

POWELL RIVER REGIONAL EMERGENCY PROGRAM

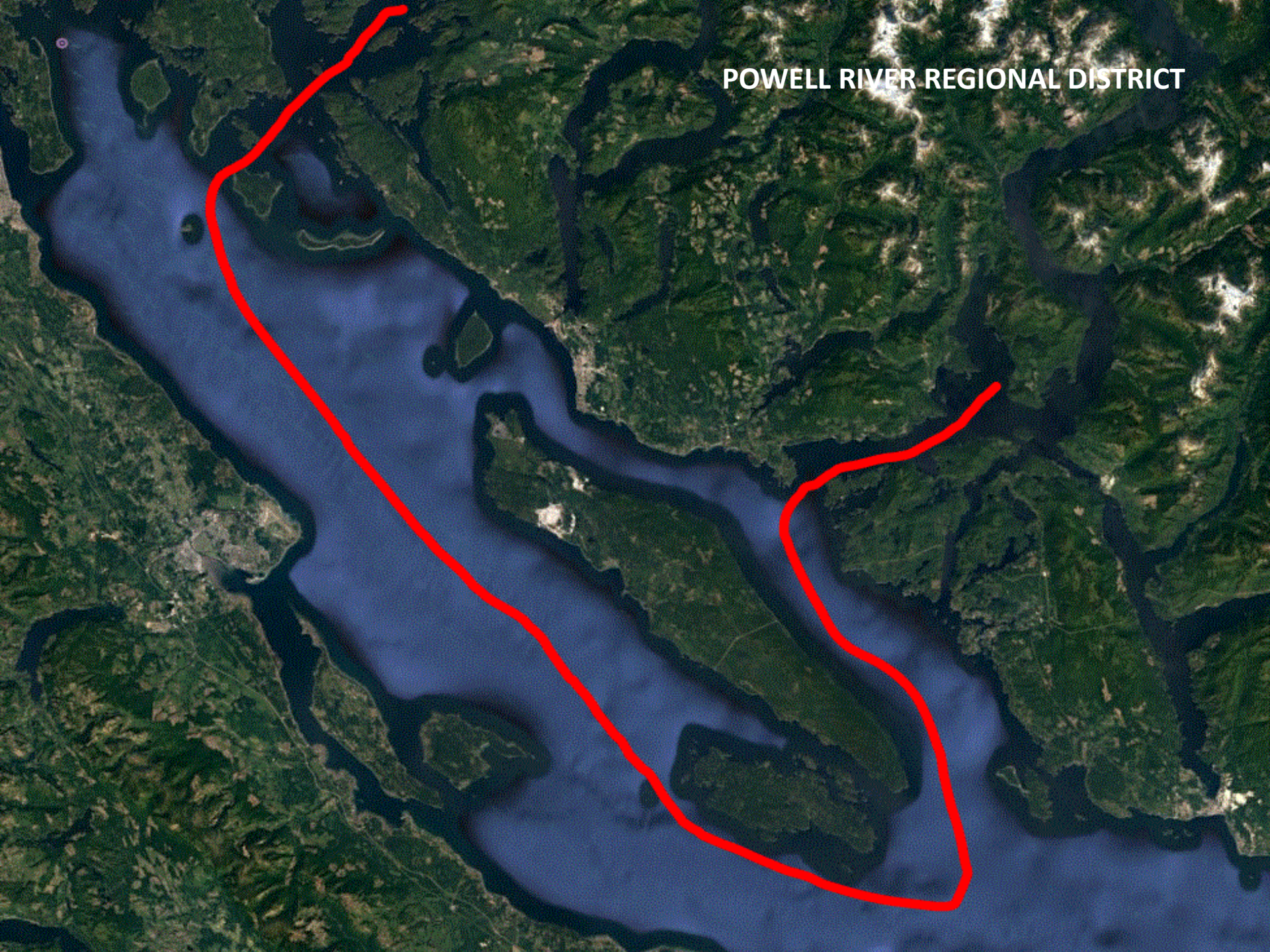
Evacuation Planning

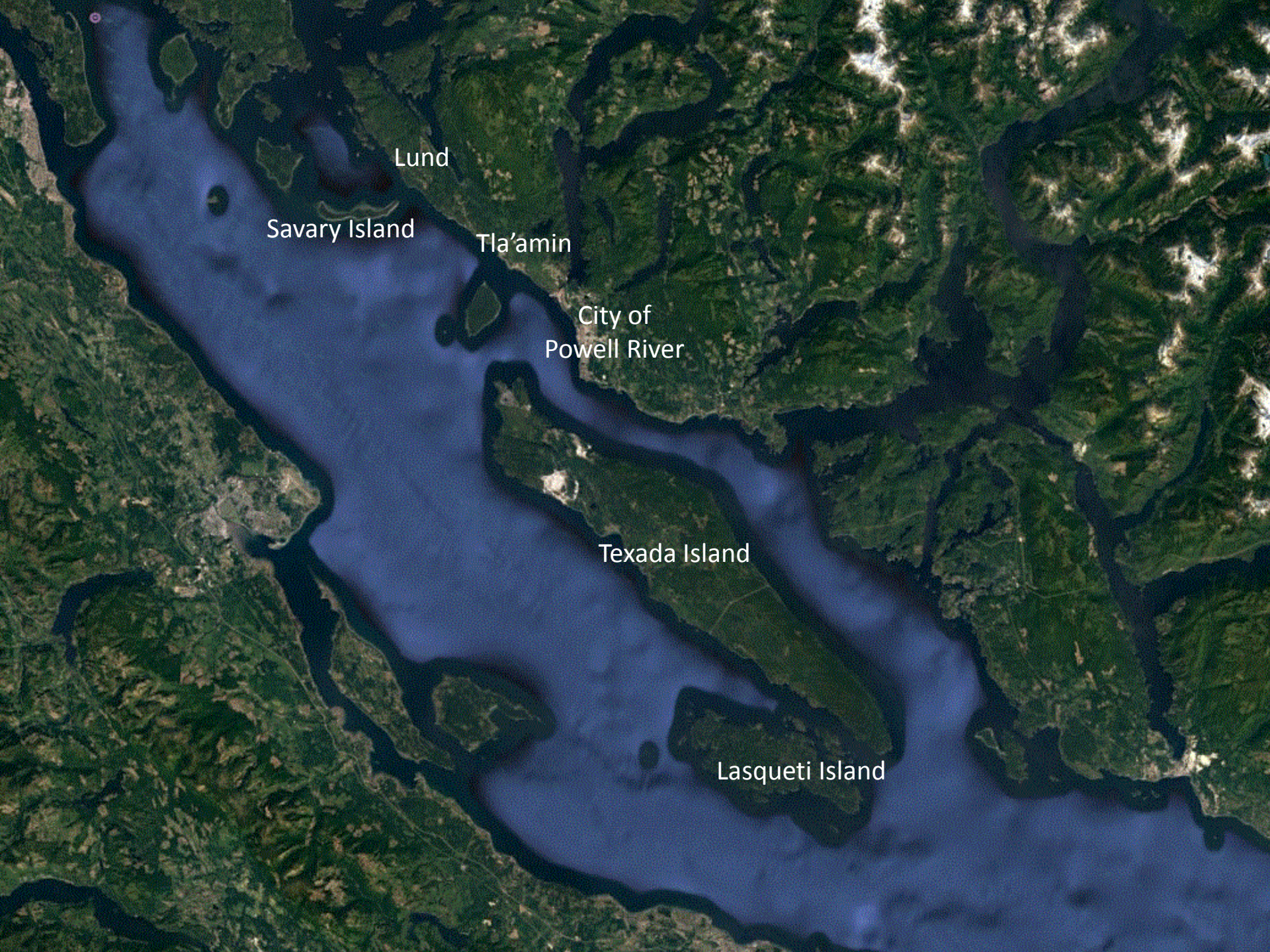


POWELL RIVER
REGIONAL DISTRICT



POWELL RIVER REGIONAL DISTRICT





Lund

Savary Island

Tla'amin

City of
Powell River

Texada Island

Lasqueti Island

PRRD Population Statistics

- City of Powell River 13,500
- Tla'amin Nation 1,000
- Mainland Electoral Areas 5,000
- Savary Island 100
- Texada Island 1,000
- Lasqueti Island 500

