Community Workshop

North Shore Sea Level Rise Strategy

Welcome! Please join a table

DISTRICT OF NORTH VANCOUVER

February 2020

Workshop Purpose

Objectives

- Learn more about sea level rise
- Learn about developing the North Shore Sea Level Rise Strategy
- Listen to your views and issues about adapting to sea level rise

We are not designing or deciding on measures today.

How input will be used

- Summary of main themes from initial public engagement (workshops, online survey)
- Consider input alongside technical analysis for draft Strategy

Workshop Outline

Introductions

Presentation

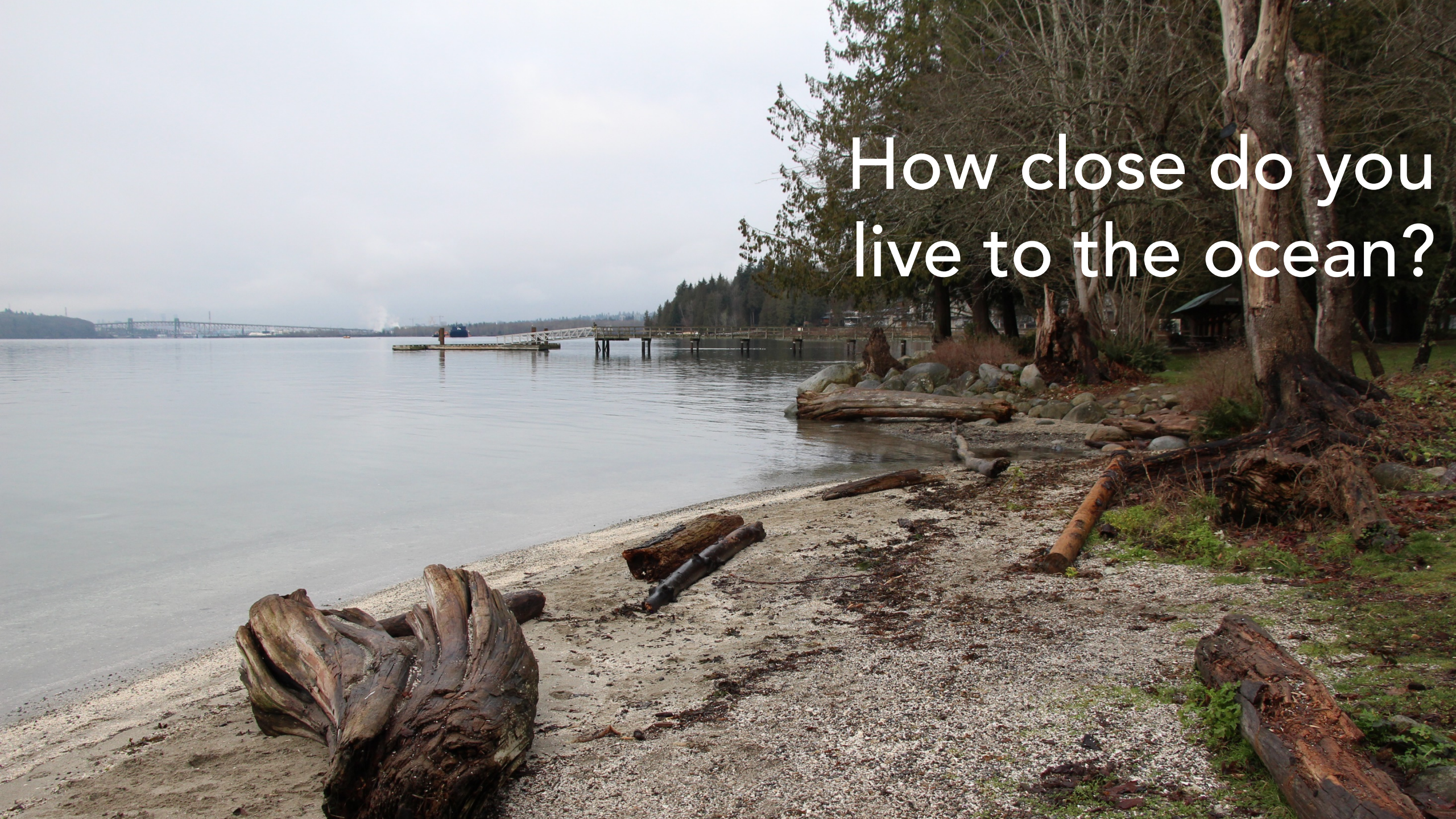
Activity 1: What matters?

Short break

Activity 2: Explore adaptation approaches

Activity 3: Reflection

Next steps

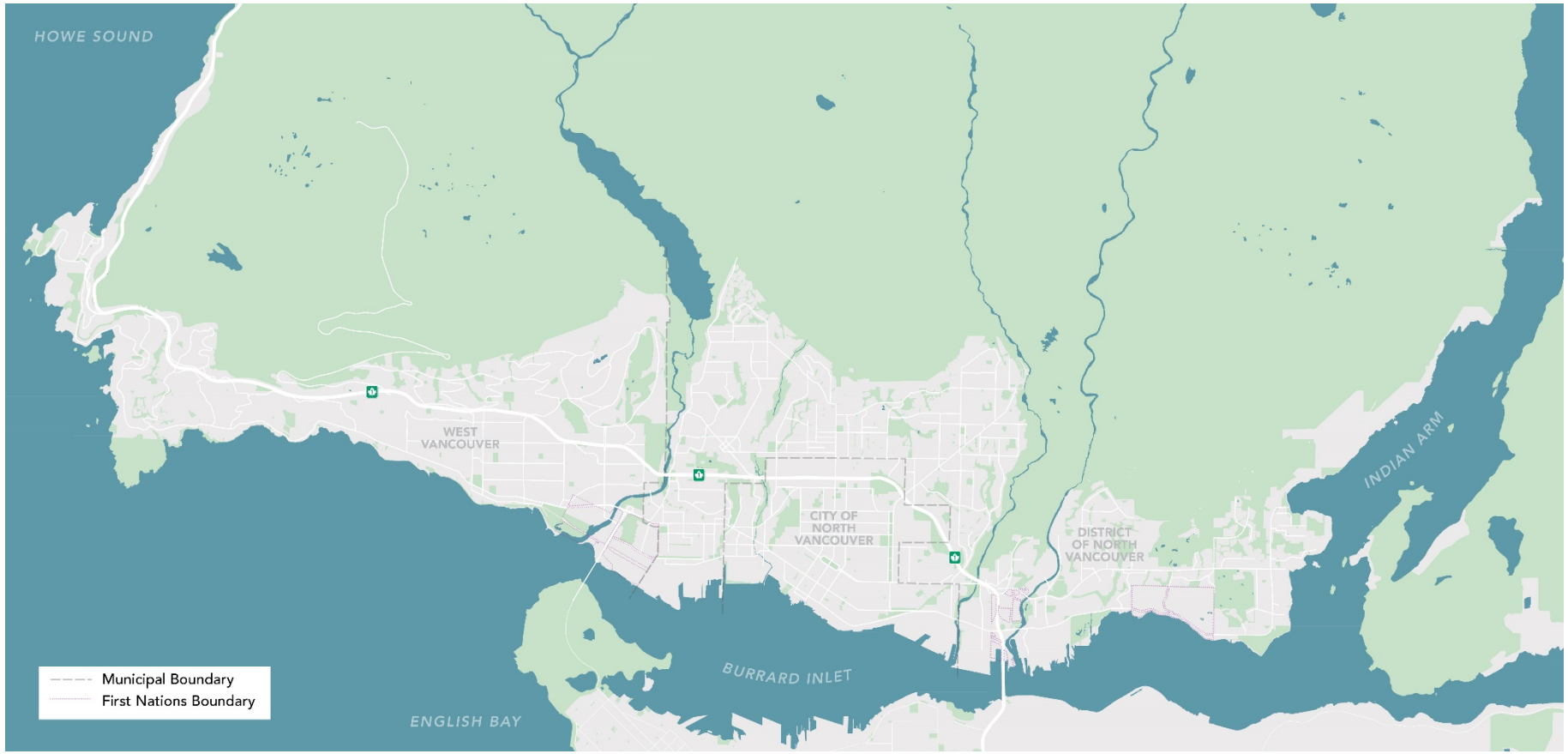

How close do you
live to the ocean?

