

Collaborating with Local Governments for Climate Change Adaptation

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Outline

- Introduction
- Case Studies:
 - City of Surrey's Coastal Flood Adaptation Strategy
 - Regional District Climate Projection Reports
- Discussion

Climate change adaptation is..



Credit: City of Nanaimo



Credit: Destination BC



Credit: District of Mission



Credit: Destination BC



Credit: Destination BC



Credit: City of Vancouver

...unique for each community.



Credit: City of Surrey, CFAS

B.C. Local Governments

- B.C. has 162 municipal governments and 27 regional districts
 - Municipalities operate primarily under the Community Charter which recognizes them as an independent order of government within their jurisdiction. This enables municipalities to provide a wide variety of services that are reflective of their community's needs and desires.
 - Regional districts provide a broad range of services that vary from one region to the next.

Snapshot of Local Government Services

- Stormwater management
 - Infrastructure
 - Inflow & Infiltration
- Waterworks
 - Water Supply
 - Infrastructure
- Emergency Preparedness
 - Hazard Risk and Vulnerability Assessments
 - Emergency Plans
 - Severe Weather Response Plans
- Land Use Planning
 - Official Community Plans
 - Zoning
- Floodplain mapping
- Bylaws
 - Buildings
 - Flood Construction Levels (e.g. Overland and Coastal Flooding)
- Transportation Networks
 - Roads
 - Snow & Ice Clearing

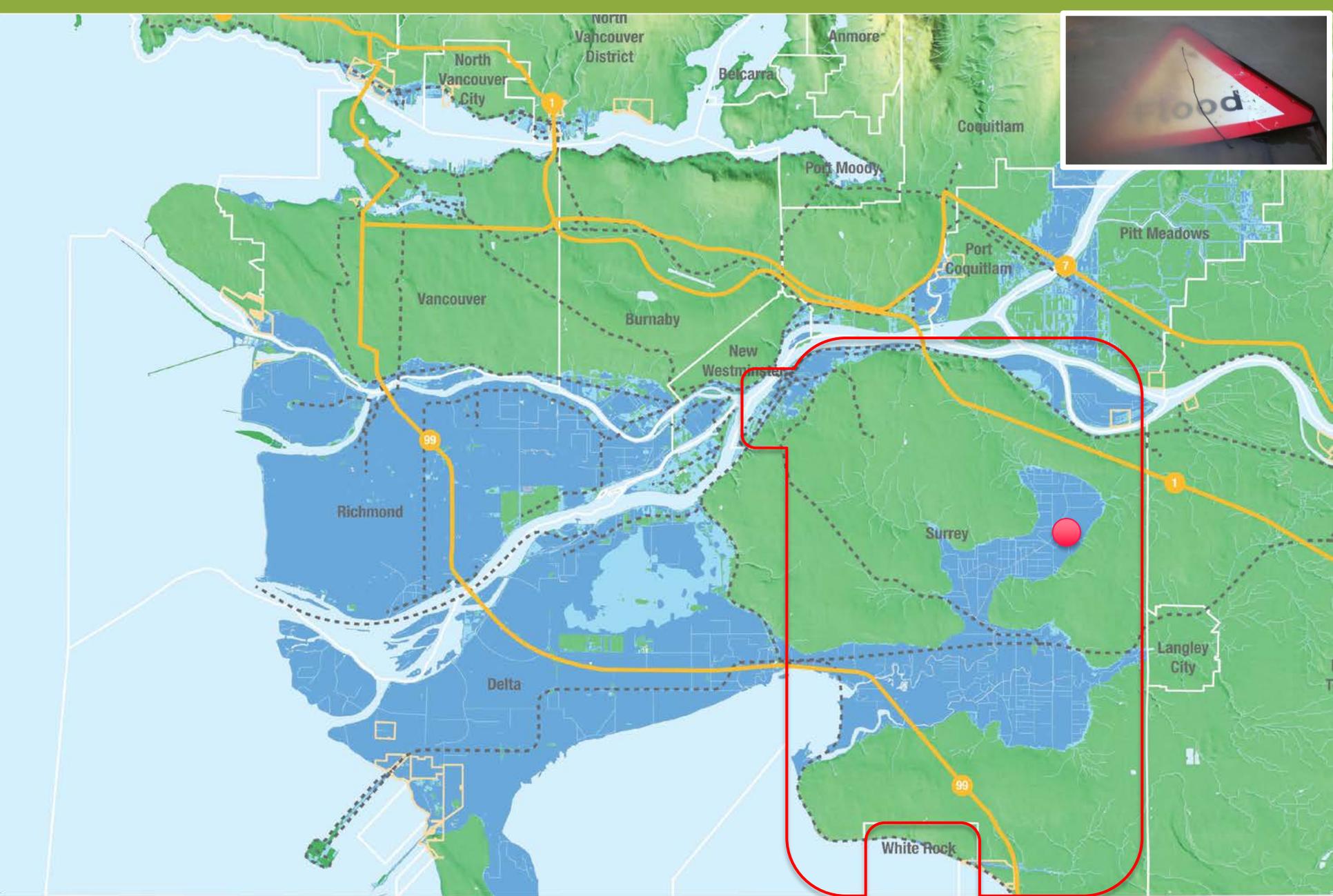


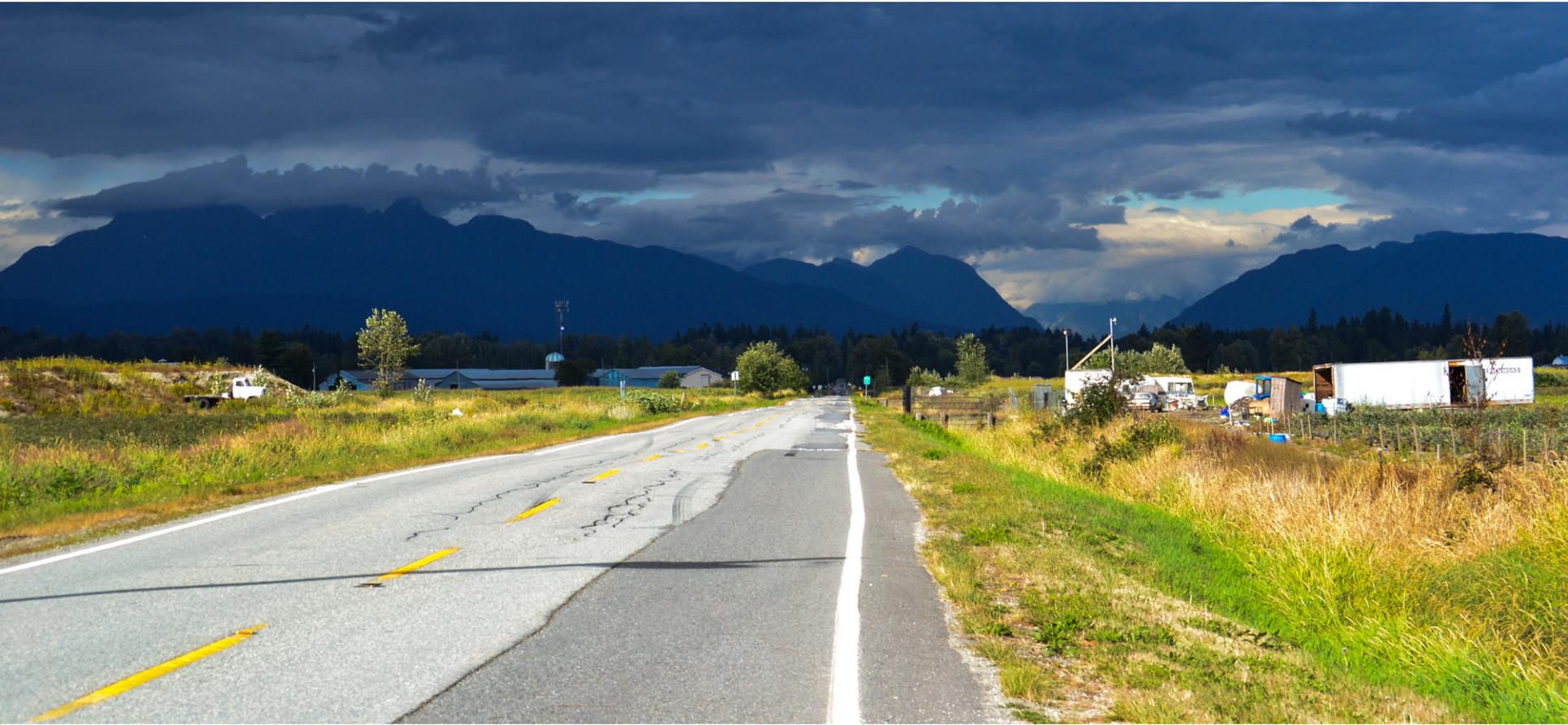
SURREY COASTAL FLOOD ADAPTATION STRATEGY (CFAS)