Total Year Round 21,100

- *Seasonals estimate 3,000
- *Tourists estimate 1,000

Worst Case Scenario Total 25,000

Air and Maritime Transport Routes

Lund

Westview

YPW

Blubber Bay

Saltery Bay

Earls Cove

Little River

YGB

False Bay

Langdale

French Creek

Horseshoe Bay



Air Transport Capacities:

YPW: 3,900 ft runway: limited to smaller aircraft



Air Transport Capacities:

YGB: 3,000 ft runway: limited to smaller aircraft



Maritime Transport Routes:

Route operated by BCFC:	Regular Vessel	Capacity
1. Westview to Little River	Salish Orca	600
2. Saltery Bay to Earls Cove	Island Sky	450
3. Westview to Blubber Bay	N. Island Princess	293
	Total	1,343

Non-BCFC

1. Savary Island to Lund	various water taxi/barge	**
2. Lasqueti Island to French Creek	Centurion VII	60
3. Private vessels		??

Further Planning Considerations:

- Highly centralized services
- Linear region with limited transport redundancies within the region (shadow effect)
- Limited accommodation providers within the region
- Reception Centres/Group Lodging facilities throughout region (18 currently under review)
- Logistical challenges for vulnerable populations; ie hospital, care facilities (VCH/HEMBC)
- Bus transport (BC Transit, SD 47) capacity up to 1,000 passengers
- Small agricultural/livestock sector
- PRREP operates community alerting system, twitter feed, web pages

Hazard/Risk Assessments:

- Tsunami study: 2006
- Savary Island CWPP: 2009
- Regional CWPP: 2015
- Regional Coastal Risk Assessment: 2018

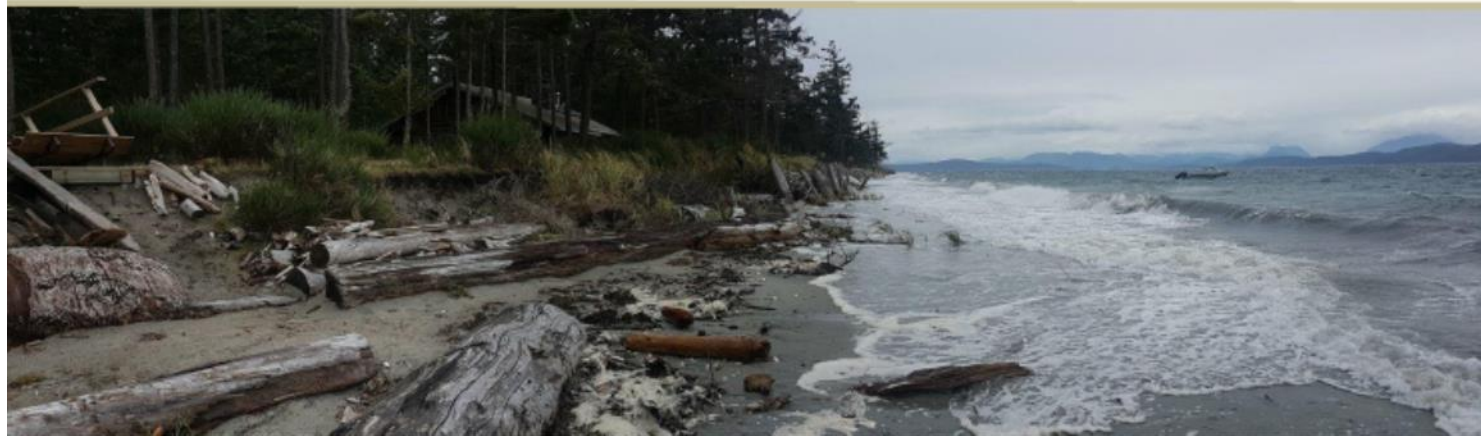
Historical:

- Early 20th century fires
- 1946 M7.3 earthquake
- 1994 chlorine dioxide spill
- 2000s apartment fires

Conclusions and Further Work:

- 25,000 max evacuees though threshold likely much lower (estimate internal max capacity 1,000)
- Earlier trigger points
- Initial discussions with CVRD, SCRD, RDN/Oceanside
- EMBC – coordination, understanding of financial responsibilities
- Goal: to work toward an understanding of potential impacts and processes for our local governments, key stakeholders, for evacuation beyond PRRD's borders