Presentation

North Shore Sea Level Rise Strategy

Grant Funding:

Consultant:



North Shore Sea Level Rise Strategy Process

Sea Level Rise

PHASE 1-3

Technical Analysis

SUMMER 2018 - SPRING 2019

- Review context
- Identify coastal flood hazards
- Assess vulnerability and risk

PHASE 4

Adaptation Actions Development

SUMMER 2019 - WINTER 2020

- Explore adaptation approaches
- Develop adaptation concepts and action areas

PHASE 5

Final Strategy

WINTER 2020 - SPRING 2020

- Refine adaptation concepts and action areas
- Finalize strategy

We are here

DNV.org/SeaLevelRise

Initial public & stakeholder engagement (*Online survey open until Feb 23*)

Potential adaptation approaches

Worldwide Coastal Impacts

Venice, Italy - November 13, 2019
85% of the city flooded

New Jersey, USA – October 2012
Hurricane Sandy

Photos (L-R): CBC News

Regional Coastal Impacts

Jan 2019 Deep Cove, king tide

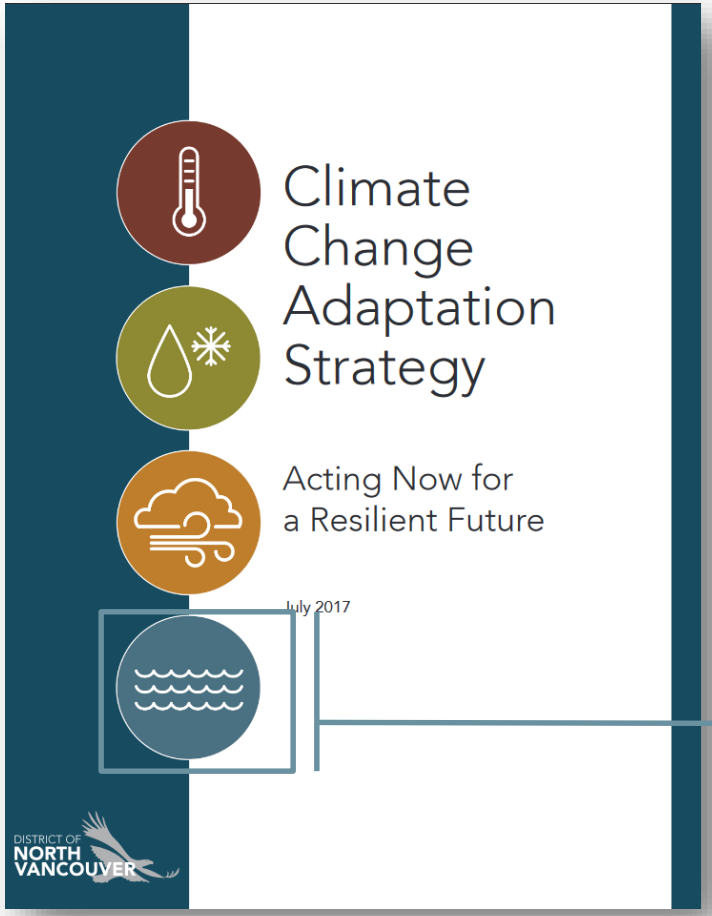
Dec 2018 White Rock Pier damage

Feb 2019 Horseshoe Bay
High winds/waves

Dec 2012 coastal storm
West Van seawall, Stanley Park seawall

Photos (L-R): NS News, CBC News, Vancouver Sun

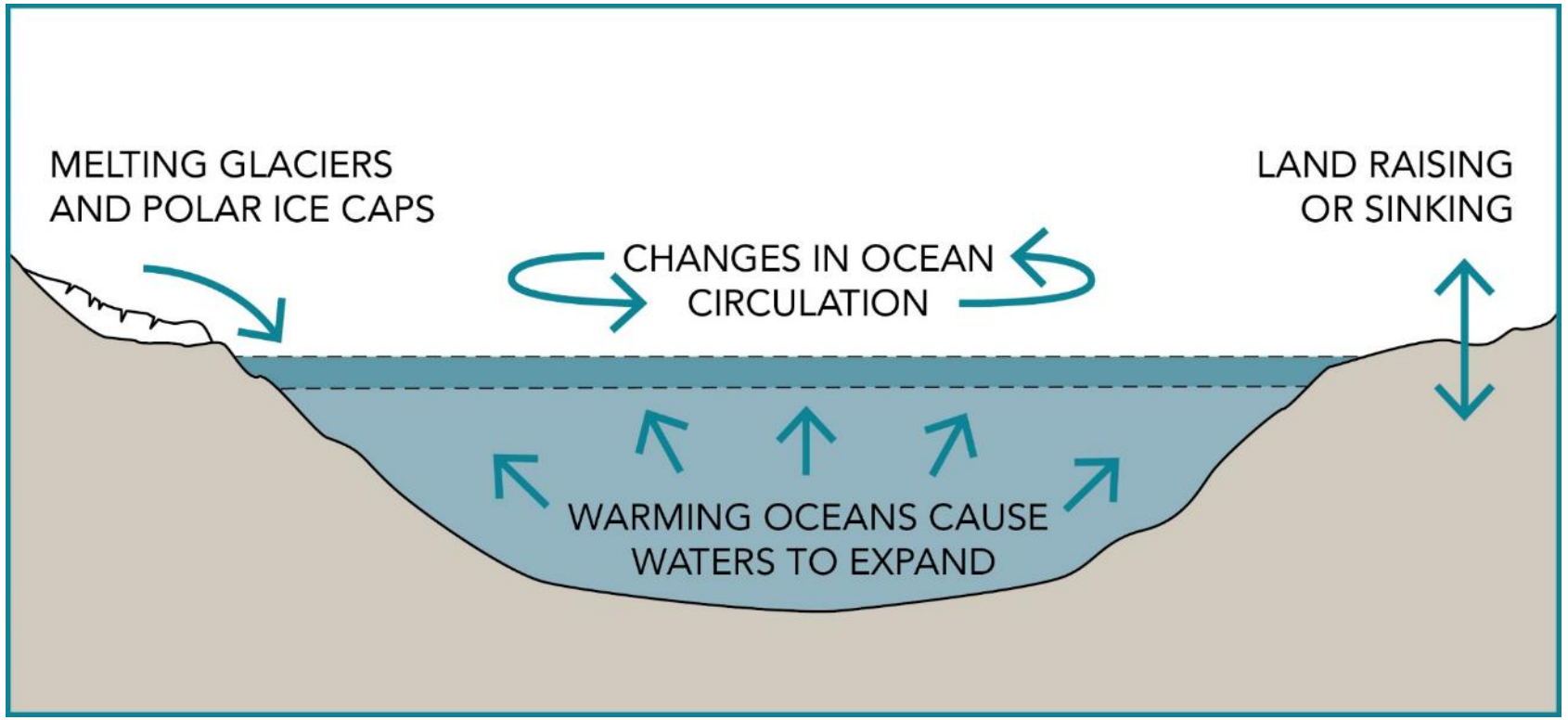
Climate Change Adaptation Strategy (2017)



