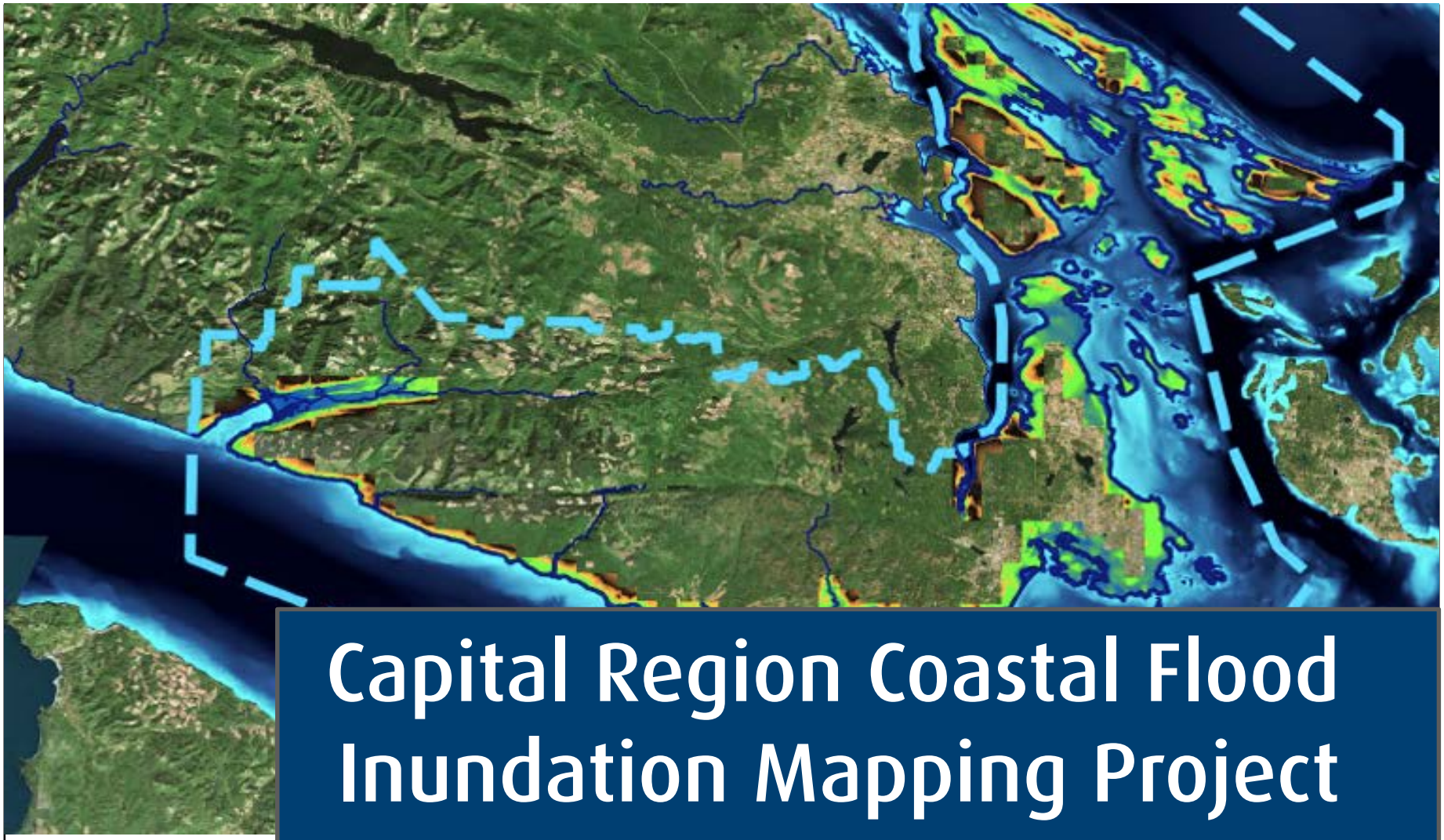


Capital Region Coastal Flood Inundation Mapping Project

July 15, 2020

Legislative Context

→ *British Columbia Local Government Act*: local governments are responsible for understanding and managing the risk of flood events through land use planning and regulations.

→ Under the *Emergency Program Act 1996*, local governments are responsible for incorporating potential emergencies and disasters that could affect all or any part of their jurisdictional area in emergency plans for which the local authority has responsibility.