Powell River Regional District Overview Coastal Risk Assessment



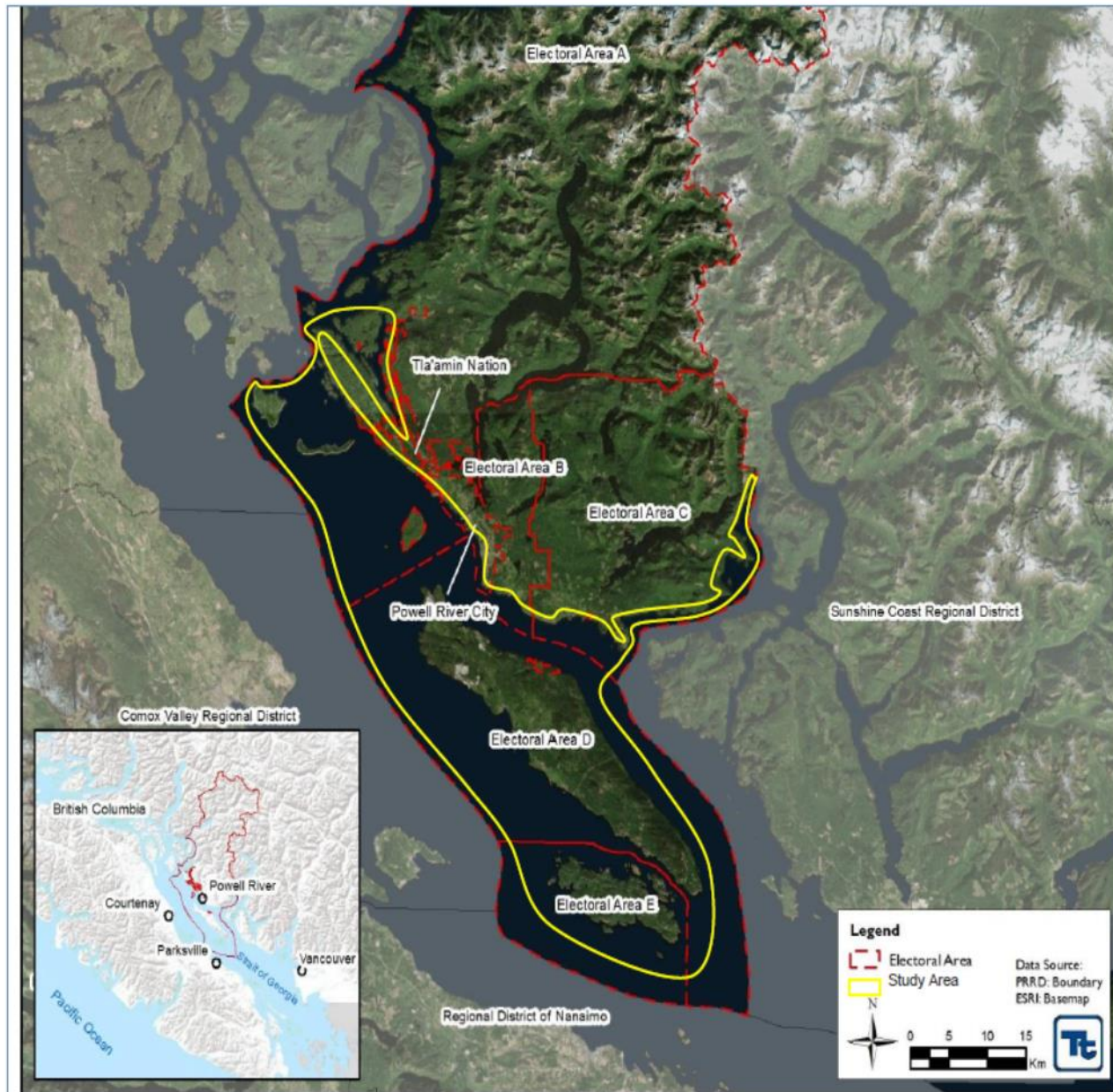
PRESENTED TO



**POWELL RIVER
REGIONAL DISTRICT**

APRIL 10, 2018
ISSUED FOR USE
FILE: 704-ENG.VGEO03174-01

- Shorelines within:
 - PRRD (El. Areas A, B, C, D and E),
 - City of Powell River
 - Tla'amin Nation
- Coastal hazards:
 - Storm Surge,
 - Coastal Erosion
 - Tsunami
 - Sea Level Rise (SLR)



7.1.3 Determination of Sea Level Rise

The anticipated global SLR is illustrated in Figure 7-2 from Ausenco Sandwell (2011b).