Sea Level Rise

Sea Level Rise

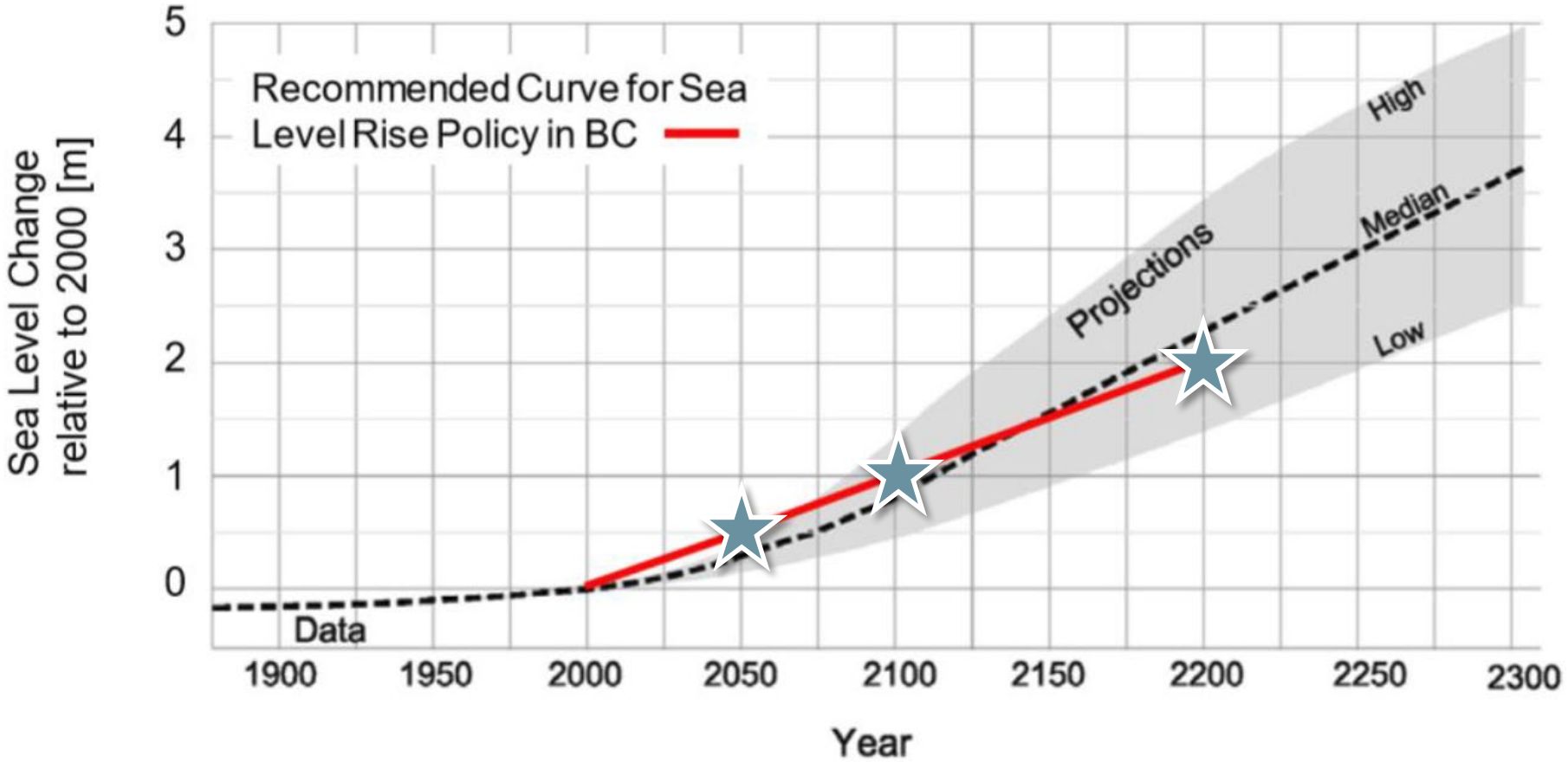
Causes of sea level rise



Measured rise (20th Century):

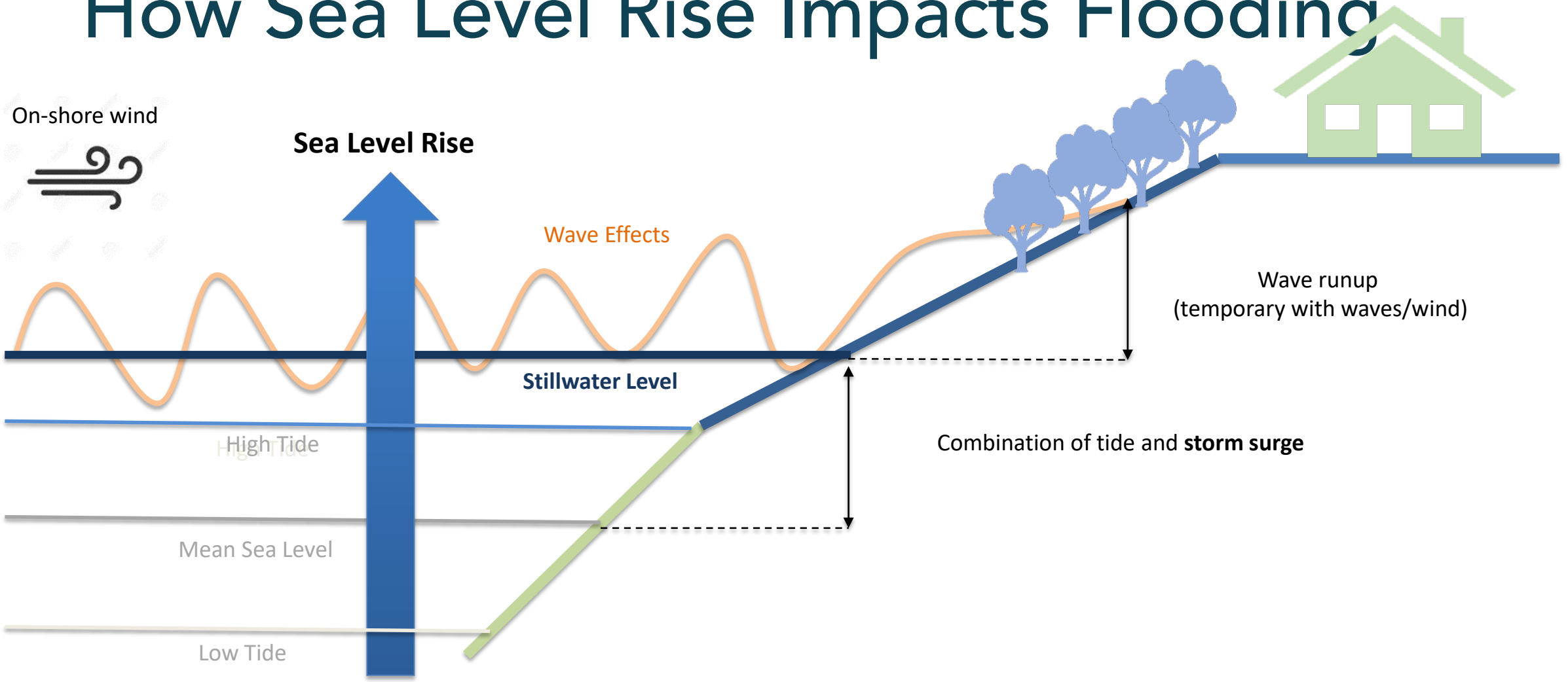
- **Global average:** 0.17m (7”)
- **Vancouver:** 0.04m (1.5”)
- Varies due to local conditions