Public Sector Climate Leadership Symposium
December 8, 2017

Matt Osler, P. Eng., MBA
Senior Project Engineer



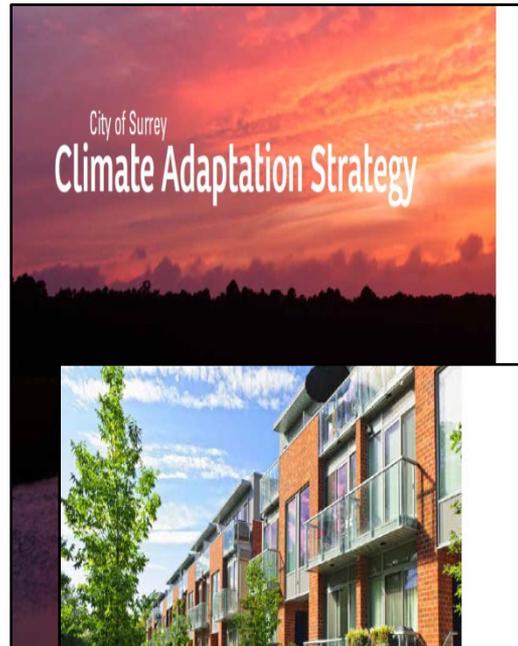






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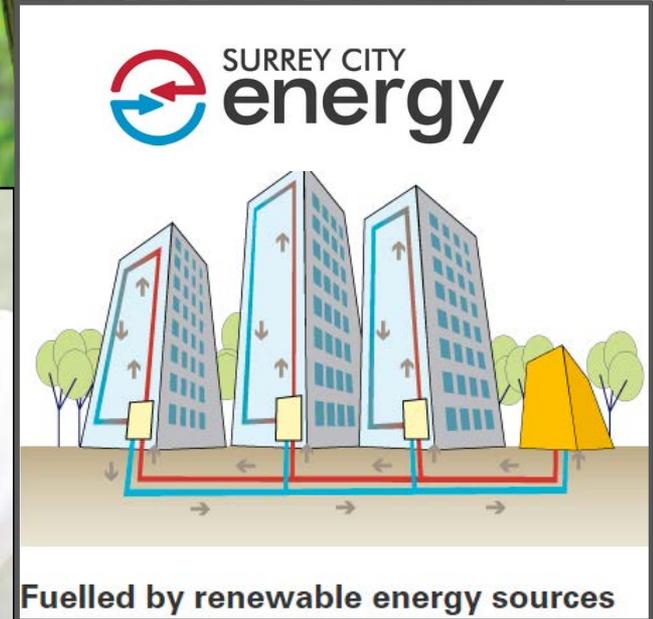
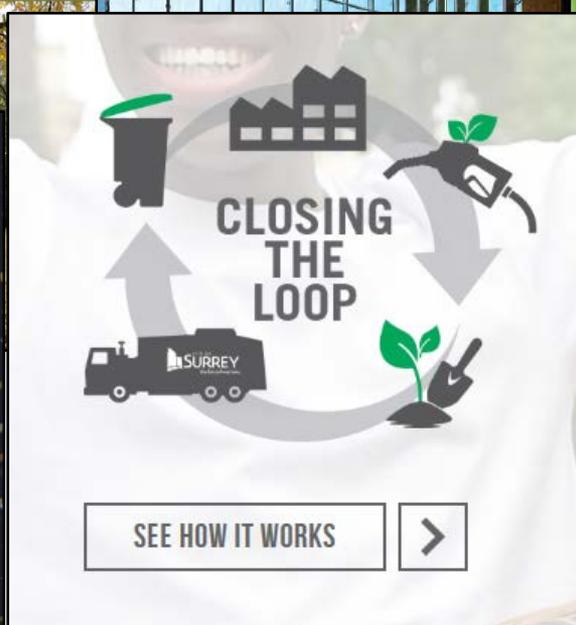
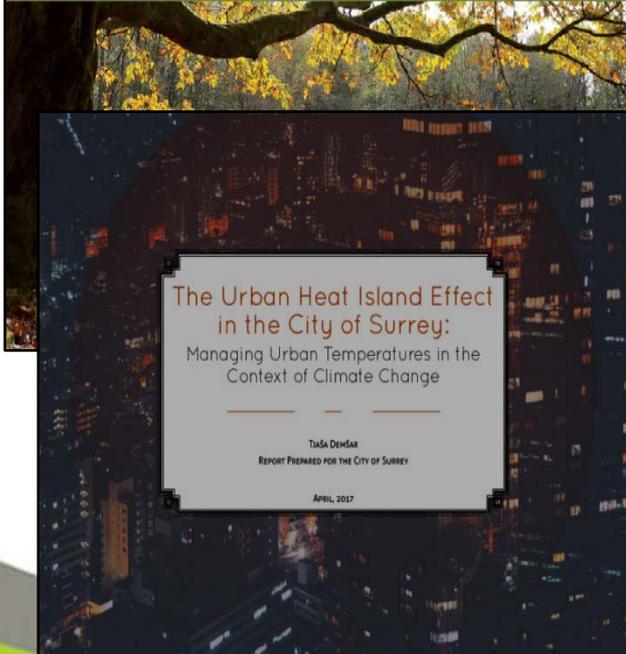
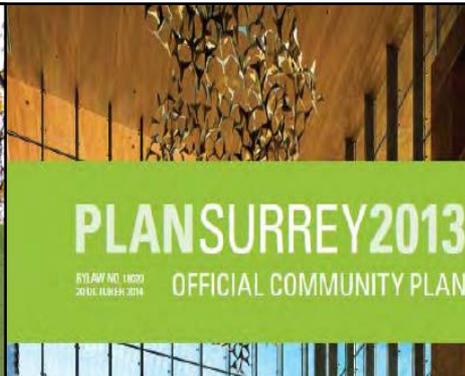
Surrey Climate Change Planning