Project Process

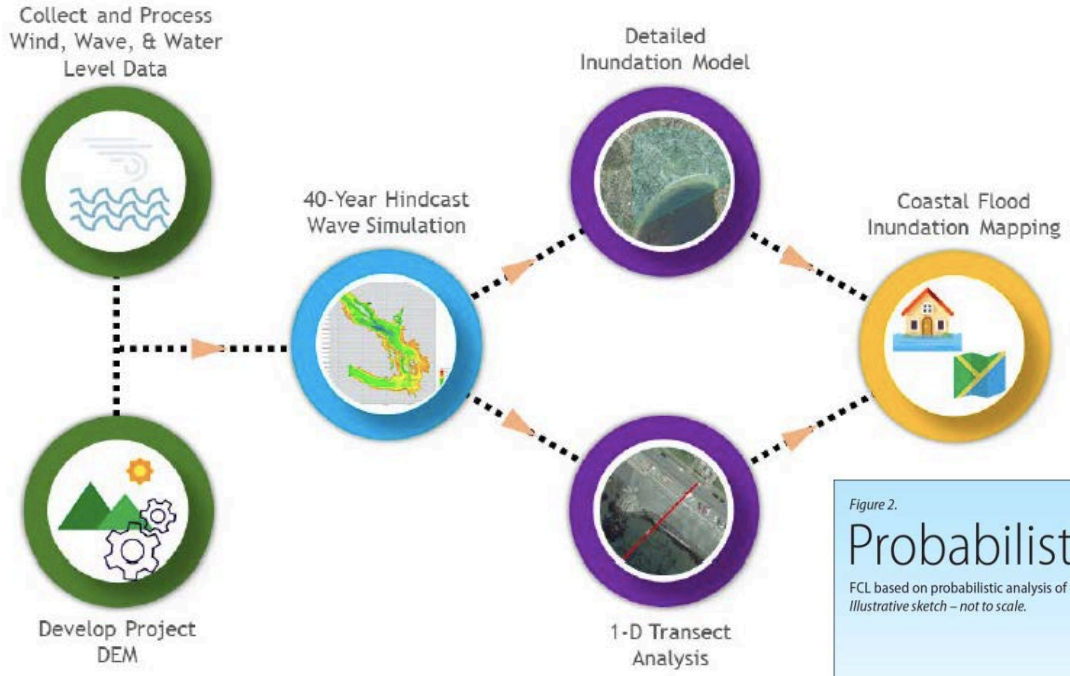
→ The CRD established an **inter-municipal, inter-disciplinary project team** to scope and execute project.

→ The *Capital Region Coastal Flood Inundation Mapping Project* was **completed to inform the CRD, its local governments, First Nations and other interested stakeholders** of the future hazards associated with coastal flooding related to sea level rise and tsunamis.

The Project

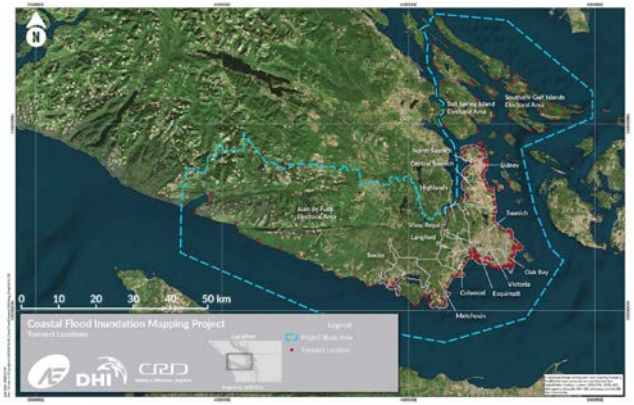
1. Digital Elevation Model (DEM) Development
2. Sea Level Rise Modelling and Mapping Report
3. Tsunami Modelling and Mapping Report