Anticipated Sea Level Rise



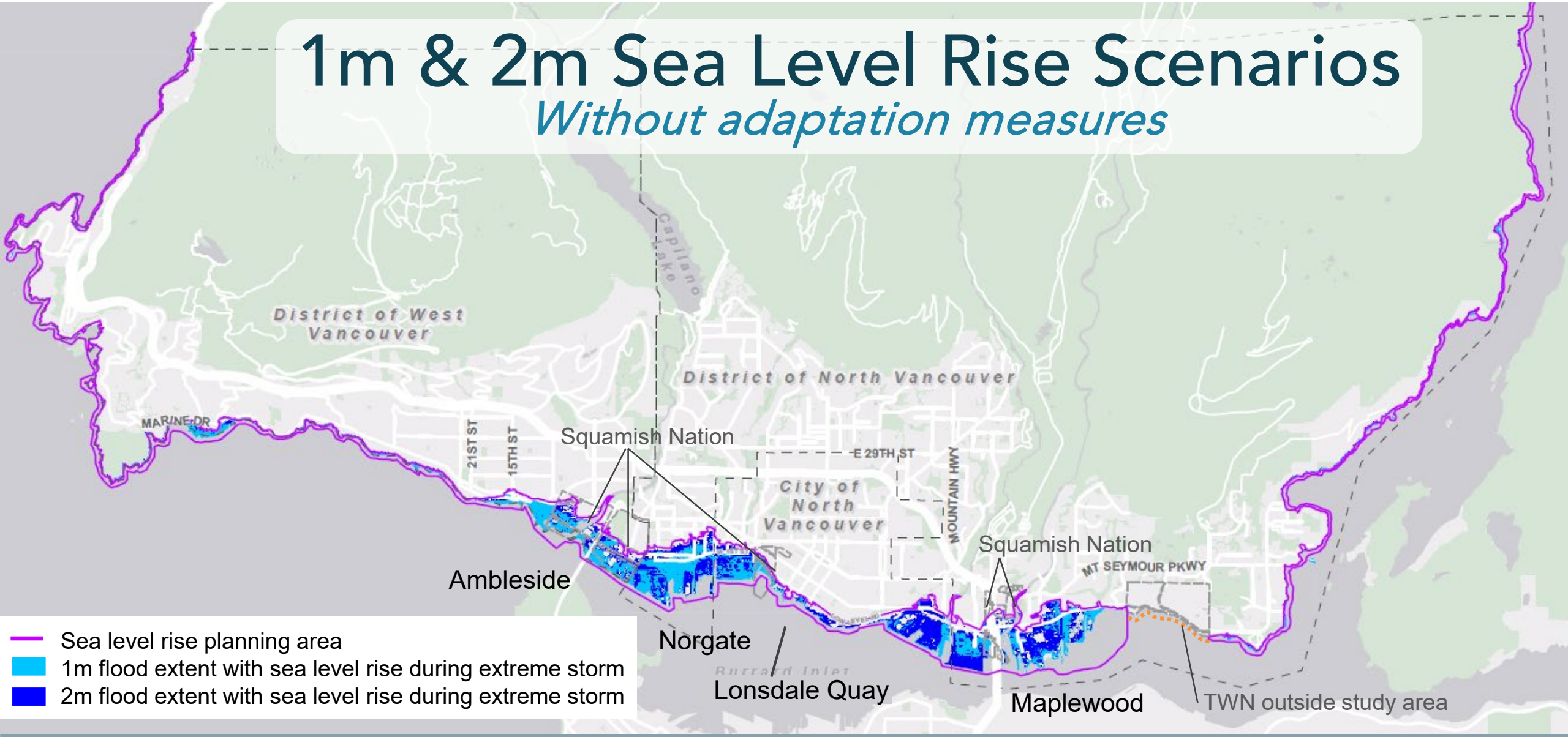
(MOE/Ausenco Sandwell, 2011)

How Sea Level Rise Impacts Flooding



1m & 2m Sea Level Rise Scenarios

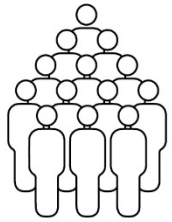
Without adaptation measures



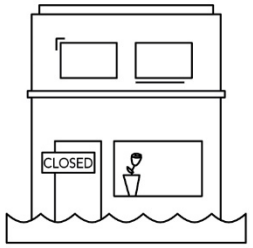
Consequences

Without adaptation measures

1m sea level rise

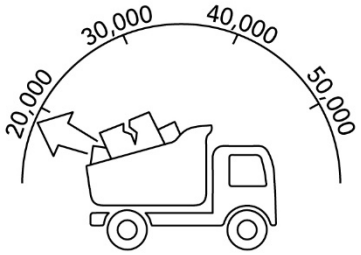


1,300+
residents could
EXPERIENCE FLOODING



450+
businesses could
EXPERIENCE FLOODING OR POWER OUTAGE

~$900
million
IN BUILDING DAMAGE



~19,000
tonnes of
BUILDING DAMAGE DEBRIS

~80
hectares of parkland
AT RISK OF FLOODING

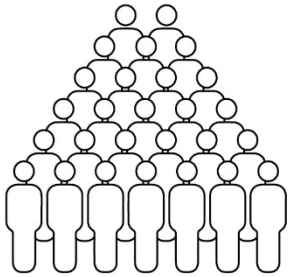
~40
Cultural and heritage places
AT RISK OF FLOODING

During major storm, whole study area

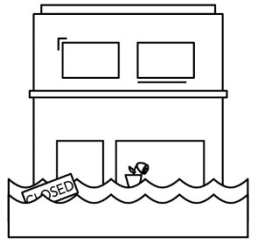
Consequences

Without adaptation measures

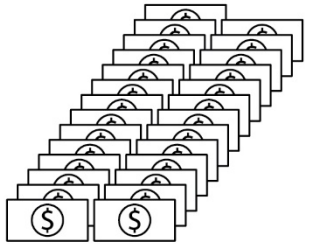
2m sea level rise



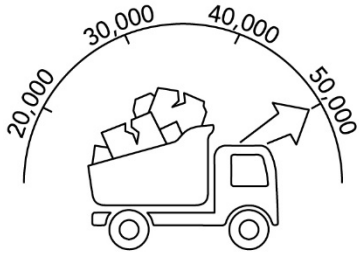
2,700+
residents could
EXPERIENCE FLOODING