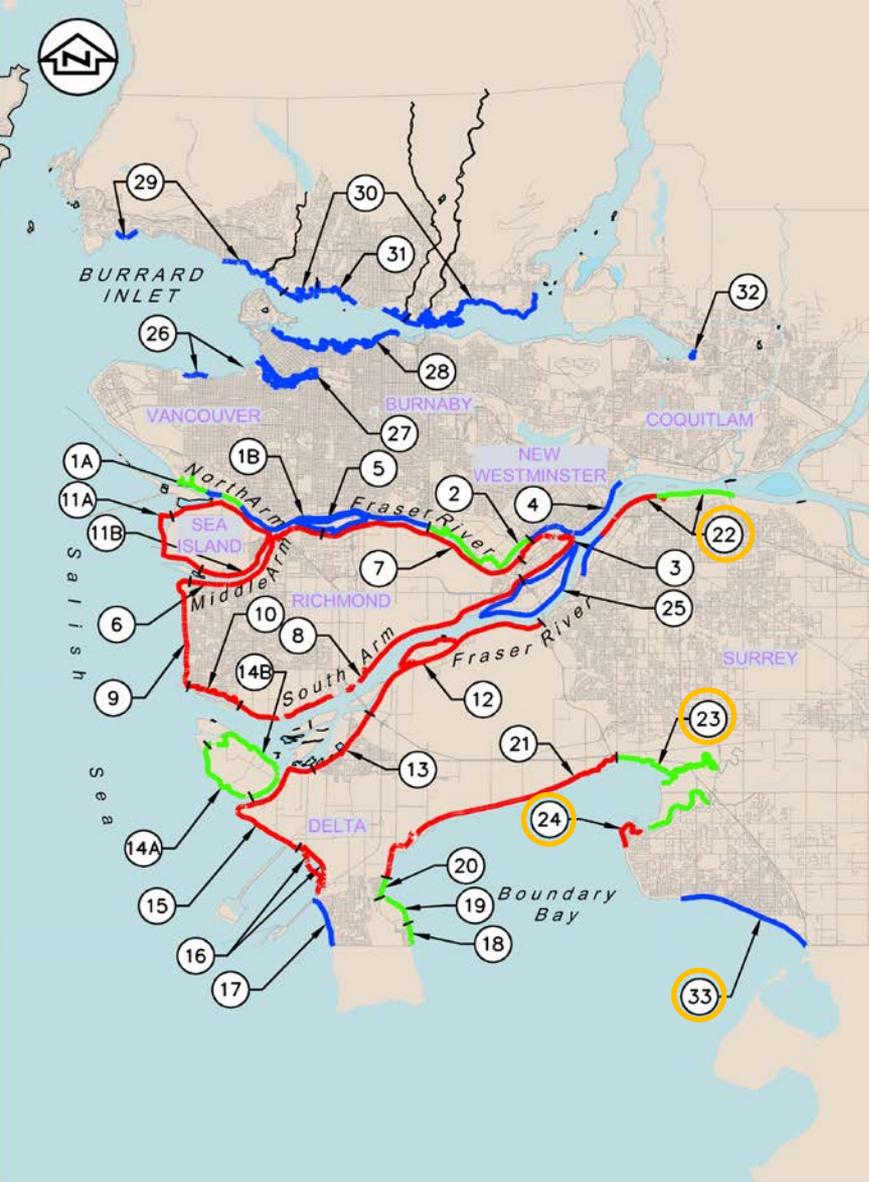


Priority Actions:

“Conduct detailed analysis on Surrey-specific climate impacts, including timelines and extent of sea level rise and its related effects on flood construction levels and floodplain designations”

Surrey Climate Change Planning





LEGEND:

- EXISTING DIKE
- EXISTING DIKE (NON-STANDARD)
- LOW LYING SHORELINES WITH NO DIKE

Introduction & Summary

- 2011 Ministry of Environment published sea level rise guidelines
 - FHALUMG Amendment, 2018
- Outlined expected sea level rise and flood protection requirements
- 2012 report estimated the cost to adapt flood protection to meet the rise in sea level predicted by 2100
- \$9.5 Billion estimate for Lower Mainland
 - Estimate of works in Surrey, \$1.5B

COASTAL AND RIVER FLOODING

1870 1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080 2090 2100 2100

Major Coastal and River Flood Events



A Changing Shoreline

In 1890, dyking of Mud Bay begins. Shortly afterwards, dyking and damming of the Serpentine and Nicomekl Rivers begins. By 1953, a timber sea wall at Crescent Beach is constructed.

Since then, residents of Surrey's Coastal Floodplain have relied on a system of dykes and sea dams to protect themselves from ocean and river flooding.



Sea Level Rise

TODAY

Sea Level Rise with Ground Subsidence

1.2 Metres

Metre



An Evolving Future

As our climate continues to change and sea levels continue to rise over the coming years, it is anticipated that the frequency and intensity of major coastal and river floods will also increase.

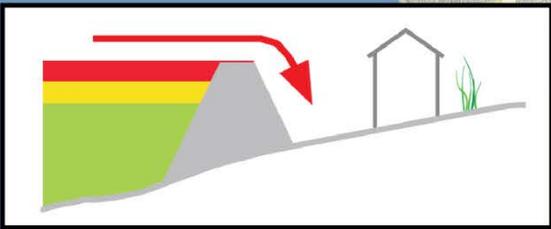
The Province has directed municipalities to plan for at least 1m sea level rise by 2100. In Surrey, and elsewhere in the Lower Mainland, most drainage systems are not designed for projected changes.

