Pacific Northwest Climate Science
CONFERENCE 2014

Adaptation of Waterfront Development to SLR

Case Studies in Science to Practice and Back to Science

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Sept 2014

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Concert Properties

HARBOURSIDE WATERFRONT CASE STUDY

SEA LEVEL RISE
Adaptation + Neighbourhood Design Innovation

PNW Climate Science Conference 2014

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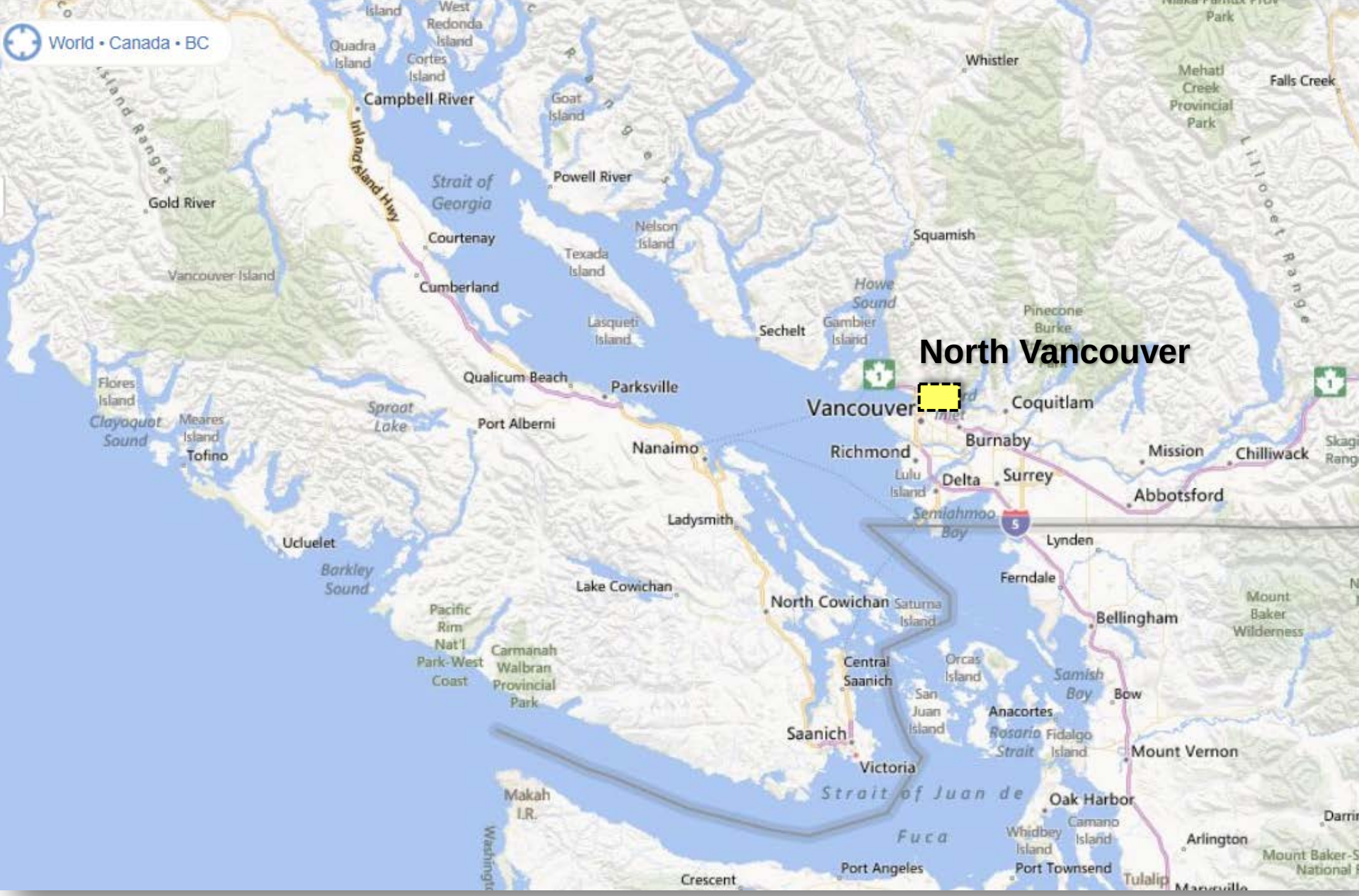