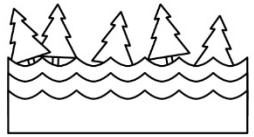
~1,900
businesses could
EXPERIENCE FLOODING OR POWER OUTAGE



~$2.7
billion
IN BUILDING DAMAGE



~50,000
tonnes of
BUILDING DAMAGE DEBRIS



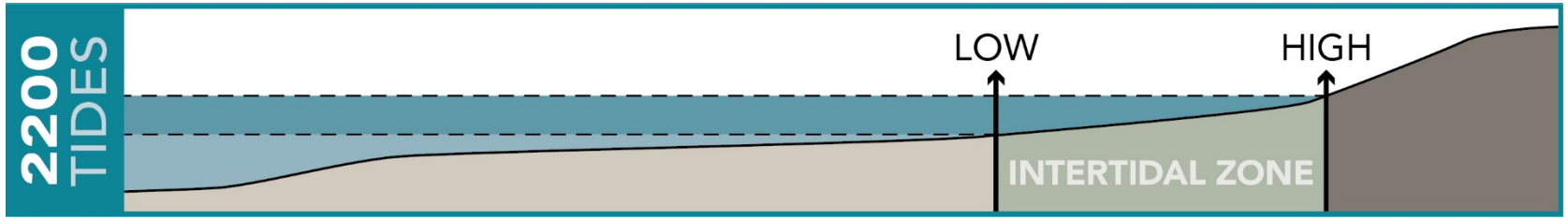
~105
hectares of parkland
AT RISK OF FLOODING

~50
Cultural and heritage places
AT RISK OF FLOODING

During extreme storm, whole study area

Intertidal Habitat Impacts

"Coastal Squeeze" occurs when walls and armoured shorelines shrink intertidal area



Natural shorelines

Photo: Port of Vancouver

Walled shoreline

Adaptation Approaches

Adaptation Approaches

Adaptation Approaches

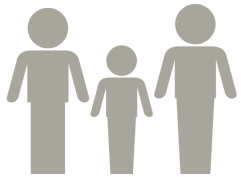
Adaptation Approaches

Adaptation Approaches

Likely a combination of approaches

Activities: getting started

Activity 1: What matters?



People

Environment

Transportation & infrastructure

Culture & heritage

Shops, businesses & industry

Residences

Parks & community spaces

Table discussion (20 minutes)

- What is important to you and why?
- What do you think is important to the community as a whole?
- As a table, pick top 3

Break

Activity 2: Explore adaptation approaches

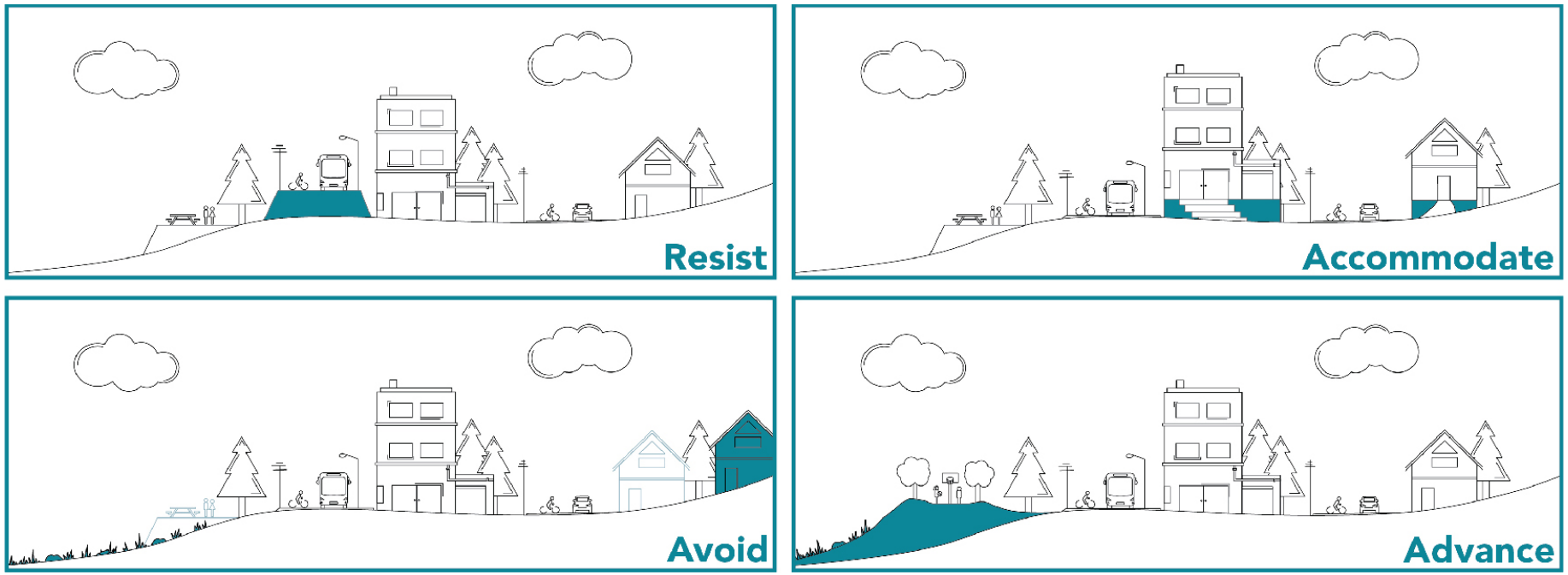


Table discussion (20 minutes)

- Which benefits or disadvantages stand out to you?
- What trade-offs should be considered?
- What co-benefits could there be?


Share 1 key take-away
or parting thought

Wrap-up

Revisiting the objectives

- Learn more about sea level rise
- Learn about developing the North Shore Sea Level Rise Strategy
- Listen to your views and issues about adapting to sea level rise

How input will be used

- Summary of main themes from initial public engagement (workshops, online survey)
- Consider input alongside technical analysis for draft Strategy

Next steps

We are here

Online survey open to February 23rd at **DNV.org/SeaLevelRise**

Spring 2020

- Draft strategy
  - public engagement
- Present to DNV Council
  - Partners present to their Councils/boards

Approach: **Resist**

Focus on structural measures such as building dikes to reduce the likelihood of flooding.

PROS

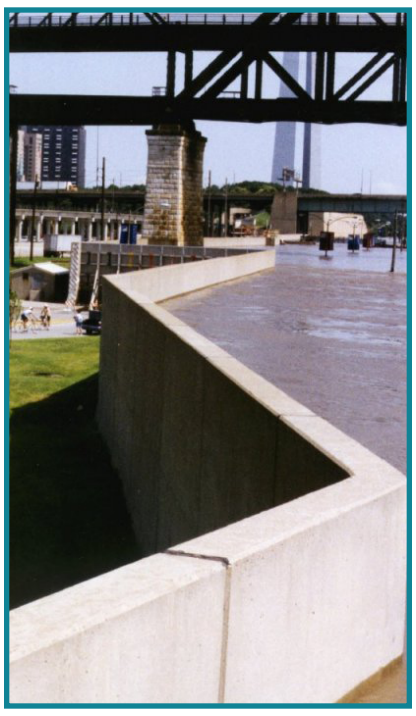
- Ability to implement standalone projects.
- Protects existing land and developed areas.
- Potential for waterfront recreational trails or roads.

