

Coastal Flood Hazard

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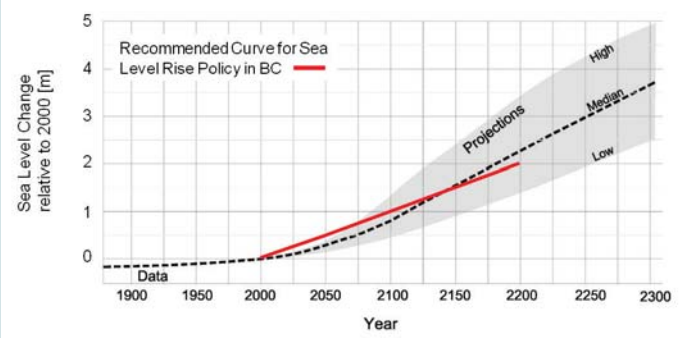
Coastal flood hazards in Squamish are affected by the combination of:

- tides
- storm surge
- local wind and wave effects
- wave impacts on the shoreline

Engineering assessments have concluded that large tsunamis are unlikely to affect Squamish. Tsunami hazards are beyond the scope of the IFHMP.

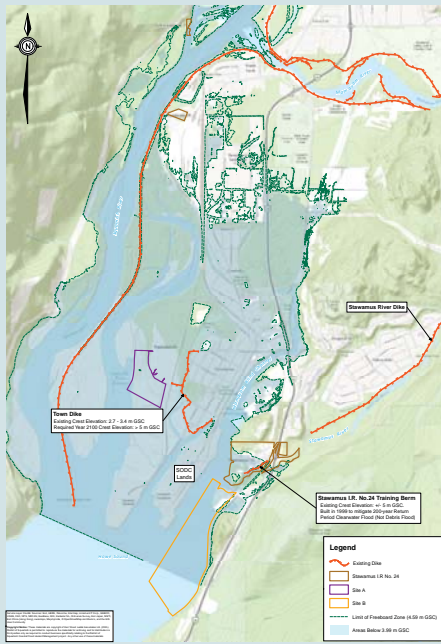
Sea Level Rise

One of the most important climate change impacts is sea level rise due to warmer ocean temperatures and melting of ice. Provincial Guidance anticipates sea level rise by 1.0 metre by the year 2100 and 2.0 metres by the year 2200. This is illustrated on the graph below.



Squamish at Risk

The District's Howe Sound coastline extends from Watts Point to Woodfibre. The foreshore is relatively steep and undeveloped except at Woodfibre and from Crescent Slough to Stawamus I.R. No. 24. In this area, river estuaries and sloughs allow coastal hazards to penetrate deep into the community.



Coastal Flood Risk Mitigation

In October 2015, District Council adopted a coastal flood risk mitigation strategy.

Connected Floodplain Areas

“Connected” floodplain areas (such as the downtown Squamish peninsula) encompass many different properties and land uses. Effective risk reduction requires unified and consistent approach. Key strategies for connected coastal floodplain areas are described below.

- **Protect** existing and proposed development against coastal floods including Sea Level Rise to Year 2100
- **Accommodate** coastal flood hazards through land use restrictions, designated floodways, appropriate FCLs, and restrictive covenants.
- **Retreat** critical facilities out of the coastal floodplain as they reach the end of their development life cycle

Unconnected Floodplain Areas

“Unconnected” floodplain areas are also vulnerable to coastal flood hazards. Flooding in one area is not “connected” to flooding in another area, so each site can define its own independent approach for reducing flood risk. Examples of unconnected coastal floodplain areas:

- Scott Crescent Development
- Waterfront Landing
- Stawamus I.R. No. 24
- Site A
- Site B
- Squamish Terminals and
- Woodfibre

Mitigation Options Include the Following Examples

Avoid/Retreat

- Reclaim area to natural state as community amenity
- Possible locations - intertidal areas, Squamish Estuary

