing issues, sewer backup, overland flood)
- You may not be eligible for overland flood insurance if you are located in a designated flood zone, or you may have your premium reassessed
- Flooding caused by storm surges, tsunamis or tidal waves is typically not covered by insurers
- Check with your insurer
- <http://www.ibc.ca/on/>

Common Questions & Comments

Will being in the floodplain affect the value of my home?

- There are studies that have shown that property in flood zones sells for less and appreciates slower over time than similar property outside flood zones

What do I do if my home is damaged or destroyed in a flood?

- Contact your insurer to see if there is any coverage available
- When authorized by the province in response to a specific emergency financial assistance may be provided to eligible residents through the NL Disaster Financial Assistance Program



Common Questions & Comments

How does flood mapping help me as a homeowner?

- Provides property owners or those seeking to become property owners with the information needed to make smart decisions:
 - Personal flood risk management- do I want to live in a floodplain?
 - Floodproofing- extent and depth of flood water
 - Financial planning for floodproofing



In Summary

We need to...

- protect the public from the risk of flood events.
- make people more aware of their flood risk.
- reduce flood risk for both current and climate change conditions.
- reduce the damages and disruption caused by flooding.
- incorporate coastal storm surge into flood mapping program.

Is Your Town Interested in Floodplain Mapping?

Contact: Paula Dawe

pauladawe@gov.nl.ca

(709) 729-4048

- WRMD maintains a priority list of communities interested in having floodplain mapping
- Town must agree to the province's policy for floodplain management

Useful Links:

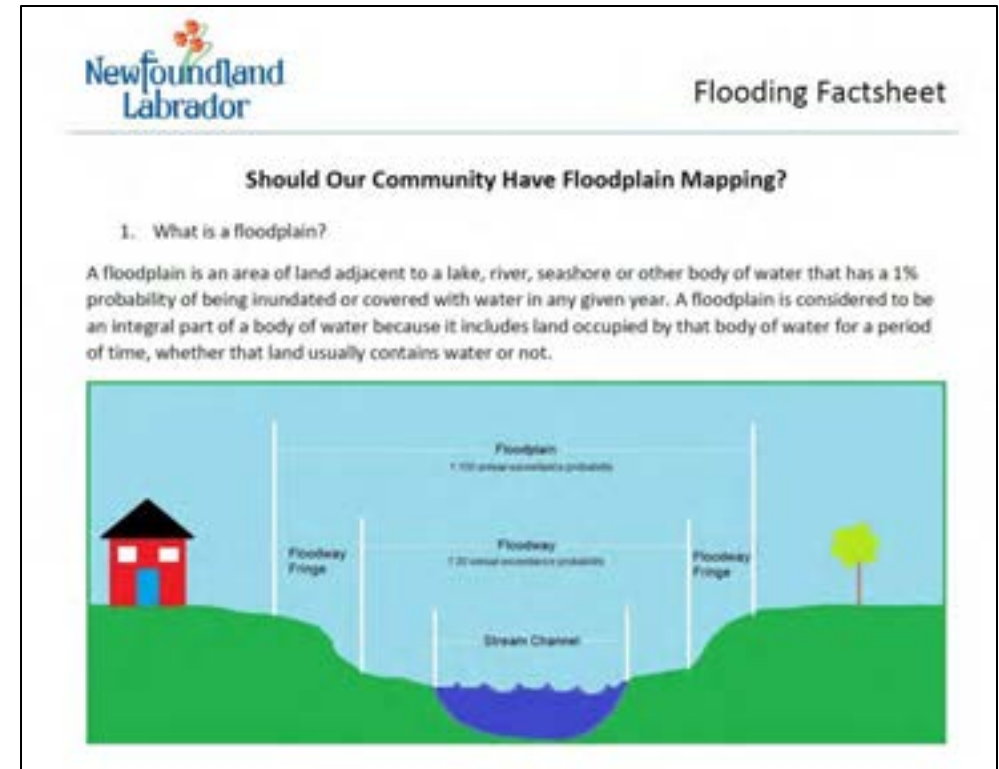
Flood Factsheets:

<https://www.gov.nl.ca/ecc/waterres/flooding/>

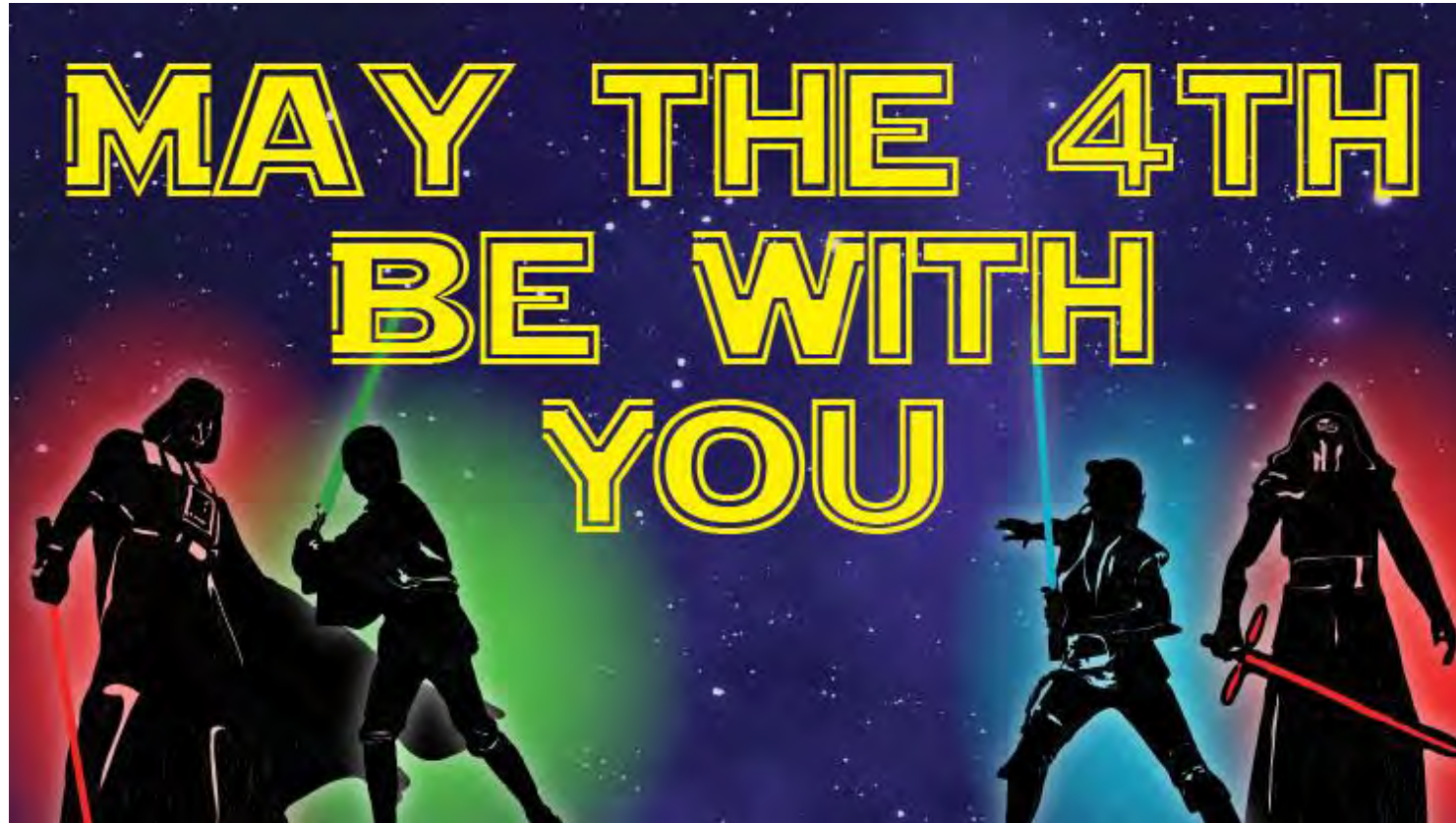
- Should Our Community Have Floodplain Mapping
- Our Community Has Flood Risk Mapping: Now What?
- I Live in a Floodplain: Now What?

The Floodplain Belongs to the River:

<https://www.youtube.com/watch?v=pTYGo3dmCtl>



Thank You



Paula Dawe:
pauladawe@gov.nl.ca