CONS

- Requires land to build structures. For example, conventional flood protection infrastructure such as dikes would require significant space (on the order of 30+ metres); other protection infrastructure such as flood walls may require less space.
- Potential to increase flood hazard due to "bathtub effect", where flooding from rivers or creeks is prevented from flowing to the ocean. Structures may introduce a false sense of security (e.g. in event of structure failure).
- Potential habitat impacts.

Dike made of sheet pile and rock armoring

Dike with walkways and integrated with adjacent development



Flood walls

Flood gate

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Approach: **Accommodate**

Focus on non-structural adaptation measures, including consciously acknowledging flood risk, defining how much risk we are willing to tolerate, and raising livable spaces in areas vulnerable to flooding.

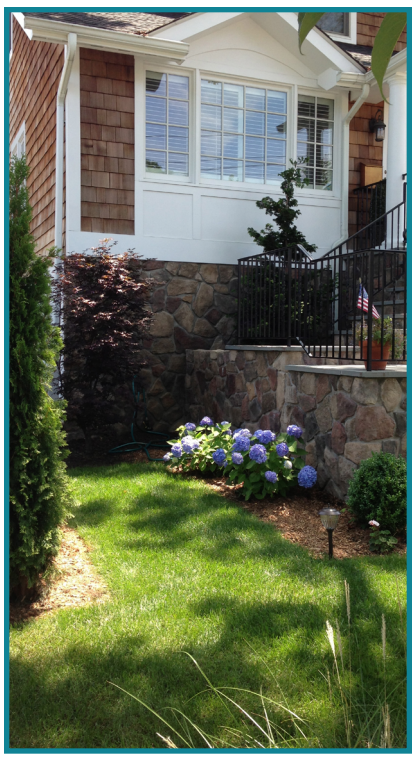
PROS

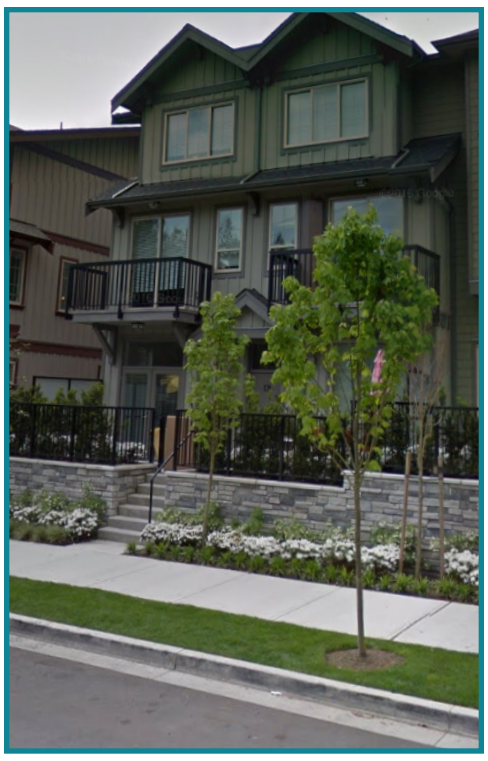
- Can be gradually implemented with redevelopment and infrastructure upgrades over time.
- Adapting existing infrastructure may be more cost-effective than building new infrastructure.

CONS

- Challenge to define risk tolerance (i.e. what the community is willing to tolerate), and potential to result in elevated risk.
- After accommodate approach measures are implemented, may need on-going education for owners on how to safely use areas below flood level (e.g. keeping mechanical equipment elevated), and difficult to enforce on private property.

Floodable Plaza





Raised buildings (dry floodproofing)

House on piles (wet floodproofing)

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Approach: **Avoid**

Focus on land use planning to avoid building or adding more uses in areas that are vulnerable to flooding, or gradually relocating buildings and infrastructure away from areas at risk of flooding.

PROS

- Highly effective at reducing risk.
- Opportunity for habitat, recreational, cultural co-benefits.
- Increased public access to waterfront.

CONS

- Costs for relocation of infrastructure or buildings.
- Possible reduced development potential, and lost tax revenue.
- Potential equity issues of who may need to move.

Convert flood-prone areas into park land and natural habitat

Relocate residents, businesses and infrastructure away from low-lying areas

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Approach: **Advance**

Reclaim land to make space for structures such as dikes, which can reduce the likelihood of flooding in coastal areas.

PROS

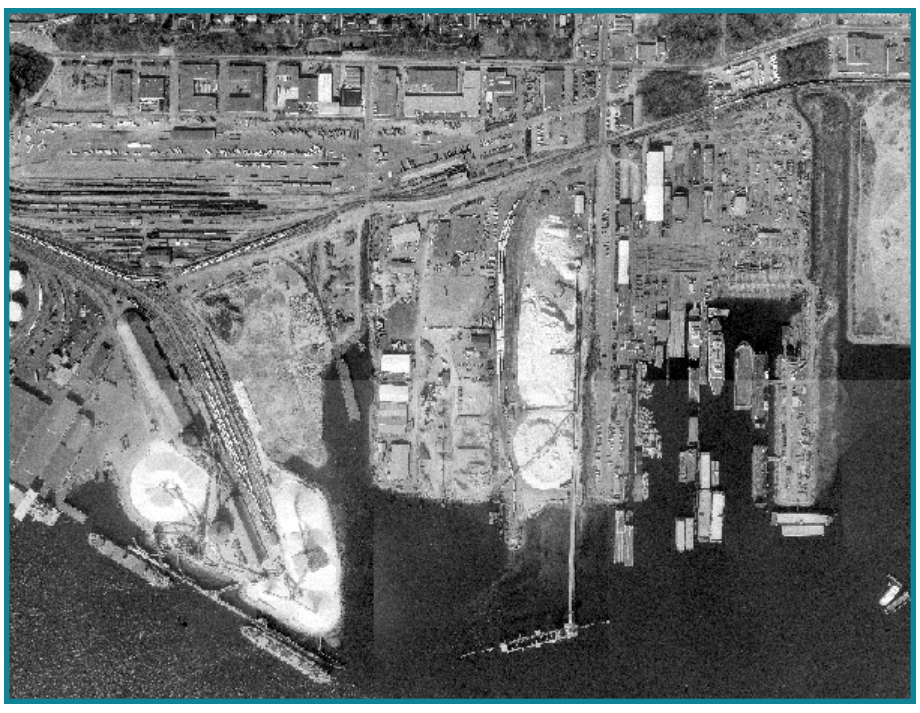
- Less impact on existing developed lands to make space for flood protection measures.
- Potential opportunities for habitat, recreational, cultural co-benefits.
- Potential development opportunities.

CONS

- Potential for major impacts to habitat.
- May entail complex implementation and regulatory requirements.
- Likelihood for high costs for reclaimed land, and may need to be combined with other adaptation approaches.