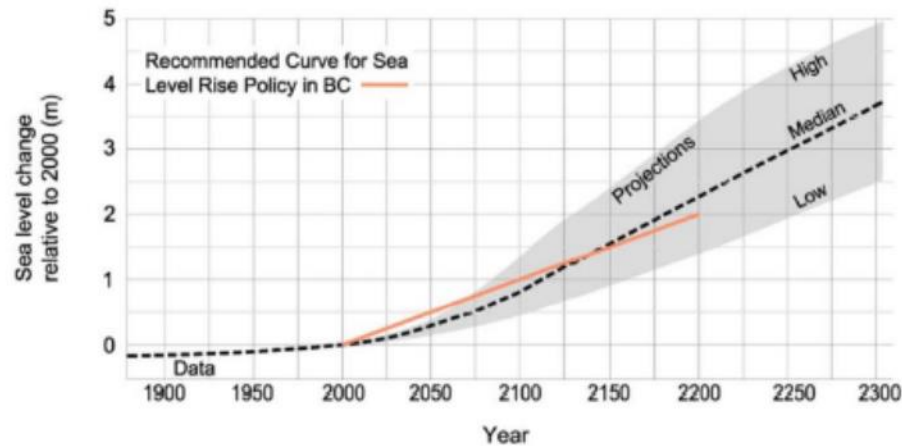


Figure 7-2. Projections of global sea level rise reproduced from © Ausenco Sandwell (2011b).

For the study area, the suggested time line for risk assessment is 50 years (Table 6-1 of Ausenco Sandwell 2011a). The recommended global SLR at 50 years is 0.5 m (Table 1 of Ausenco Sandwell 2011a); this is to be regionally adjusted based on crustal uplift rates.

Rates of crustal uplift and subsidence have been measured at a range of stations in BC (Ausenco Sandwell 2011a). The closest three stations to the study area are on Vancouver Island:

- Campbell River: +4.1 mm/yr (60 km NW of Powell River)
- Little River: +3.0 mm/yr (30 km W of Powell River)
- Nanoose Bay: +2.1 mm/yr (65 km S of Powell River)

8.1 Scenarios Selected for Risk Analysis

The following scenarios were selected for risk analysis using the modelling results from the hazard analysis:

- High Tide and SLR
- High Tide and 200-Year Surge and Waves (Southeast)
- High Tide, and 200-Year Surge and Waves (Southeast), and SLR
- High Tide and 200-Year Surge and Waves (Northwest)
- High Tide, and 200-Year Surge and Waves (Northwest), and SLR

Table 6-1. Summary of Historic Coastal Hazard Events Inventory.

Event Date	Event Title	Event Location	Event Severity
February 1916	Victoria's Groundhog Day Snowstorm of 1916	Southern Coastal BC	Snow fell for 38 hours, bringing over 78 centimeters to Vancouver. In the PRRD, strong winds blew down homes and uprooted trees. Residents living along the shoreline had to evacuate their homes due to exceptional high tide.
June 23, 1946	Earthquake	PRRD	A 7.3 magnitude earthquake with its epicentre in western Canada and the northwestern United States, lasted about 30 seconds and caused numerous slides and subsidence. In the PRRD, the earthquake itself caused extensive damage, destroying underwater powerlines. The earthquake also produced a significant tsunami – a small wave affected shores along the Strait of Georgia, killing one person. A considerably larger and wave occurred at Sisters Islets south of Texada Island and west of Lasqueti Island, with a reported height of 7 to 8 feet, i.e. 2.1 to 2.4 m (Hodgson 1946).
December 17-30, 1993	Storm Surge/Tidal Flooding	PRRD	Gulf Islands. Pender, Lasqueti (PRRD), and other islands suffered severe damage. Loss of communications was reported throughout the impacted areas
November/ December 1999	Coastal Flooding	Finn Bay Road, Baggi Road and Sarah Point Road	Flooding caused properties in the PRRD along Finn Bay Road, Baggi Road and Sarah Point Road to be blocked for several days.
2001	Storm	Savary Wharf, Lund Water Taxi dock	Savary wharf severely damaged. Ramp of water taxi dock in the Lund Harbour severely damaged
November 12, 2007	Winter Storm	PRRD	All ferry services were cancelled; thousands of residents were without power for several days.
January 2010	Winter Storm	Tla'amin Nation Waterfront	High tide and storm surge impacted the waterfront of Tla'amin Nation, resulting in debris accumulation.
December 24, 2010	King Tides	PRRD	unknown