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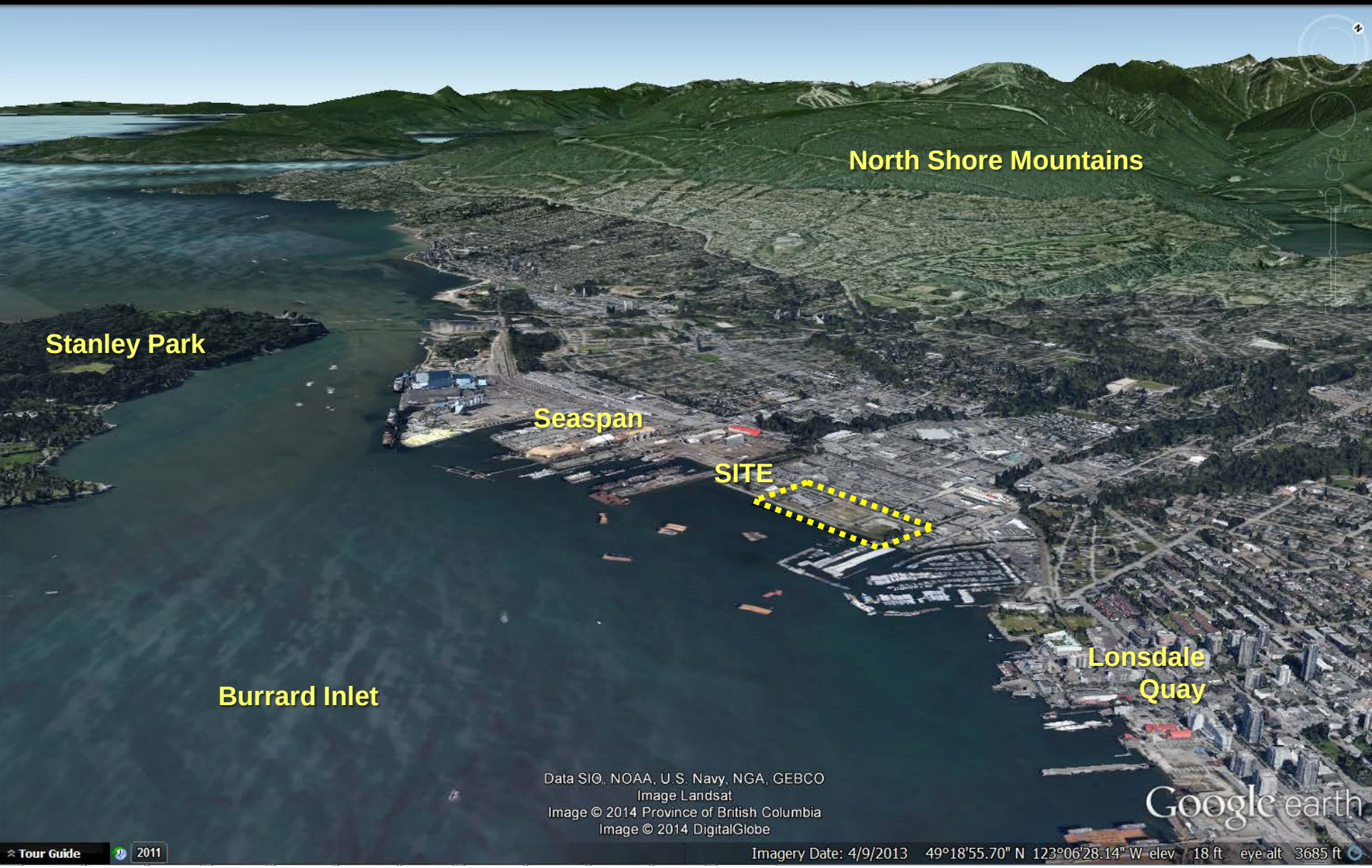
Harbourside Waterfront