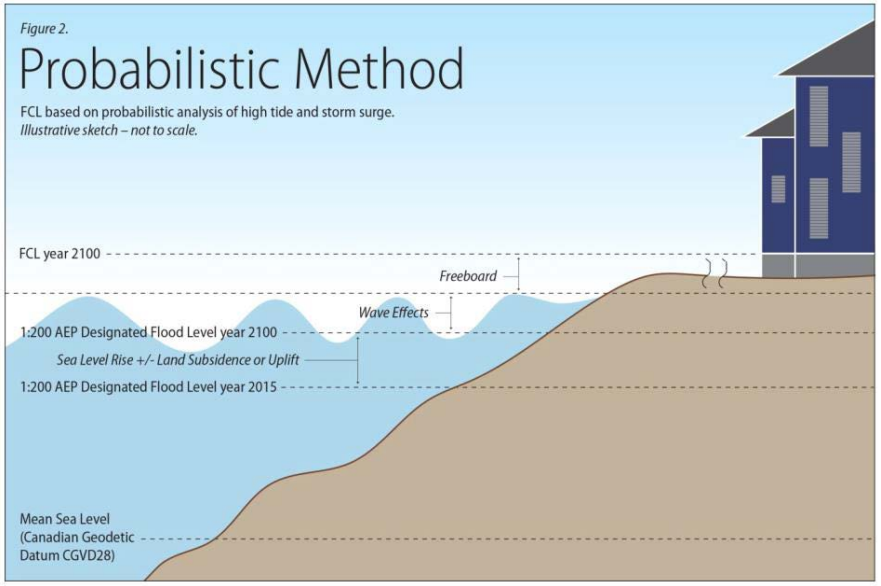
Sea Level Rise Methodology



→ 199 transects for regional coverage

→ five detailed sites





Provincial Probabilistic Method for Derivation of FCLs (BC MoE, 2011b)

Sea Level Rise Summary Findings

Summary of 95%ile Flood Construction Levels by local government/electoral area

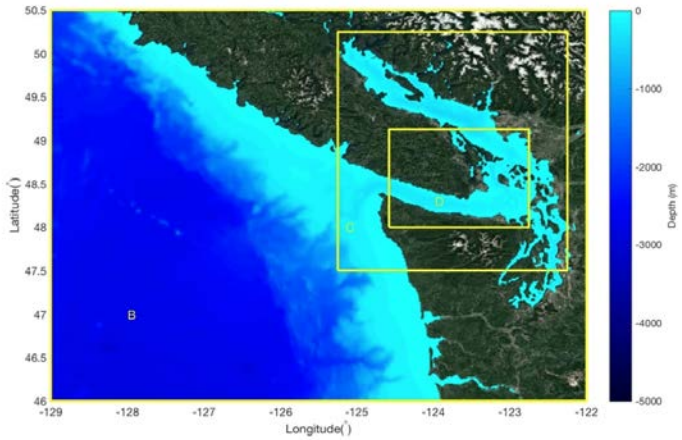
Local Government / Electoral Area	0.0 m RSLR FCL (m CGVD2013)	0.5m RSLR FCL (m CGVD2013)	1.0 m RSLR FCL (m CGVD2013)	2.0 m RSLR FCL (m CGVD2013)
Central Saanich	3.93	4.43	4.89	5.67
Colwood	3.24	3.70	4.35	5.20
Esquimalt	3.95	4.45	5.65	6.55
Highlands	3.84	4.34	4.84	5.34
Juan de Fuca Electoral Area	4.39	4.90	5.38	6.48
Langford	2.76	3.27	3.77	4.83
Metchosin	3.80	4.30	4.86	5.92
North Saanich	4.70	5.21	5.72	6.33
Oak Bay	4.99	5.39	5.89	6.71
Saanich	4.15	4.66	5.17	6.18
Salt Spring Electoral Area	4.29	4.64	5.21	5.91
Sidney	3.51	3.99	4.29	5.31
Sooke	3.23	3.73	4.23	5.23
Southern Gulf Islands Electoral Area	4.82	4.90	5.28	6.44
Victoria	4.28	4.69	5.60	6.62
View Royal	4.86	4.94	5.01	5.16