Event Date	Event Title	Event Location	Event Severity
November 24, 2011	Fall Storms	BC South Coast	A one-day event brought storm surge on top of high tide that led to minor local flooding near the Tsawwassen Terminal (BC Ferries). BC Ferries cancelled several mid-day sailings between Vancouver and Vancouver Island. Winds of up to 100 km/h hit the North Coast and parts of Vancouver Island
2012	Storm	Saltery Bay Provincial Park	Storm damage to breakwater at Saltery Bay Provincial Park, just west of the Saltery Bay ferry terminal. Storm surge undermined the beach wall
October 22, 2014	Heavy Rain/Flood	Sliammon Creek Fish Hatchery	A one-day event brought heavy rainfall to the PRRD. Sliammon Creek near Powell River overflowed its banks and debris damaged the fish hatchery operated by the Tla'amin First Nation.
December 8-10, 2014	Heavy Rain/Landslides	City of Powell River, Finn Bay Road, north of Lund, Atrevida Road near Lund, Stittle Road	A three-day storm brought 140 mm of rain to the PRRD. Landslides were reported all over the City of Powell River. Homes were shifted from the foundations, roads were closed, and sewer systems were at capacity. Basements were flooded as well. The PRRD activated their EOC. Powell River and PRRD (Area B) received assistance from British Columbia.
March 1, 2016	Landslide	Atrevida Road	A one-day rain event in the PRRD caused landslides, evacuations, and emergency services. Trees and debris blocked roadways.
November 14, 2017	Erosion	1069 Squirrel Lane, Savary Island	About 20 feet of shoreline erosion experienced between 1959 and 2017 at 1069 Squirrel Lane. The shoreline forms a natural berm in front of the house, and may be flooded should water overtop the crest. The shoreline has been left in its natural state at 1069 Squirrel Lane, where coastal erosion is significantly higher than on the neighboring property where semi-vertical logs were placed to protect against erosion.
January 19-23, 2018	Winter Storm	PRRD	A five-day event of heavy rain and gale force winds impacts the PRRD. The strong winds led to BC Ferries cancellations and downed trees, branches, and power lines. Streams and creeks overflowed their banks. Homes in low-lying areas flooded. Widespread power outages were also reported.
Date unknown	King Tides and Storm Surge	Marine Avenue in downtown Powell River	Flooded road hindering access to boat ramp and sewage treatment plant.

Table 6-2: Number of BC Ferries Comox to Powell River Cancellations due to Wind and Storm Events.

Year*	# of cancellations
2007	14
2008	12
2009	5
2010	12
2011	50
2012	85
2013	54
2014	45
2015	26
2016	72
2017	54

*Numbers by fiscal year ending March 31

Key Findings

- In terms of population exposed, the worst scenario assessed in this study is 'High Tide, and 200-Year Surge and Waves (Southeast), and 0.5 m SLR (in 50 years), resulting in 408 people exposed.
- In terms of infrastructure damage, the worst scenario assessed in this study is 'High Tide, and 200-Year Surge and Waves (Northwest), and 0.5 m SLR (in 50 years), resulting in general building stock potential loss of \$165 Million, as well as 37 critical, 22 commercial and 28 other regional assets exposed.
- As a result of the projected storm events, five main areas of HWY 1 may become inundated.