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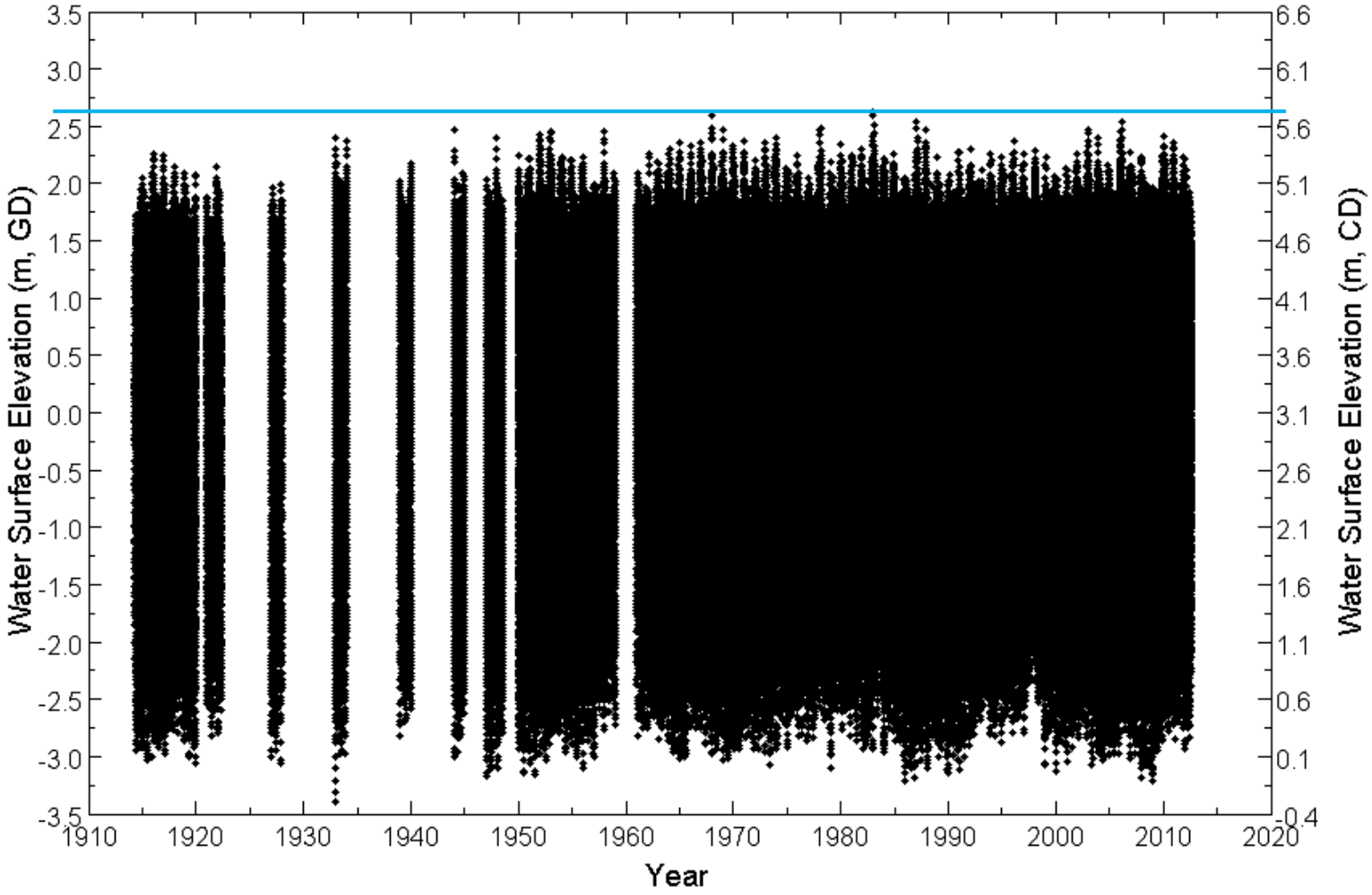
Hourly Sea Level Record at Point Atkinson, BC



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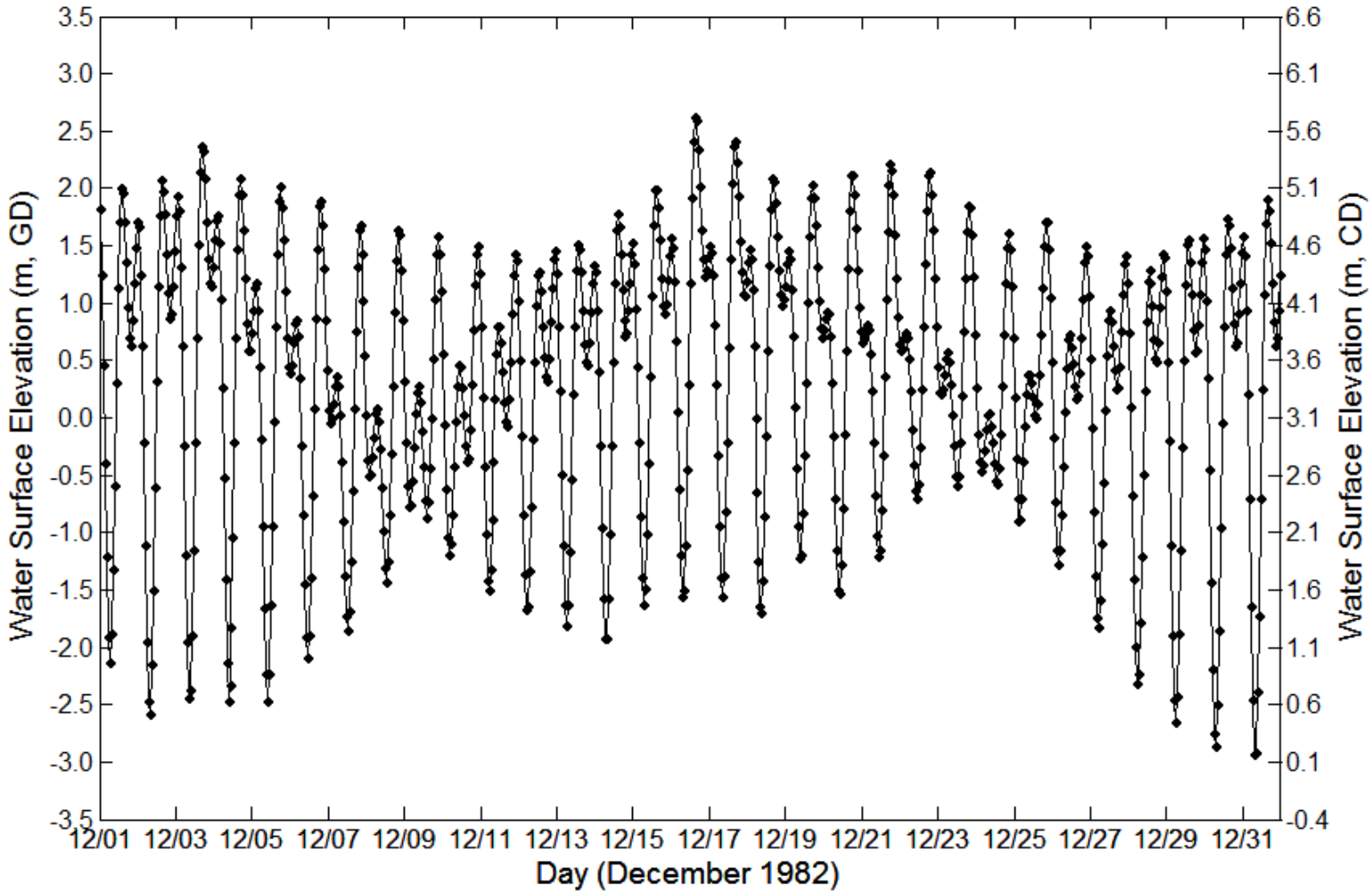