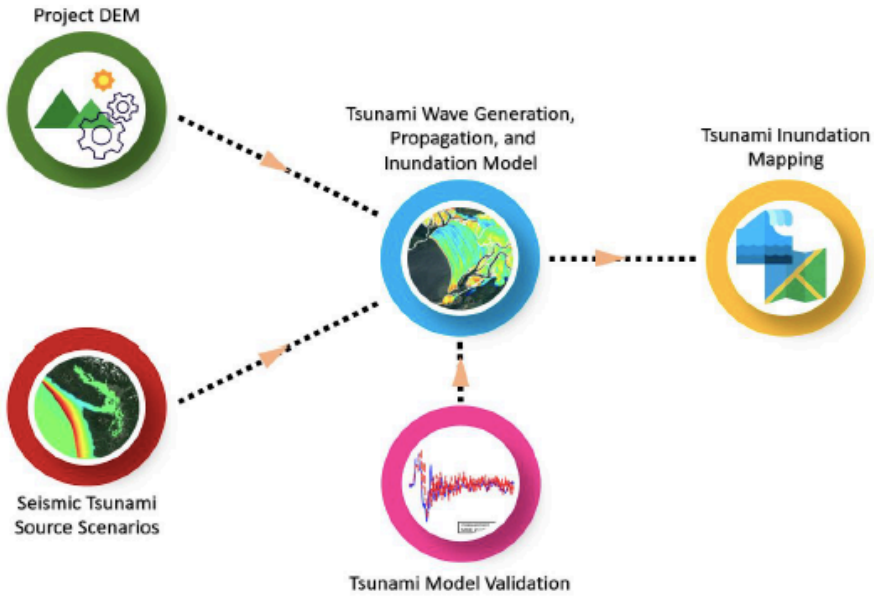
→ The majority of the capital region's coastline is quite elevated

→ Low-lying areas in the region are susceptible to coastal storm flooding

→ Should consider tsunami in flood construction levels (FCLs)

Tsunami Methods





→ 11 tsunami scenarios

→ Entire region modelled to 30 m cell resolution (1arc-second)

→ Five areas were selected for detailed inundation modelling, resolution of 4 m

Tsunami Methods Continued

Source	Abbrv.	Magnitude	Probability	Comment
Cascadia Subduction Zone, CSZ L1	CSZ – L1	9.1-9.2	2500-yr return period	Worst-case earthquake scenario (L1)
Cascadia Subduction Zone, CSZ Northern Segment	CSZ-NS	8.5-9.0	500-600 yr return period	Rupture of northern segment
Cascadia Subduction Zone, CSZ Central Segment	CSZ-CS	8.5	500-600 yr return period	Rupture of central segment (southern Washington, northern Oregon), identified by Wang et al., 2013
Devil's Mountain Island fault Mw 7.5.	DM1	7.5	2000-yr return period	Worst-case earthquake – Long transpressive rupture (>50 km)
Devil's Mountain Island fault Mw 6.5	DM2	6.5	<2000-yr return period	Middle length transpressive rupture (<50 km)
Southern Whidbey Island fault Mw 7.5	SW1	7.5	2000-yr return period	Worst-case earthquake – Long transpressive rupture (>50 km)
Southern Whidbey Island fault Mw 6.5	SW2	6.5	<2000-yr return period	Shorter transpressive rupture (<50 km)
Alaskan 1964	AL	9.2	500-1000 yr	Same as 1964 earthquake
Aleutian Trench	UN	8.6	unknown	1946 Aleutian Trench earthquake, off Unimak Island
Haida Gwaii	HG1			2012 earthquake
South of Haida Gwaii	HG2			Hypothetical event spanning region between Haida Gwaii failure and Nootka fault

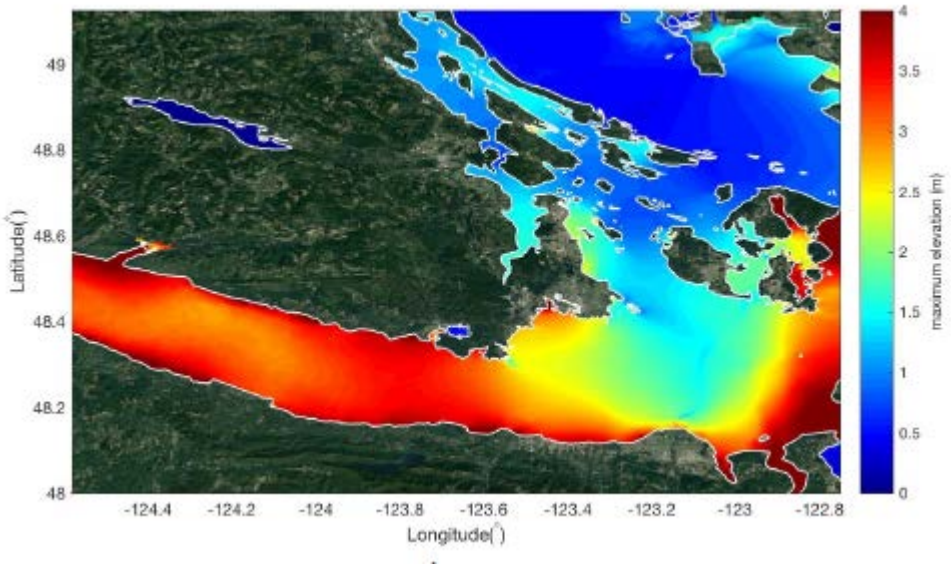
Detailed Modelling Scenario Selection

Table 2-3
Matrix of Detailed Tsunami Inundation Scenarios Modelled at Each Domain