Norgate coastline in 1953: natural intertidal area

Major land filling



Norgate coastline in 1970: land filled

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Ways we use the land in the planning area

Residential

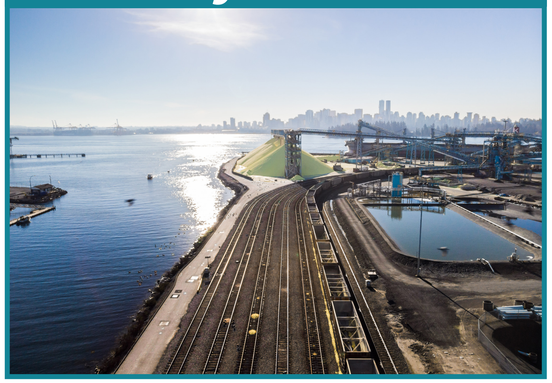
Industrial

Commercial

Parkland

Bridgeheads

Railways



Streets

Natural Areas

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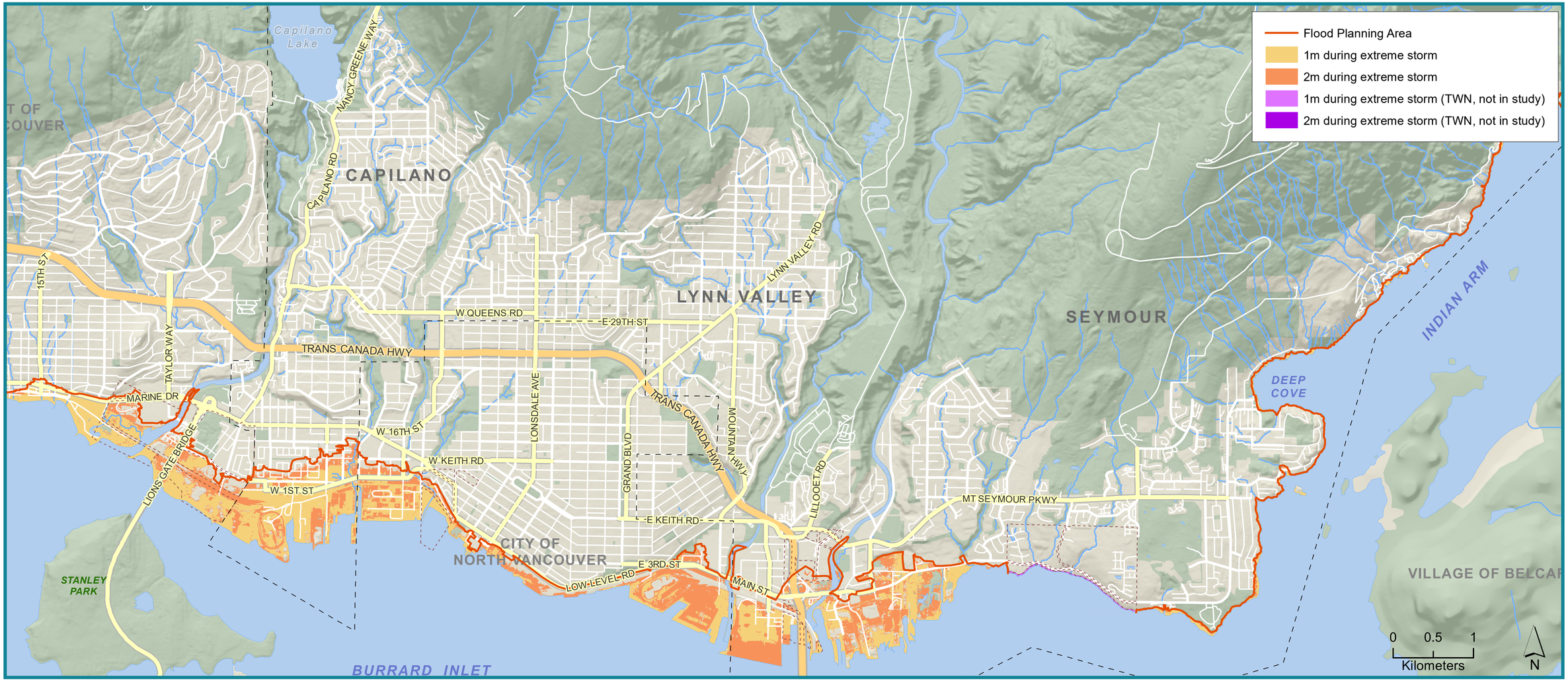
Sea Level Rise Scenarios - District

If no adaptation measures are implemented:



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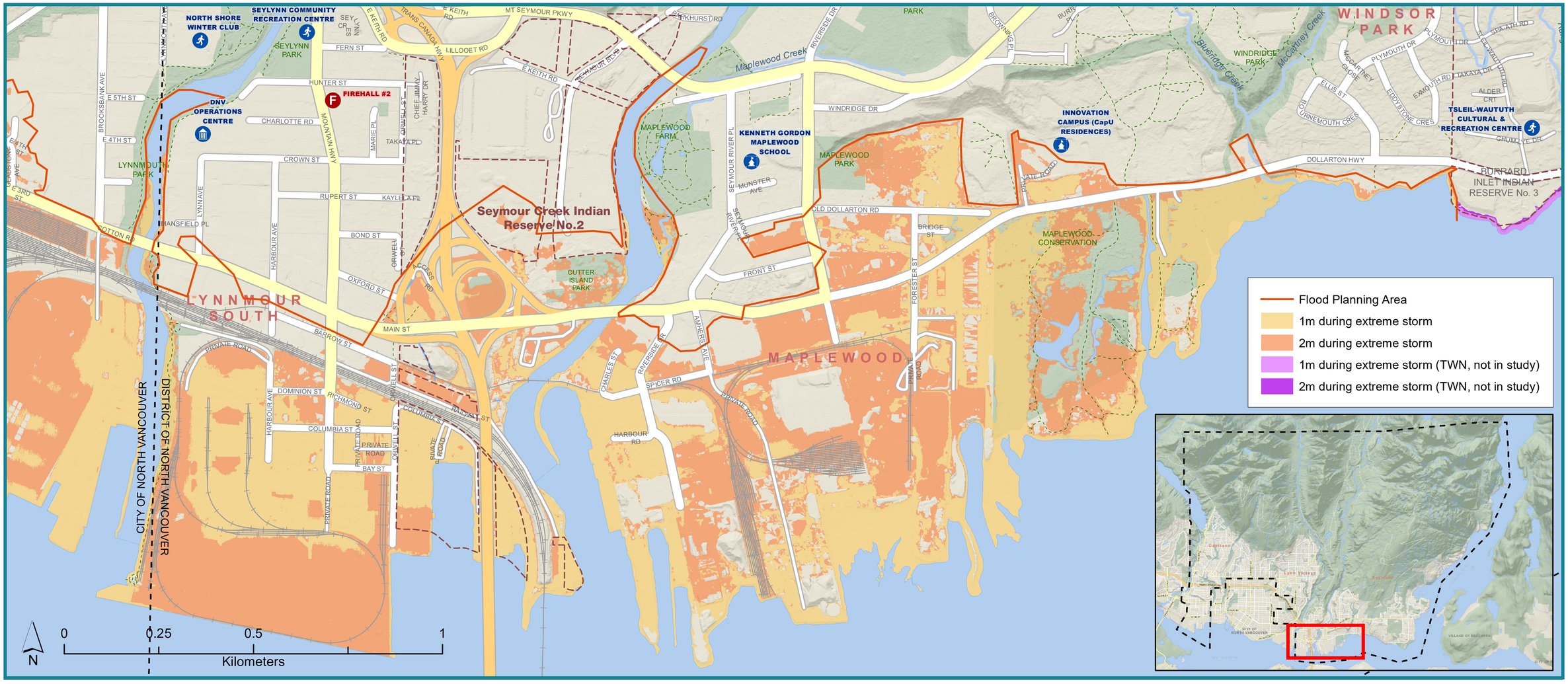
Sea Level Rise Scenarios - Norgate