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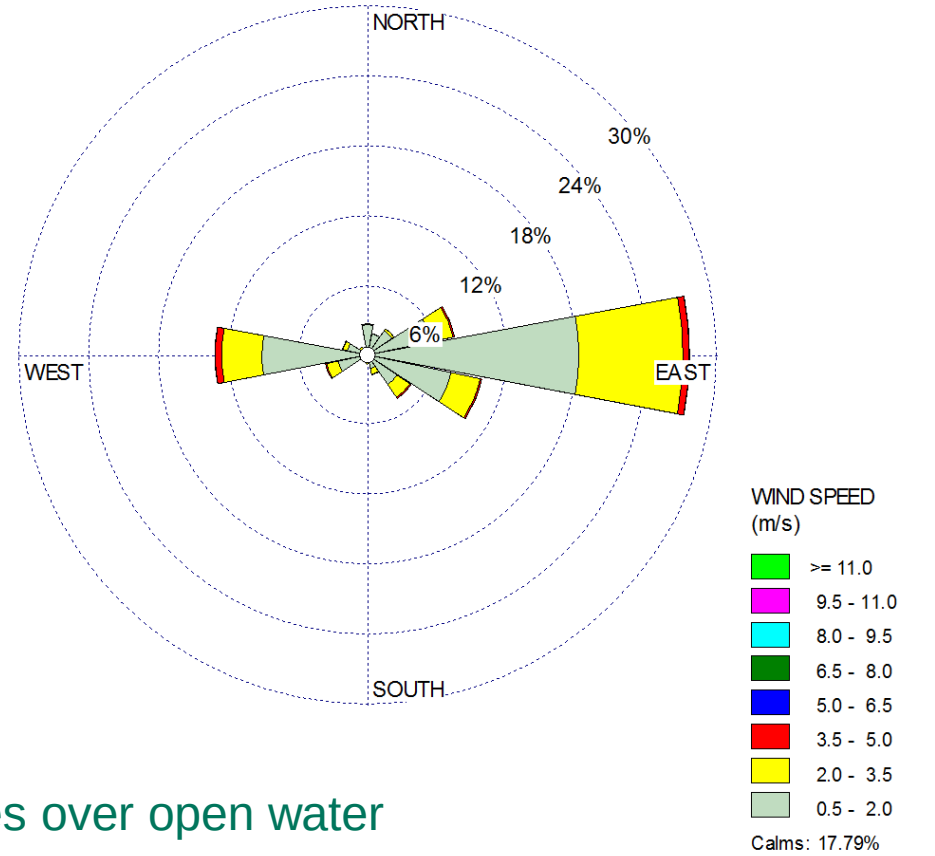
Wind Frequency and Statistics