Photos courtesy of Surrey Archives and Museum

2015



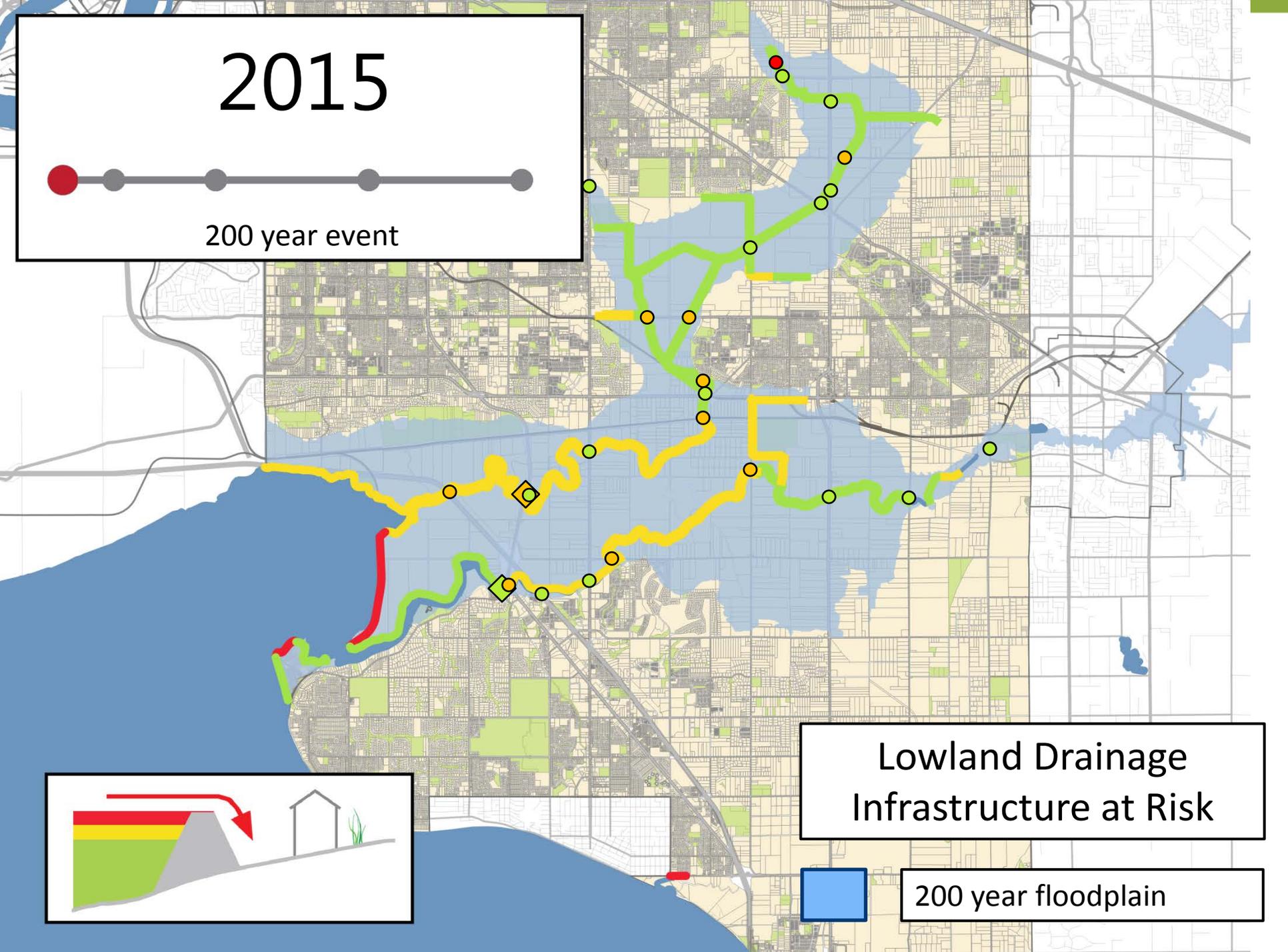
200 year event



Lowland Drainage Infrastructure at Risk



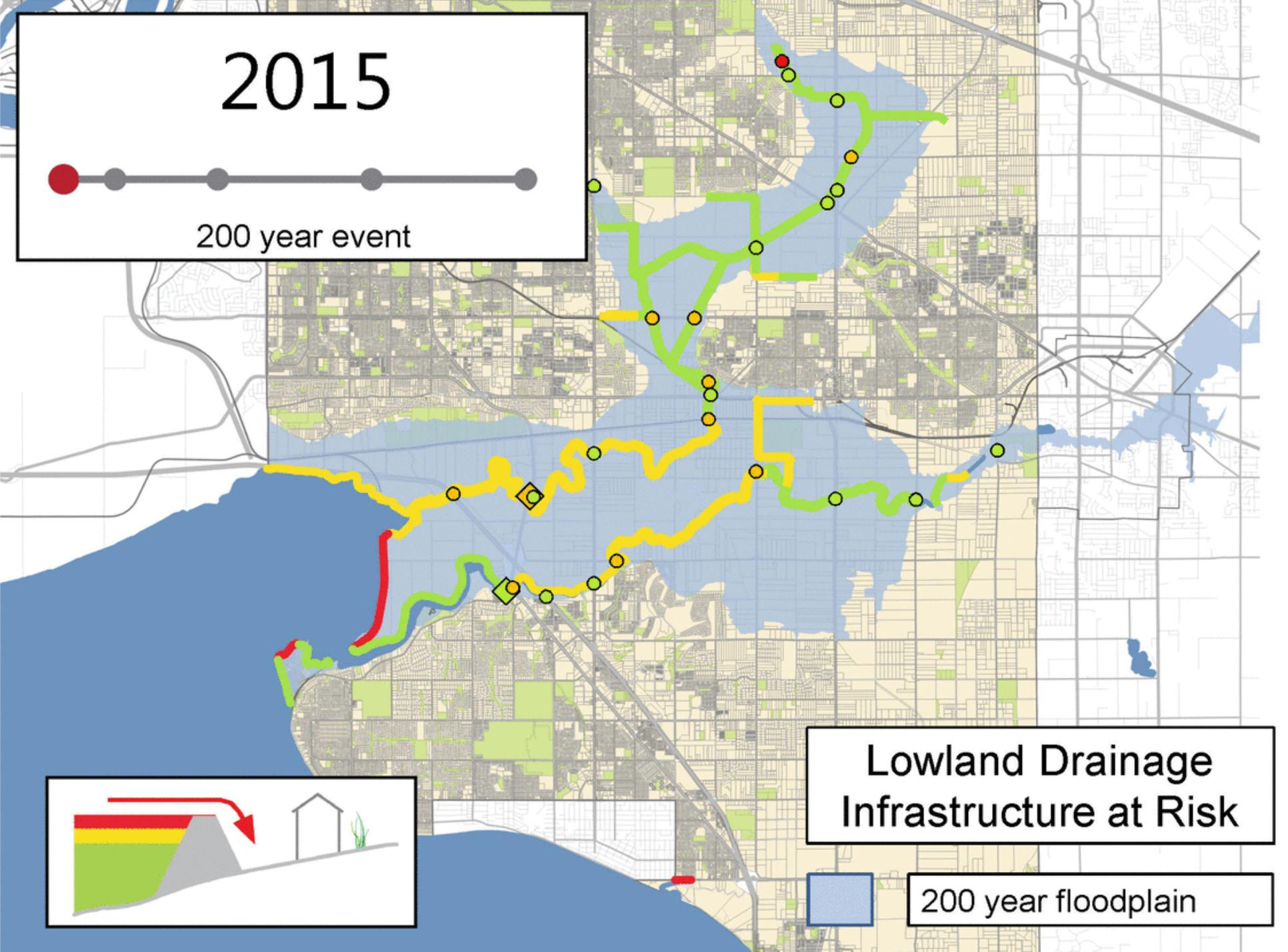
200 year floodplain



2015

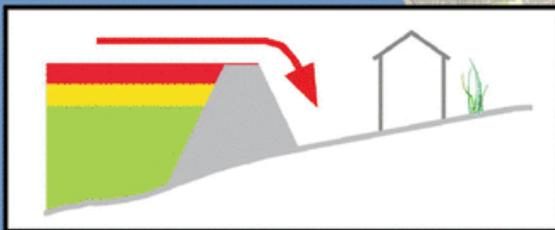


200 year event



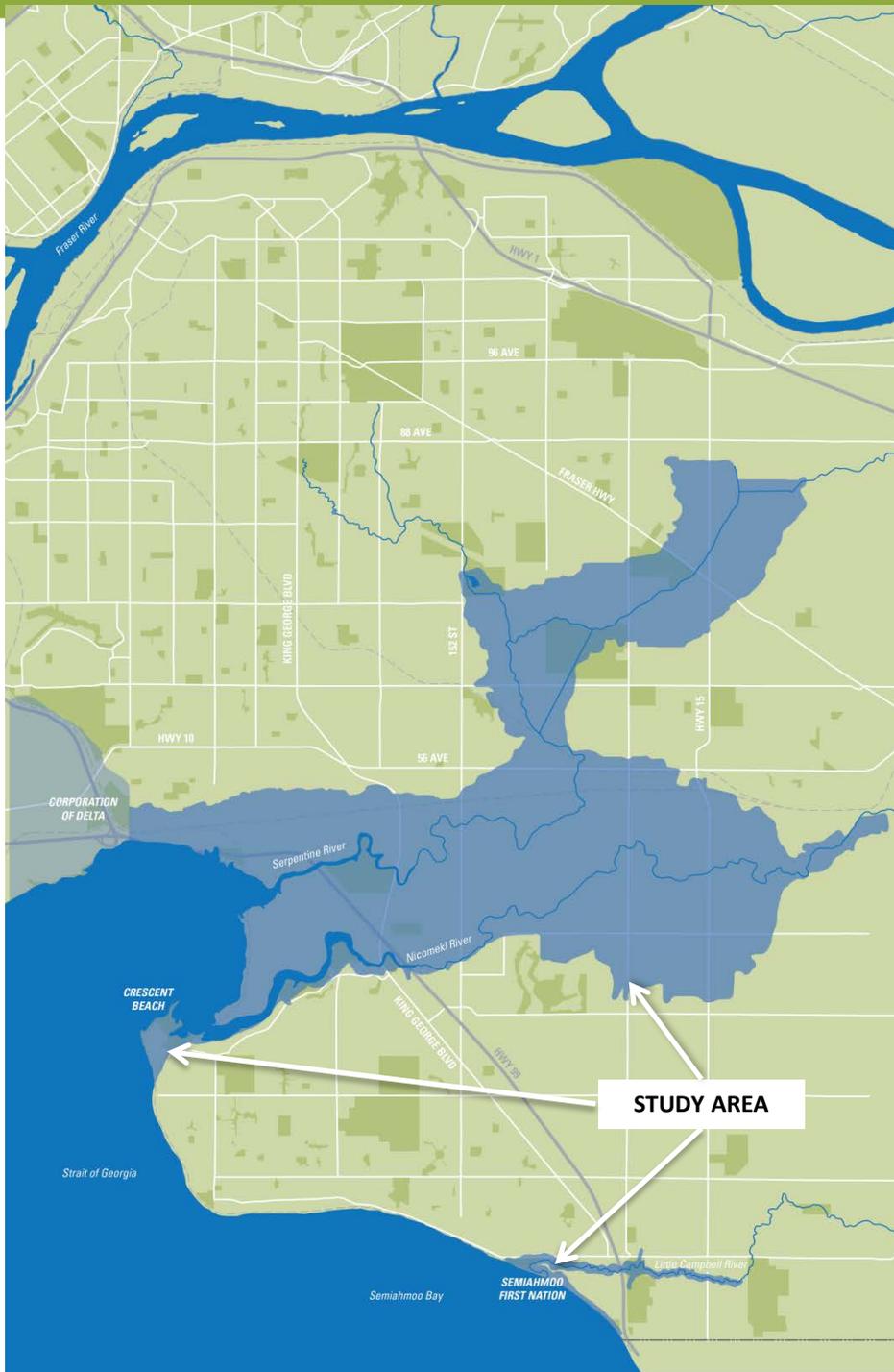
Lowland Drainage
Infrastructure at Risk

200 year floodplain



SURREY COASTAL FLOOD ADAPTATION STRATEGY (CFAS)