If no adaptation measures are implemented:

Sea Level Rise Scenarios - Maplewood

If no adaptation measures are implemented:



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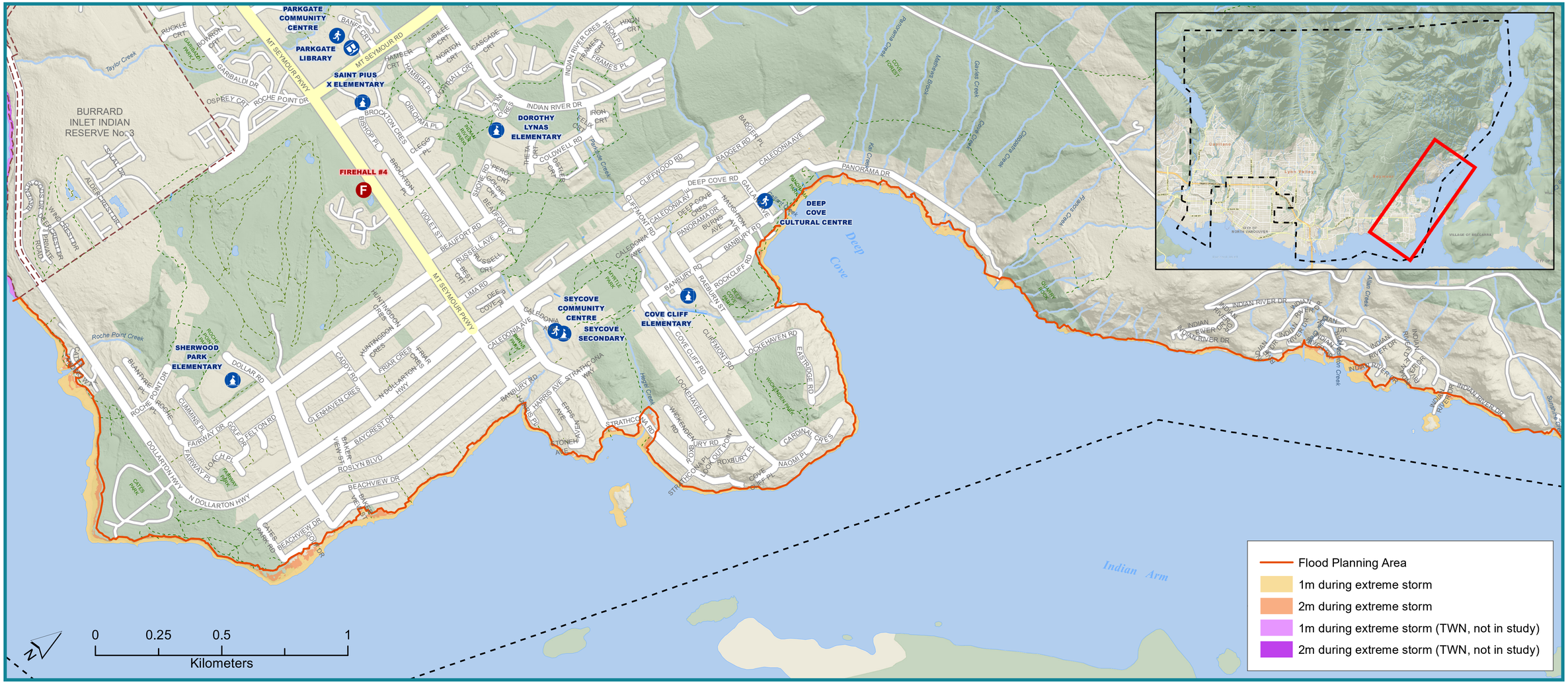
Sea Level Rise Scenarios - Deep Cove

If no adaptation measures are implemented:



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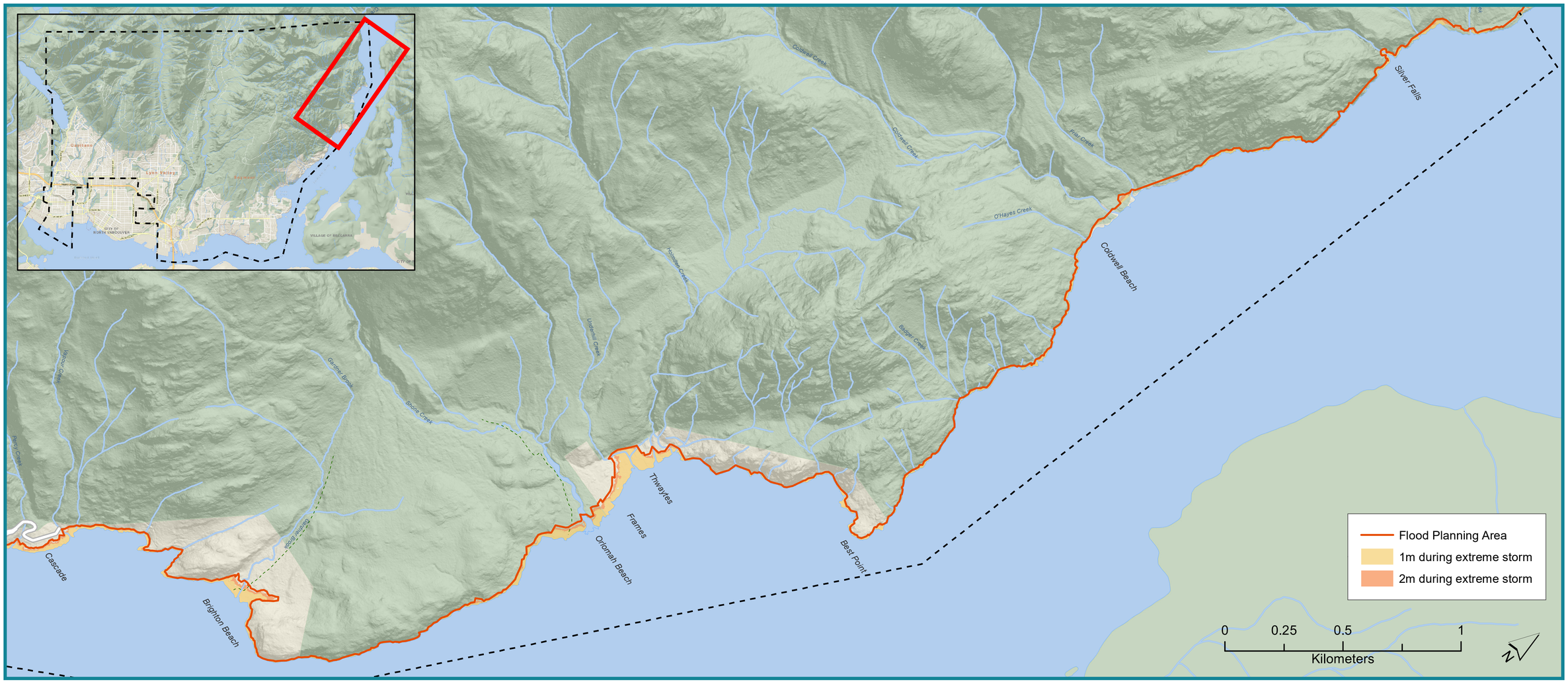
Sea Level Rise Scenarios - Indian Arm

If no adaptation measures are implemented:



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