Accomodate

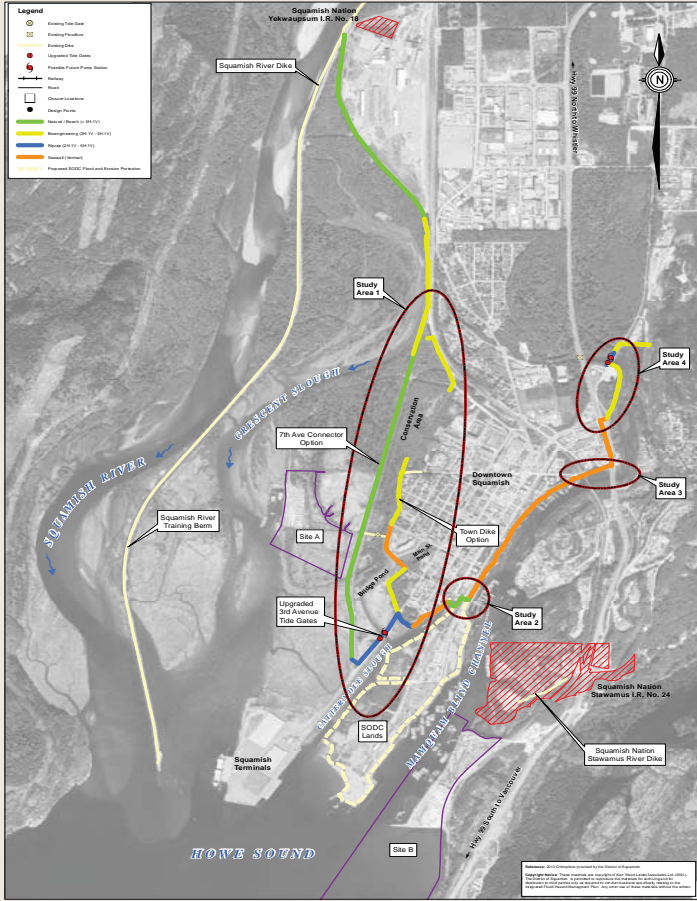
- Raise elevation of habitable space above flood levels
- Use flood resistant building materials below the FCL
- Allow water dependant industrial uses (e.g. log sort)

Protect

- Raise land elevation with structural fill
- Construct offshore defenses (e.g. breakwaters)
- Construct perimeter defences (e.g. sea dike or seawall).

Future Sea Dike Alignment

District Council approved the future sea dike but some questions must still be addressed in special “study areas”.



Different colours in the figure show different types of shoreline treatment:

- Natural or Beach Slopes (Green)
- Riprap (Blue)
- Bioengineered (Yellow)
- Seawall (Orange)

Special Study Areas

Special Study Area #1 will determine whether the dike should follow the CN Rail tracks or the existing Town Dike.

- If the District proceeds with the 7th Ave Connector the dike should be incorporated into the truck route.
- If the 7th Ave Connector does not proceed, the Town Dike alignment may be more favourable.

Special Study Area #2 will decide how the dike should tie in with SODC and Squamish Yacht Club boat ramp.

Special Study Area #3 will accommodate bike and foot traffic flow between the railway bridge and Highway 99.

Special Study Area #4 will integrate the sea dike with Rose Park, the proposed Sea to Sky Forestry Centre, and a possible future pump station at Loggers Lane.

Balancing FCLs and Overtopping

If the sea dike is built too low, waves will overtop the dike into downtown. The District of Sechelt has this problem at Trail Bay.



In Squamish, too much overtopping would overwhelm the stormwater system. But, If the sea dike is built too high, it will trap more water during a river dike breach and increase MBEs.

The District selected an overtopping rates of 10 L/s per metre of dike. Higher overtopping rates are unsafe.

Sea Dike Crest Elevations

Different types of shorelines are proposed in different areas.

- Natural beach shoreline is preferred.
- Areas with less space need riprap or bioengineering.
- A seawall is required along Mamquam Blind Channel.

The preliminary elevation for the sea dike crest is 4.7 m above mean sea level. This is on average about 2-3 m above natural ground in Downtown Squamish.

Sea Dike Implementation

The IFHMP recommends phased implementation as per the table below:

ACTION	TIMING
Raise to 3.3 m elevation with standard cross-section	Immediate
Raise to Year 2100 elevation with ongoing redevelopment	Ongoing
Raise to minimum elevation 4.0 m at final dike width.	As funding permits
Raise to Year 2100 (1 m SLR) crest elevation	When justified by sea level rise

The first section of sea dike is already under construction as part of the Mireau development on Mamquam Blind Channel.