- Mayor & Council adopted recommendations to develop a Coastal Strategy Feb 22, 2016 under Corporate Report No. R034;2016
 - Continuing commitment to participatory planning
- CFAS anticipated to be complete by end of 2018
- Large study area with many communities, stakeholders and partners



City of Surrey Actions

Engineering Works funded through 10 Year Plan:

- Drainage Utility Fees collected on all properties
- Development Cost Charges charged new development

Since 2014, Drainage Utility funding includes Climate Change investigations & strategy development

- Trending & sea level rise studies and strategy
\$3,700,000
- Seismic Investigations / models
\$200,000
- Floodplain Mapping
\$600,000
- Regional Partnership on various projects
\$500,000

Total 2017 – 2026 **\$5,000,000**



CFAS Phase 1 Video

SURREY COASTAL FLOODPLAIN

Image © 2017 TerraMetrics
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Google earth



<https://youtu.be/Q3hYUtQQhAc>

Internal Engagement

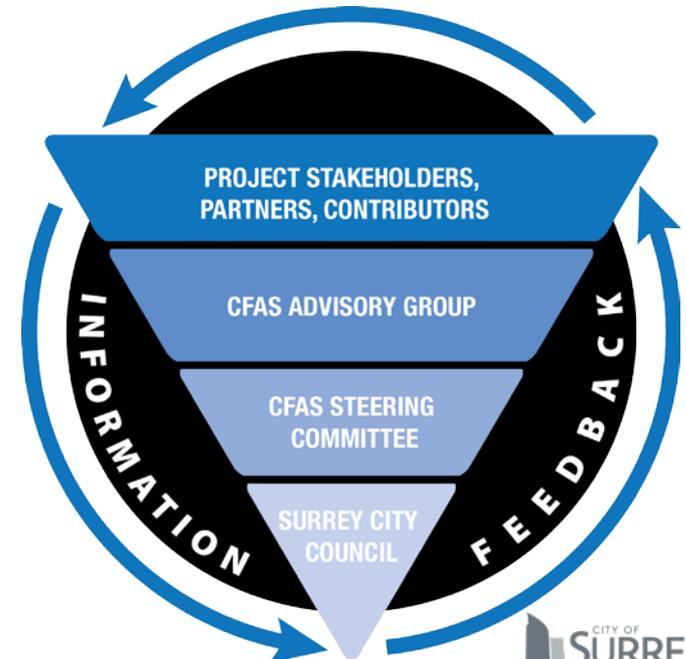
Quarterly Staff CFAS Steering Committee

- Planning & Development Department
- Engineering Department
- Parks, Recreation & Culture Department
- Surrey Fire Service
- Finance & Technology Department



Surrey CFAS Process

- Many stakeholders
 - Farmers and agricultural community
 - Residents, businesses, community groups
 - Environmental and recreational groups
 - Infrastructure operators and owners
 - Semiahmoo First Nation



External Engagement

THREE CRESCENT BEACH COMMUNITY MEETINGS

- May to September, 2016
- 60+ Participants

THREE FOCUS GROUPS

- February to March, 2017
- 60+ participants
 - Agriculture & Farming
 - Community & Residential
 - Environment & Recreation

OPEN HOUSE PHASE 1

- April 26, 2017
- Participants: 30+

SIX TECHNICAL WORKSHOPS

- Nov 2016 to Nov, 2017
- 150+ participants
 - 2 Green Shores™ Shoreline Design (1 Colebrook, 1 Crescent Beach)
 - 2 PIEVC™ Infrastructure (1 vulnerability, 1 TBL evaluation)
 - Coastal Design with Dutch & UBC
 - Coastal Regulators

SEMIAHMOO FIRST NATION

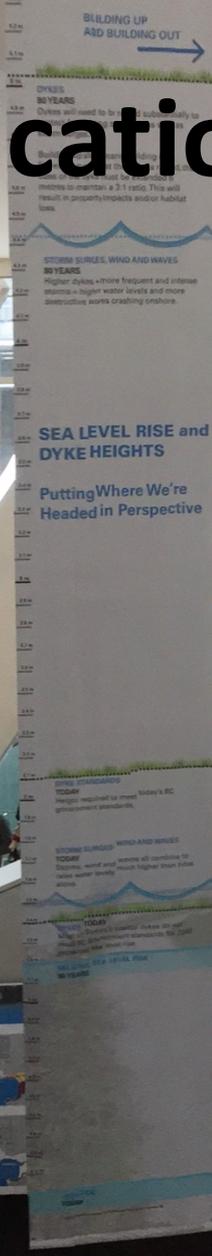
- Field visit and 3 meetings

OPTIONS ASSESSMENT

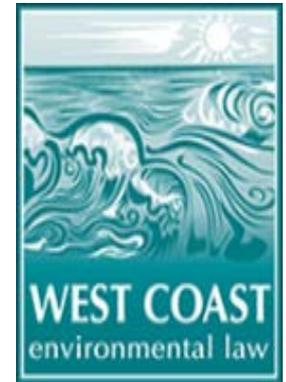
- July to November, 2017
- 100+ participants
 - Advisory Group Workshop
 - Crescent Beach Workshop
 - Semiahmoo Bay Workshop

Digital Communication

- Website
- Interactive “StoryMaps”
 - *From Saltmarsh to Farmland: How Flood Control Supports Surrey’s Agricultural Heart*
 - *Crescent Beach: Dynamic, Beautiful, Ever changing*
- E-mail
- Social Media #SurreyCoastal & YouTube Playlist
- Contests
- Surveys



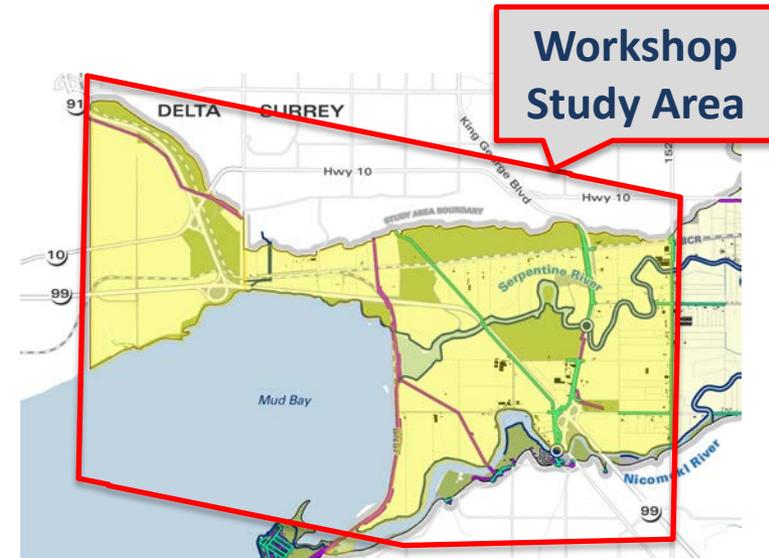
Building Partnerships for Adaptation



PIEVC Vulnerability Assessment

Workshop 1: March 28, 2017

- Mud Bay infrastructure operators, owners & emergency service providers participated in a one day workshop
- Workshop included 66 participants from 28 organizations
- Workshop utilized the PIEVC Protocol
 - Developed by Engineers Canada and heavily used by Ministry of Transportation and Infrastructure



Organizing Committee Established



Delta



Study Area Bus Tour – Sept 25, 2017

- Reviewed options in groups and visited two sites

What Did We Hear? (A brief sample)

- Regional and interjurisdictional coordination is needed
- Significant costs associated with both options, opportunity for cost-sharing important
- Need to get regulators on board and have political will
- Consider overall resilience of solutions to multiple hazards
- Adaptability over time



PIEVC Triple Bottom Line Analysis

Workshop 2: October 5, 2018

Helped to establish, in broad terms, environmental, social and economic factors to aid decision-makers in selecting appropriate adaptation actions and strategies.

Focus of
Workshop 2



Environmental



Social



Economic



What is Acceptable?



RESIDENTS:

Are people permanently displaced?



AGRICULTURE:

Is there permanent loss of agriculture land?



ECONOMY:

Is there a permanent loss of business?



ENVIRONMENT:

Are there impacts (positive & negative) to wetland habitats, freshwater fish habitat & riparian areas?