Fetch: distance travelled by wind or waves over open water

Bathymetry: Ocean depth influences wave period and amplitude

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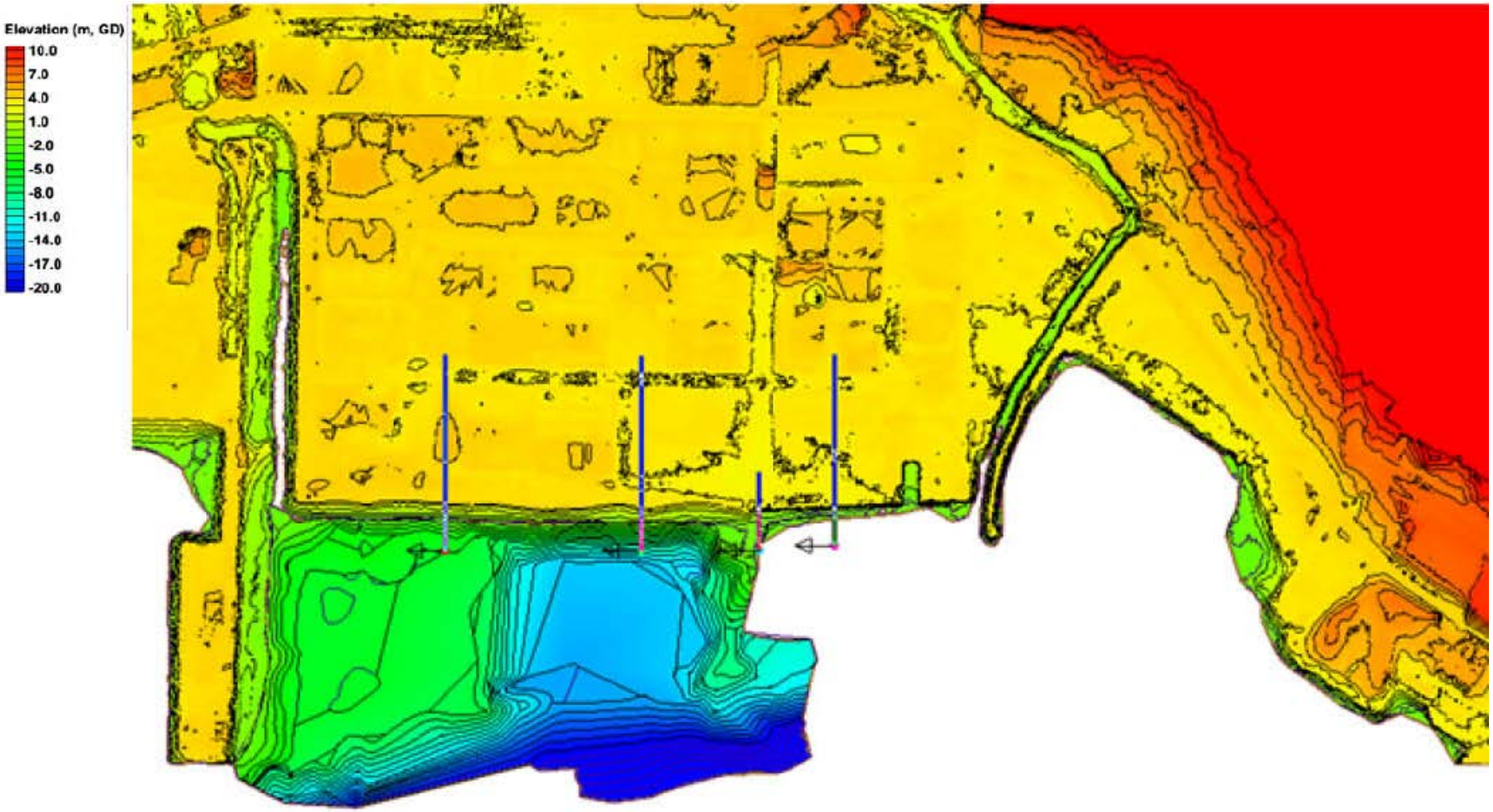
Harbourside Waterfront Context

Study Area


HARBOURSIDE DRIVE
FELL AVE
MCKAY CREEK
SCHOOL
HARBOURSIDE WATERFRONT
STUDY AREA
HARBOURSIDE PLACE
DOG PARK AND SPIRIT TRAIL
BURRAD
YACHT
CLUB
MOSQUITO CREEK
BURRARD INLET