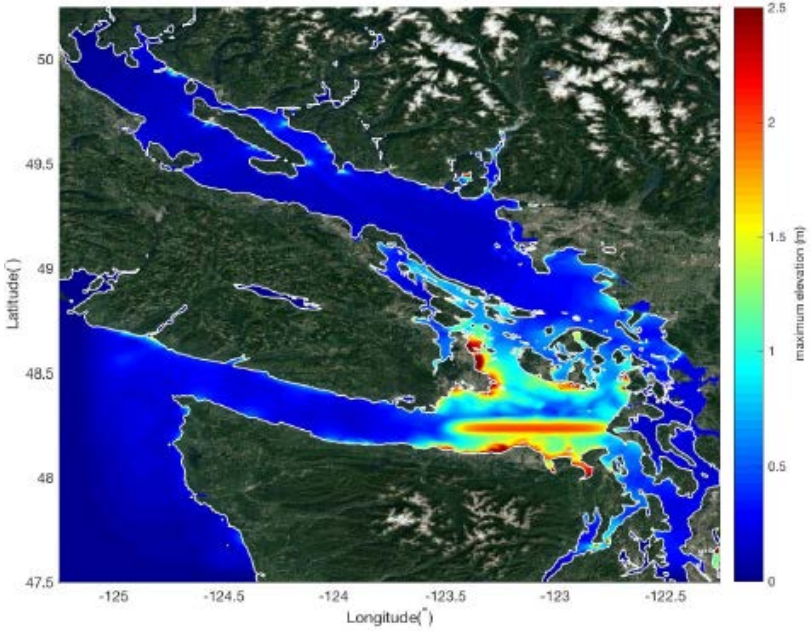
Detailed Modelling Scenarios	Abbrv.	Victoria/ Esquimalt	Saanich/ Oak Bay	Sidney	Sooke	Port Renfrew
Cascadia Subduction Zone - L1 Source	CSZ-L1	✓	✓	✓	✓	✓
Cascadia Subduction Zone - Northern Segment	CSZ-NS	✓	✓	✓	✓	✓
Cascadia Subduction Zone - Central Segment	CSZ-CS	✓	✓	✓	✓	✓
Alaskan 1964	AL	✗	✗	✗	✓	✓
Aleutian Trench	UN	✗	✗	✗	✓	✓
Haida Gwaii	HG1	✗	✗	✗	✗	✗
South of Haida Gwaii	HG2	✗	✗	✗	✗	✗
Devil's Mountain Fault Mw 7.5	DM1	✓	✓	✓	✗	✗
Devil's Mountain Fault Mw 6.5	DM2	✓	✓	✓	✗	✗
Southern Whidbey Island Fault Mw 7.5	SW1	✓	✓	✓	✗	✗
Southern Whidbey Island Fault Mw 6.5	SW2	✓	✓	✓	✗	✗

✓ - Source modelled for that detailed tsunami inundation domain
✗ - Source not modelled for that detailed tsunami inundation domain

Surface Water Elevation



Maximum water surface elevation, CSZ–NS



Maximum water surface elevation, Devil's Mountain Fault, Mw 7.5

Arrival Times - Example

Next Steps

→ Provide reports and associated deliverables to local governments, First Nations and senior levels of government and emergency coordination bodies.

→ Work together to better understand how to prepare for future coastal floods and tsunami risk.
- Inform planning and policy, public education, communication and other related activities.
- Coordination opportunities on local government flood policies (i.e., FCLs).
  - Consideration of tsunami risks within FCLs.

→ Opportunities for collaboration and capacity building with intermunicipal committees.
- Regional Emergency Management Partnership
- Local Government Emergency Program Advisory Commission
- CRD Climate Action Inter-Municipal Working Group

→ Continued work that incorporates best available science.