RECREATION:

Is there a diversity of recreational activities (positive & negative)?



CULTURE:

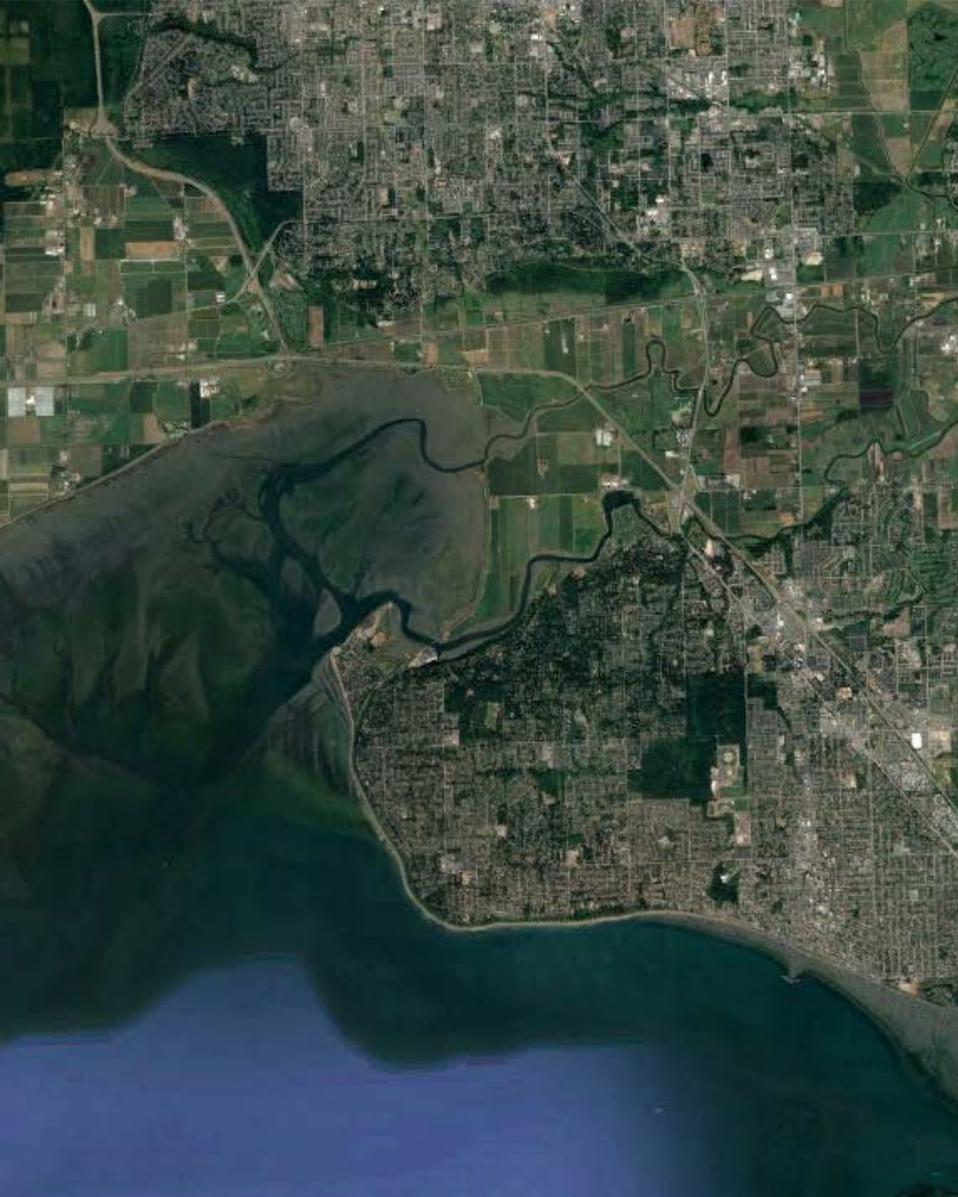
Are there Semiahmoo First Nation cultural impacts that could be expected?

CFAS Advisory Group

- Agricultural Land Commission
- A Rocha Canada
- Anderson Walk (BCS2382) Strata
- Bird Studies Canada
- City of Surrey
- Corporation of Delta
- Crescent Beach Property Owners Association
- Delta Farmers Institute
- Ducks Unlimited Canada
- Engineers and Geoscientists BC
- Fraser Valley Real Estate Board
- Friends of Semiahmoo Bay Society
- Hopkins Berry Farm
- Kooldale Farms Ltd.
- Lindrian Farms
- Little Campbell Watershed Society
- M&M Pacific Coast Farms
- Metro Vancouver
- Ministry of Agriculture
- Ministry of Transportation & Infrastructure
- Mud Bay Dyking District
- Nicomekl Enhancement Society
- Residents at large
- Surrey Board of Trade
- Surrey Environmental Partners
- Surrey Heritage Advisory Commission
- School District #36
- UBC School of Architecture & Landscape Architecture
- Westland Insurance Group
- White Rock
- Winners Holstein Ltd.

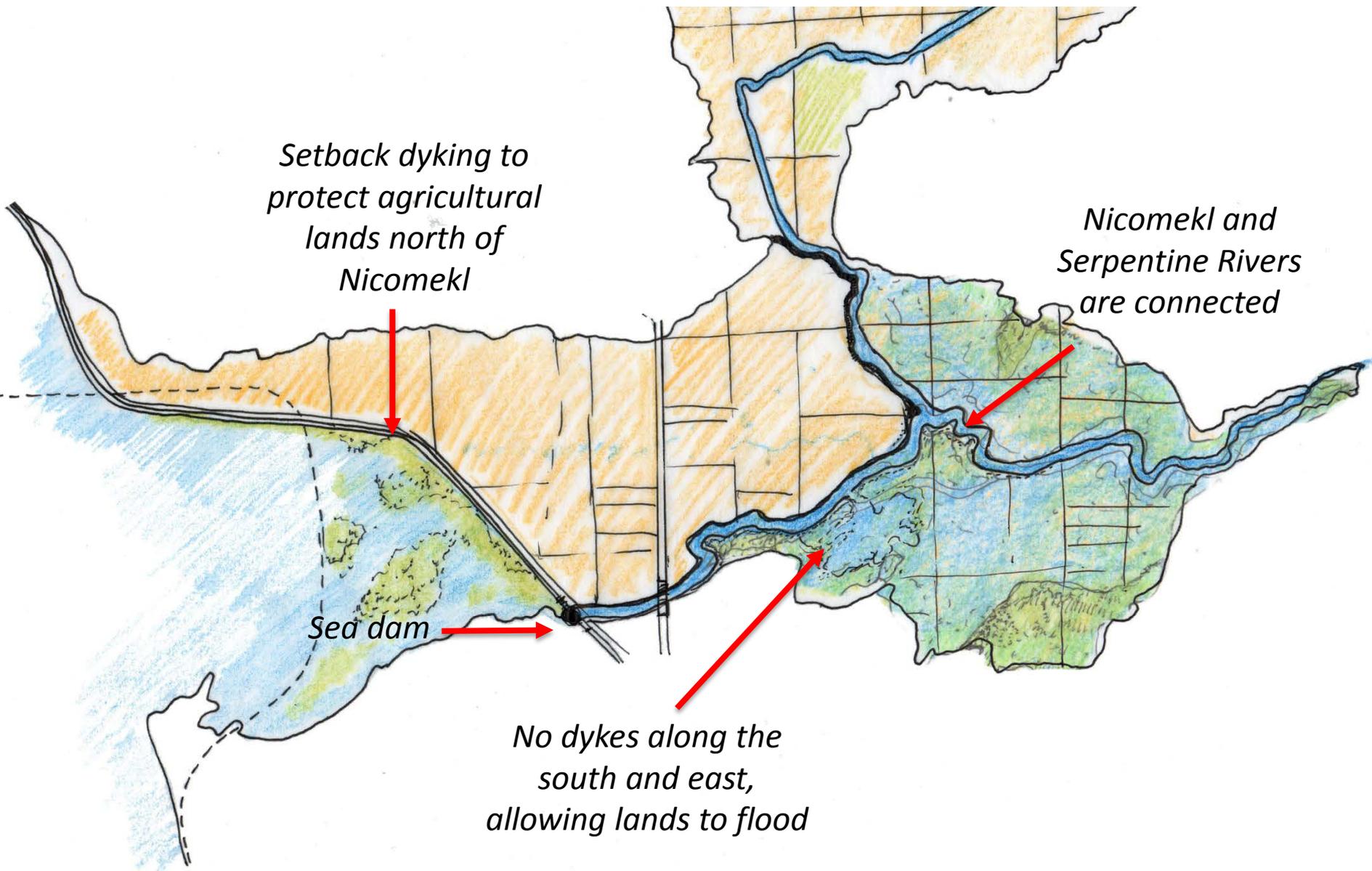


Preliminary Options Development



- Developed with stakeholder input and in collaboration with UBC-LINT (Dutch Firm)
- 10,000 ft view: Large area with many possibilities/options
- Only presenting options that are significantly different from each other
- Options are preliminary and not public
- Details and phasing come at a later point
- Sample of options developed not the final list