Topographic and Bathymetric Data



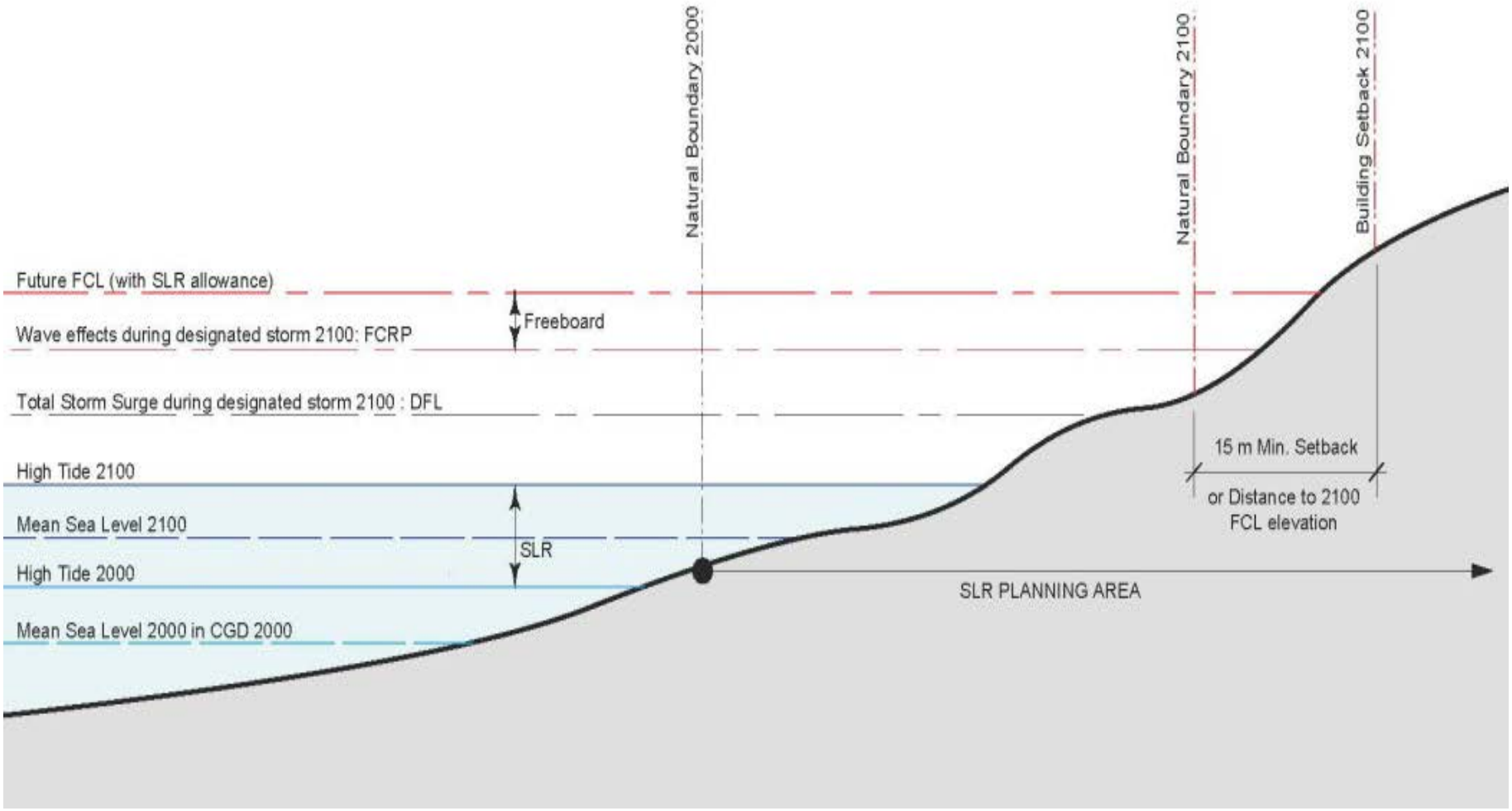
Objectives of Projecting Sea Level Rise

- Define a Flood Construction Level (FCL) conforming to provincial guidelines
- Recognize the Life Cycle of the development (70 years?)
- Maintain high amenity in both public and private spaces

Objectives of Projecting Sea Level Rise

- Create a foundation for City/Developer action in the short term and flexibility for adaptive management in the future