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


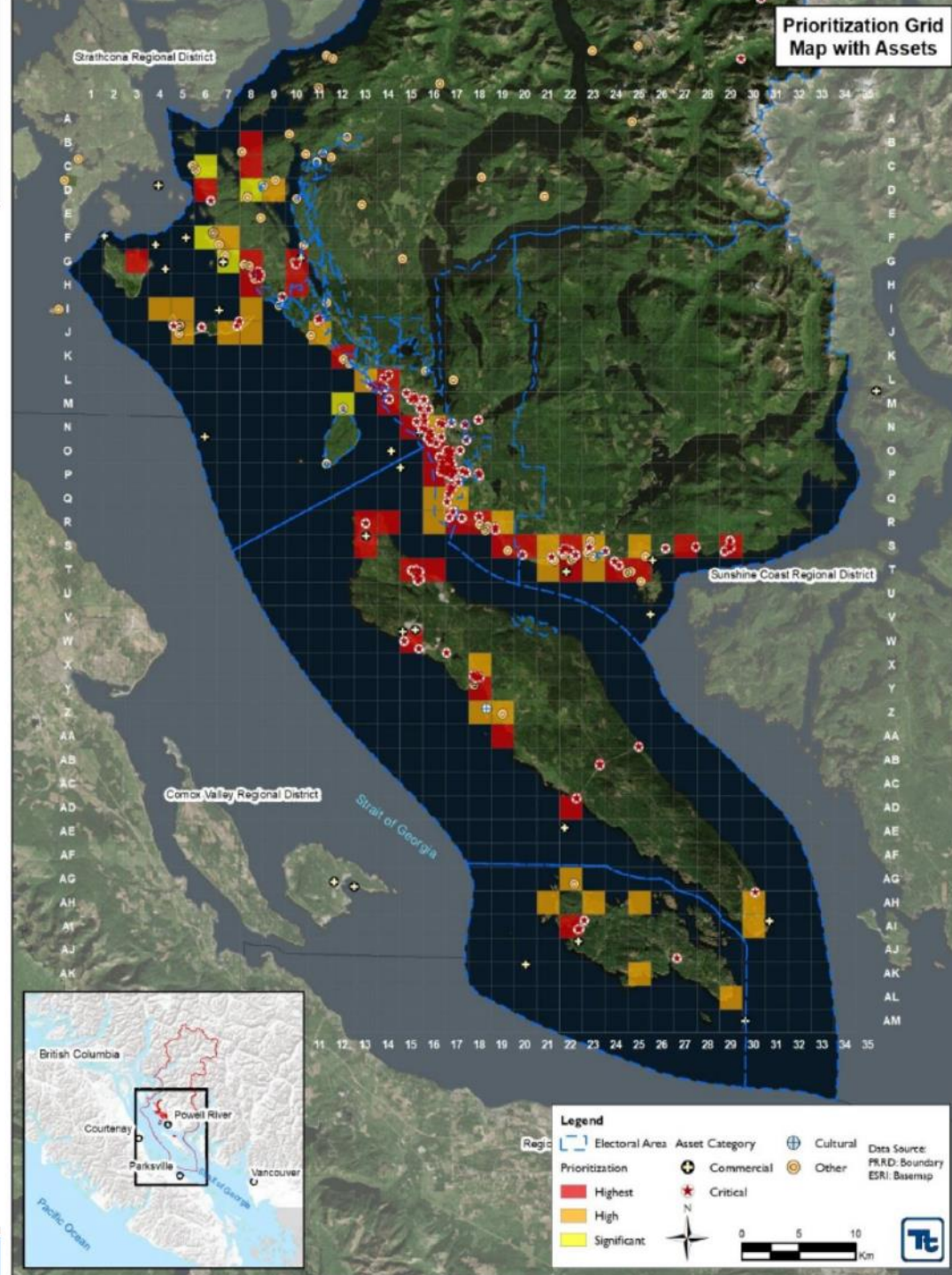
Priority Areas for Future Work

- Ranked criticality or importance of assets (1 to 3)
- High tide and SLR scenario selected as highest priority, as it is the most probable scenario.
- Grid with 2 kilometer spacing was overlaid in the study area and grid squares were color coded to identify priority areas.
- Prioritization criteria:
 -  Highest – If at least one asset with an ‘importance rating of 1’, or a portion of roadway is located in the high tide and SLR scenario inundation area
 -  High – If at least one building, or an rating of 1 and 2’ is located in a storm scenario inundation area
 -  Significant – If at least one asset with an importance rating of 3 is located in the storm scenario inundation area

Priority Areas for Future Work

Results:

-  Highest Priority: Total of 25 assets and approximately 1 km of roadway.
-  High Priority: Total of 34 assets, 558 buildings with an estimated replacement cost value of approximately \$230 million.
-  Significant Priority: Total of 12 assets located in the significant priority areas.



Any Questions?



Photo: D. Poole.