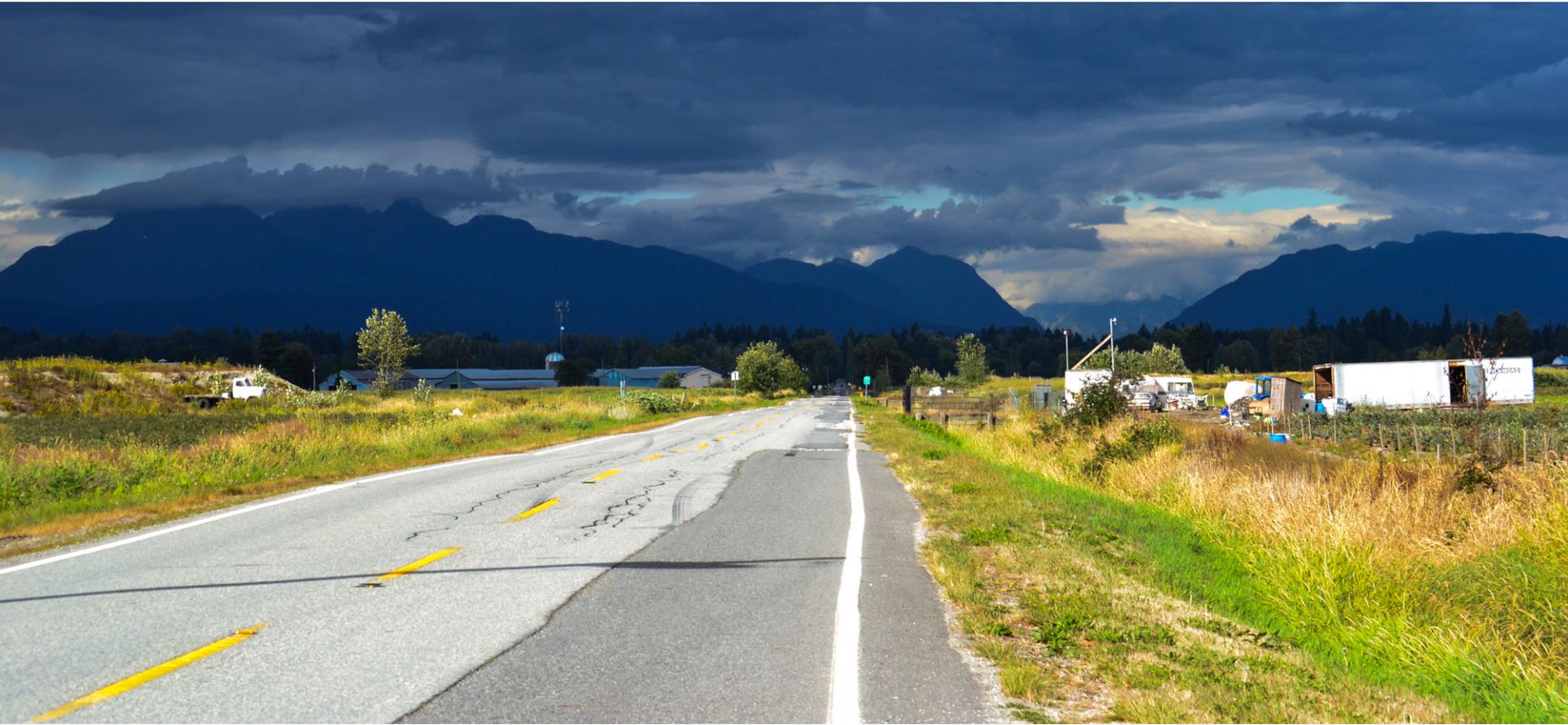
EXAMPLE CONCEPT: River Realignment



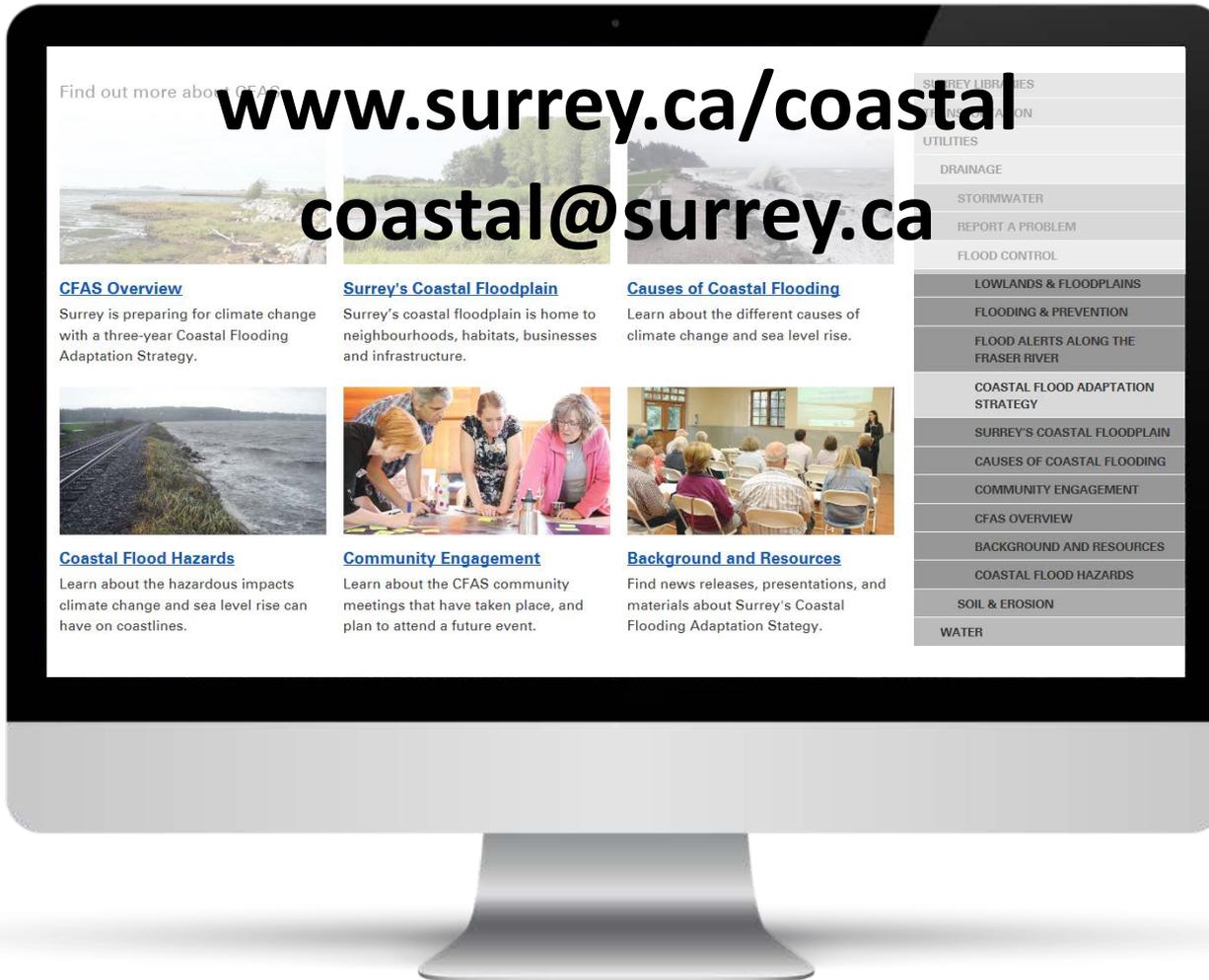
CFAS Next Steps

- Survey on broader Mud Bay Area options (January)
- CFAS Advisory Group Meeting (February)
- CFAS Open House to present preferred strategy (March)