Flood Construction Level Definitions



Not to scale

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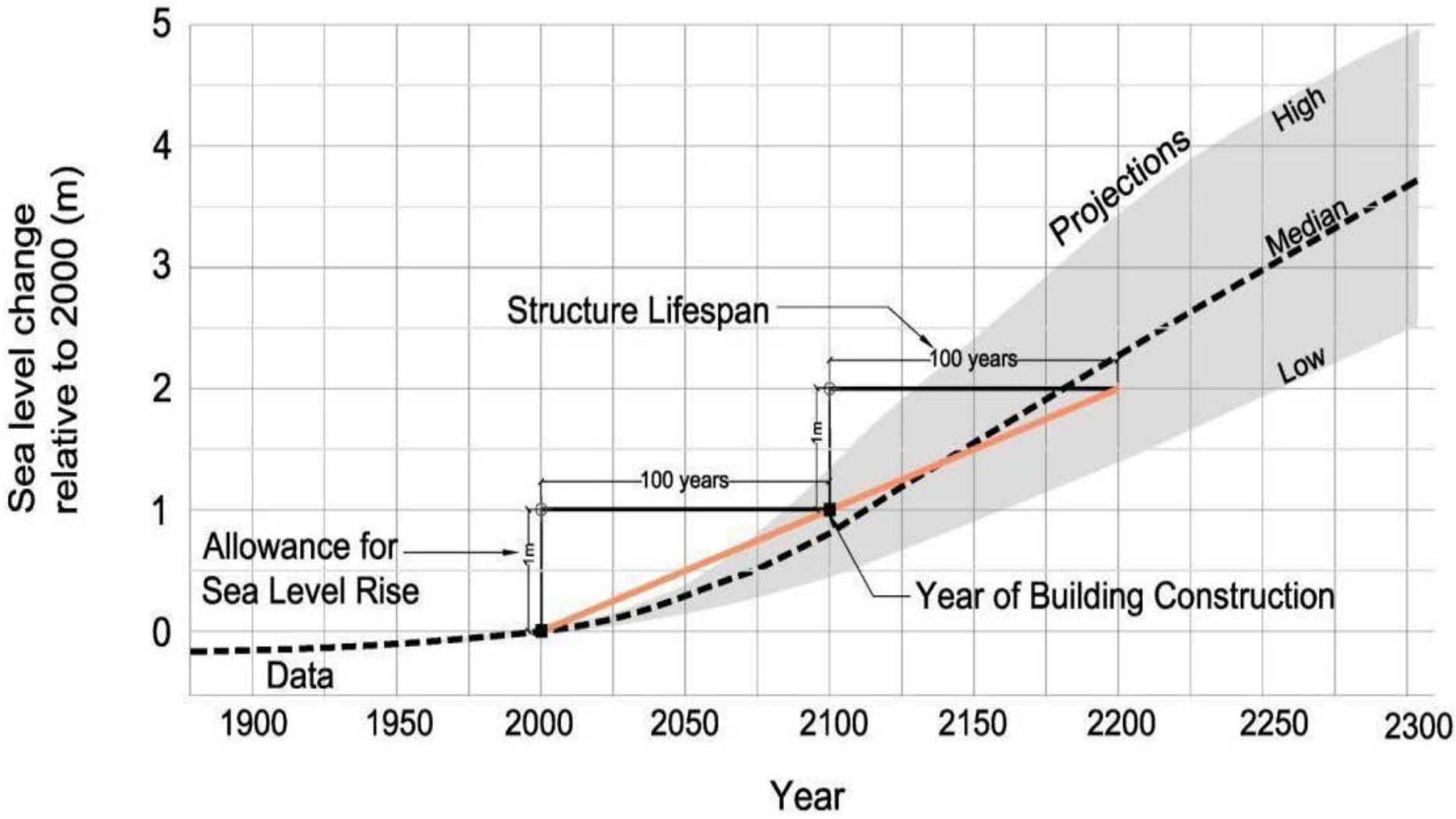
Building Lifespan

- Building life design year is approximately 2080-2100

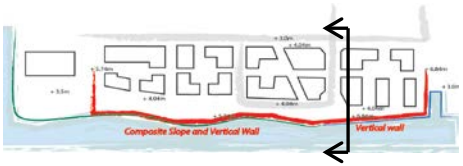


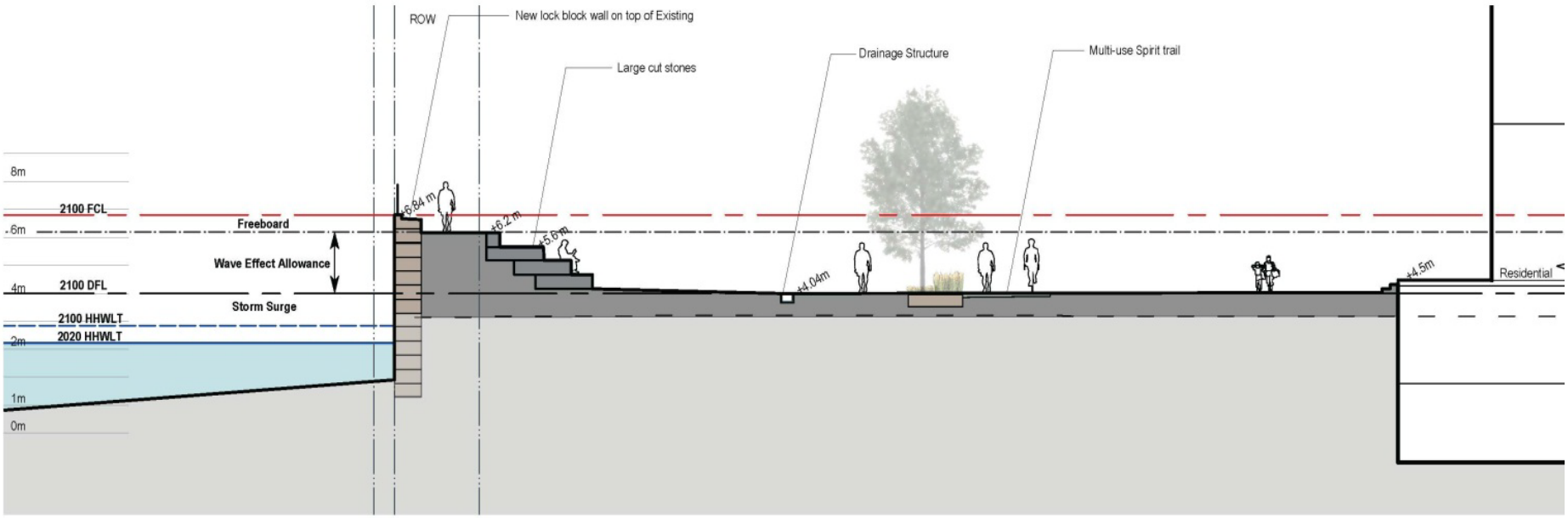
Site – Specific Coastal Flood Calculations

- Modification to the existing shoreline creates varying Flood Construction Elevations depending on the shape of the proposed shoreline.

Terraced vs Vertical Wall Summary

- Elevate sea wall to 6.8 m from 3 m
- Elevate park grade by 1 m





Alternative Scenario: Vertical Wall Approach
Scale 1:200

Vertical Wall Rejected

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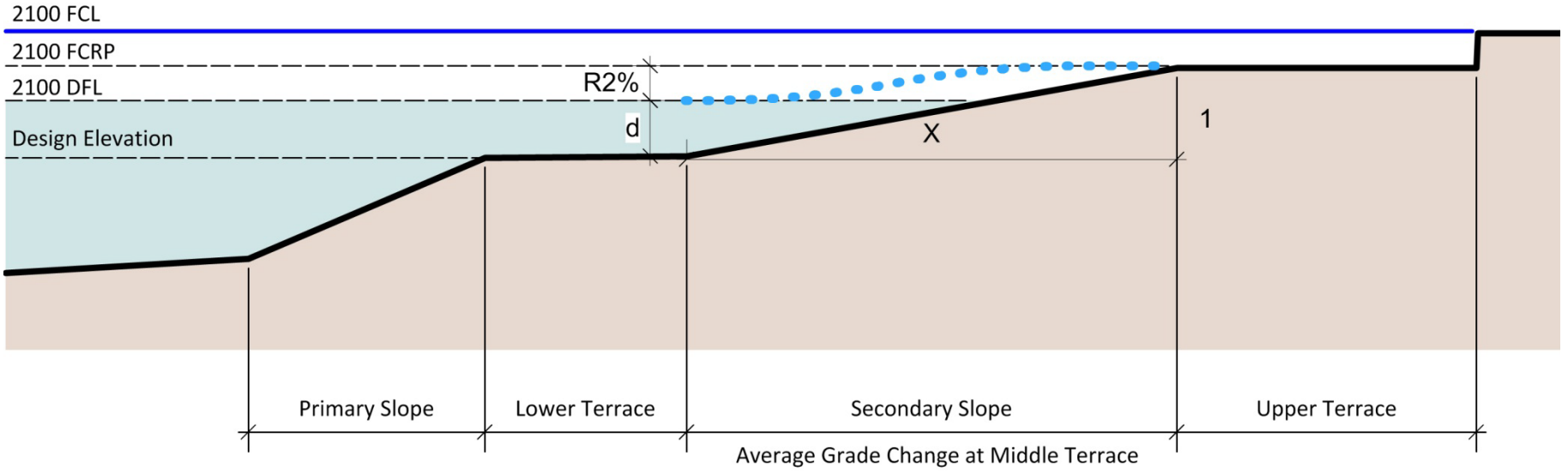
Wave run-up model – terraced scenario



Assumptions for Prediction of Wave Run-up R2%, Using Hughes Method [1]		
Parameter	Value	Unit
Designated Flood Level (DFL)	4.04	m, CGD
Water depth at the toe of secondary slope, d	0.8 to 1.6	m
Design Elevation at Lower terrace	2.44 to 3.24	m, CGD
Slope, X	4.0 to 5.0	-
Roughness	rough surface	-
Permeability	impermeable	-

1. Steven A. Hughes: Estunatubg Irregular Wave Runup on Rough, Impermeable Slopes, US Army Corps of Engineers, ERDC/CHL CHETN-III-70, July 2005

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Water Levels with Management Strategies

Parameters	2020 Values	**2100 Values**
Flood Construction Level (FCL, m CGD)	**4.54**	**5.24**
Freeboard (m)	0.6	0.6
Flood Construction Reference Plane (FCRP, m CGD)	**3.94**	**4.64**
Wave Effect Allowance (m)	0.6	0.6
Designated Flood Level (DFL, m CGD)	**3.34**	**4.04**
Regional Sea Level Rise (SLR, m)	**0.19**	**0.89**
Storm Surge AEP 1/200 (m)	1.25	1.25
High Tide (HHWLT, mCGD)	1.9	1.9
Reference Vertical Datum (MWL, CGD)	0.0	0.0
Low Tide (LLWLT, m CGD)	-3.1	-3.1

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Insert Harbourside Video

- 2 minute length

Key Lessons: Engage!

- *“Our pursuit of sustainability is not challenged by our technical capacity but by our capacity to work together effectively towards common goals.”*

Iona Campagnolo

27th BC Lieutenant Governor

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