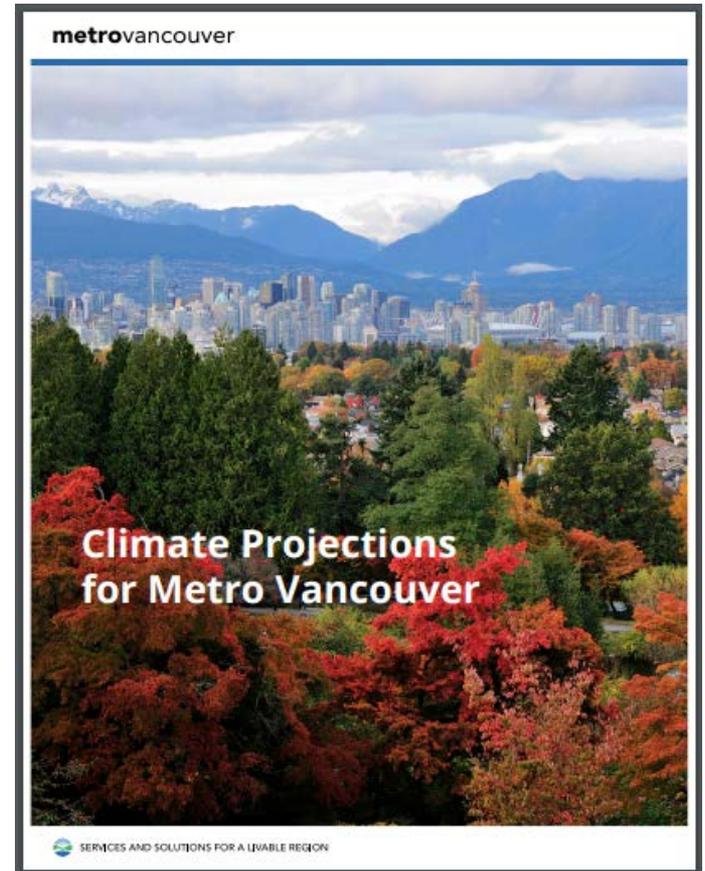


More information?



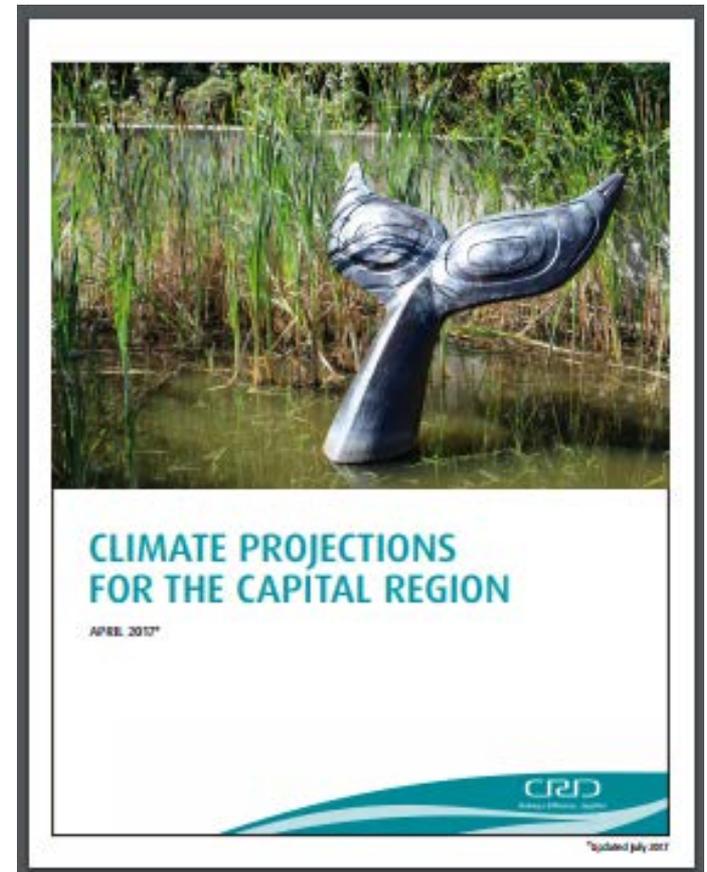
Climate Projections for Metro Vancouver

- Urban Forest Climate Adaptation Framework
- PIEVC assessment of drinking water system
- Vancouver School Board 10-year GHG reduction and adaptation plan for design of new schools/retrofits
- UBC Community Energy Manager: for future need for cooling



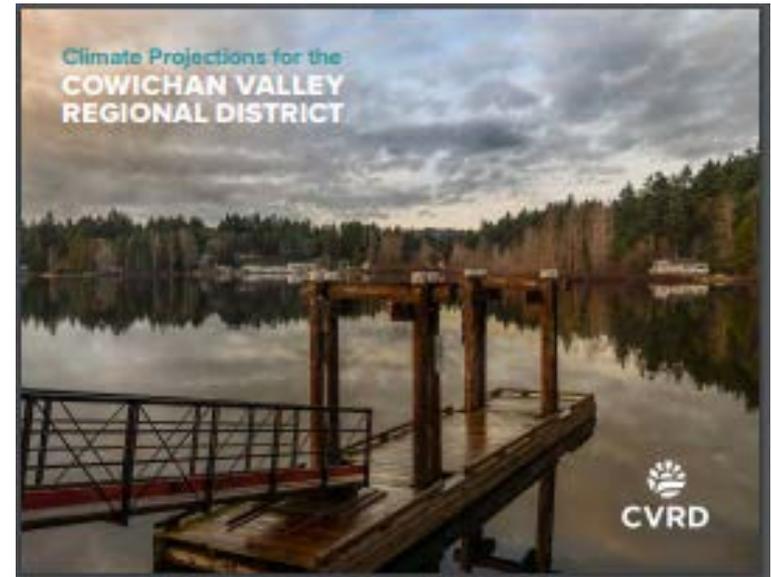
Climate Projections for the Capital Region

- Preliminary Water Balance Study for Hartland Landfill North
- Watershed Water Availability and Demand Study on the Southern Gulf Islands
- Island Health's climate risk mapping and building design criteria
- Keyline Design Guidebook (for agriculture industry)



Climate Projections for the Cowichan Valley

- Science and sustainability curriculum with local schools
- School District Energy Managers
- Regional Air Quality Roundtable Master Plan
- Stormwater analysis and infrastructure assessment for the Koksilah industrial area
- CVRD corporate energy analysis and GHG strategy



Discussion

- What does collaboration look like for you? Or your organization?
- What are the barriers?
- What are the benefits?
- What are ways to get collaboration started?

Getting the ball rolling

- Reach out to your local government(s)
- Stay informed about engagement opportunities through:
 - Local government newsletters and social media accounts
 - BC Climate Action Secretariat's Climate Leader Reader

Example



[More Information](#)

Resources

- City of Surrey's [Coastal Flood Adaptation Strategy](#)
- Regional Climate Projection Studies
 - [Climate Projections for Metro Vancouver](#)
 - [Climate Projections for the Capital Region](#)
 - [Climate Projections for the Cowichan Valley Regional District](#)

Resources

- Plan2Adapt.ca
- ReTooling.ca
- [BC Adapts Video Series](#)
 - [Coastal Flood Management](#): examples of adaptation to sea level rise
 - [Rainwater Management](#): examples of adaptation to changed precipitation and stormwater patterns
 - [Water Conservation](#): examples of adaptation to seasonal droughts

Resources

- [Preparing for Climate Change - An Implementation Guide for Local Government](#)
- Adapting highway design and maintenance to ensure safety and reliability
 - [Climate resilience technical circular, 2015](#)
 - [EGBC Climate Resilience Guidelines for Highway Infrastructure, 2017](#)

Thank you!

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