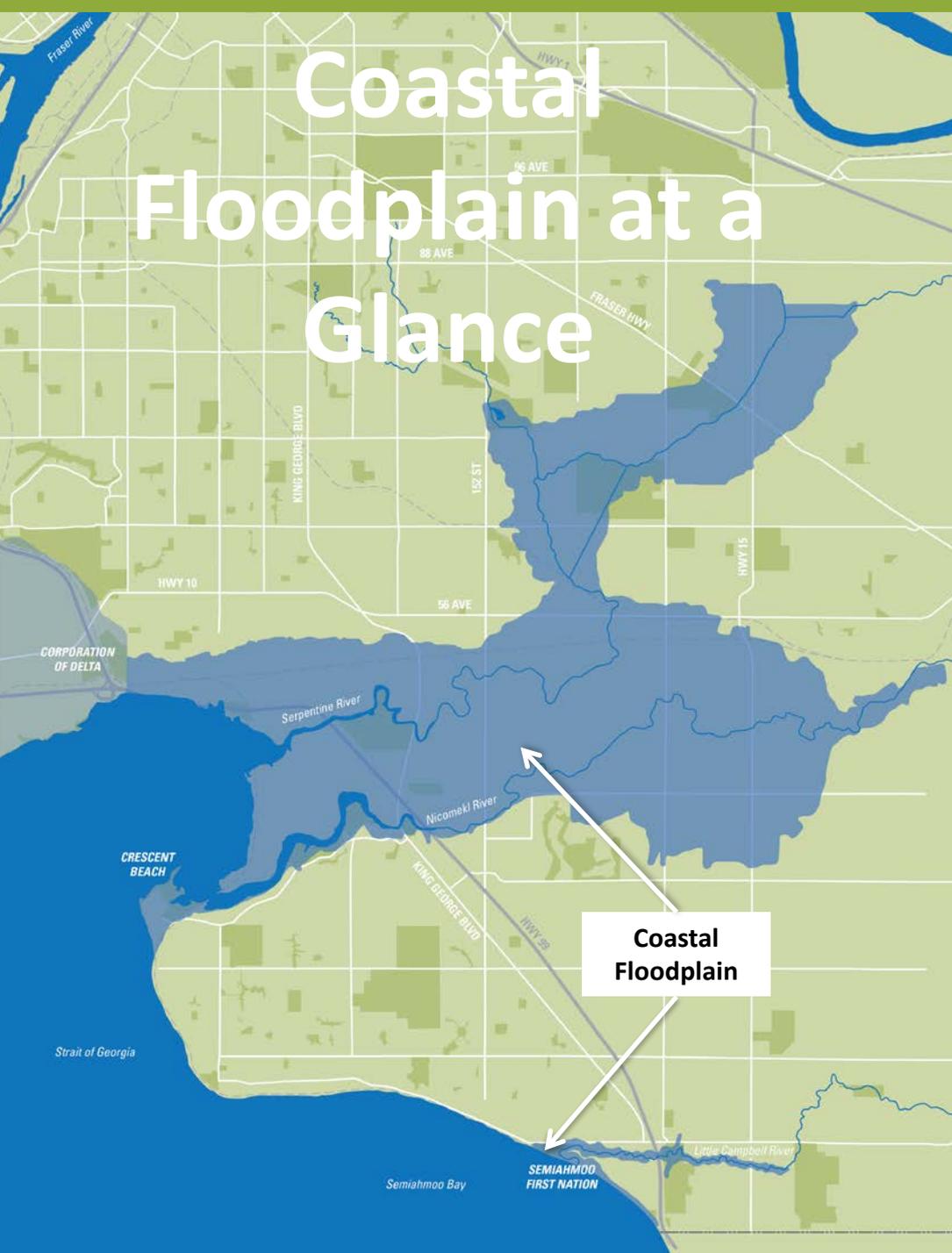


SURREY COASTAL FLOOD ADAPTATION STRATEGY and DISASTER MITIGATION ADAPTATION FUND UPDATE

February 11, 2019 CIC Presentation

Coastal Floodplain at a Glance



Coastal Floodplain at a Glance



COMMUNITIES AND PEOPLE

Many residential areas and neighbourhoods
Semiahmoo First Nation
2,500+ residents
Approximately 20% of Surrey's land area



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PARKS AND ENVIRONMENT

Destination regional and City parks
Beaches and recreation areas
Critical foreshore, coastal, and riparian areas



Coastal Floodplain at a Glance



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LOCAL AND REGIONAL ECONOMY

3,000 jobs
Over \$100M in annual farm gate revenue
Over \$2B in assessed property value
Almost \$25B annual truck and rail freight traffic

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INFRASTRUCTURE



Over 10km of Provincial Highways
Over 200,000 vehicle trips a day
Over 30km of railway (freight, passenger)

Lowland Flood Management Video



<https://www.youtube.com/watch?v=bn4RQQaEfV8&list=PLzV7gE1jnZNtBJzAXgQ7kwMNf6bQFRQm8&index=3&t=0s>

Coastal Flood Adaptation Strategy (CFAS)

- The Province has directed municipalities to consider 1m of sea level rise by year 2100.
- Coastal cities around the world are facing same challenges



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

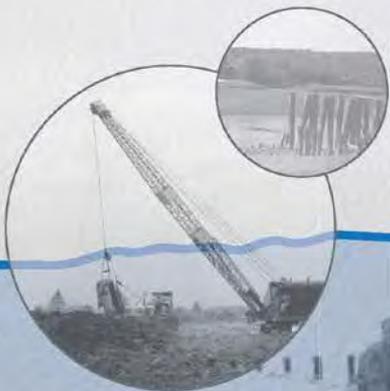
Major Coastal and River Flood Events



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

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.

1
Metre

100 cm

80 cm

60 cm

40 cm

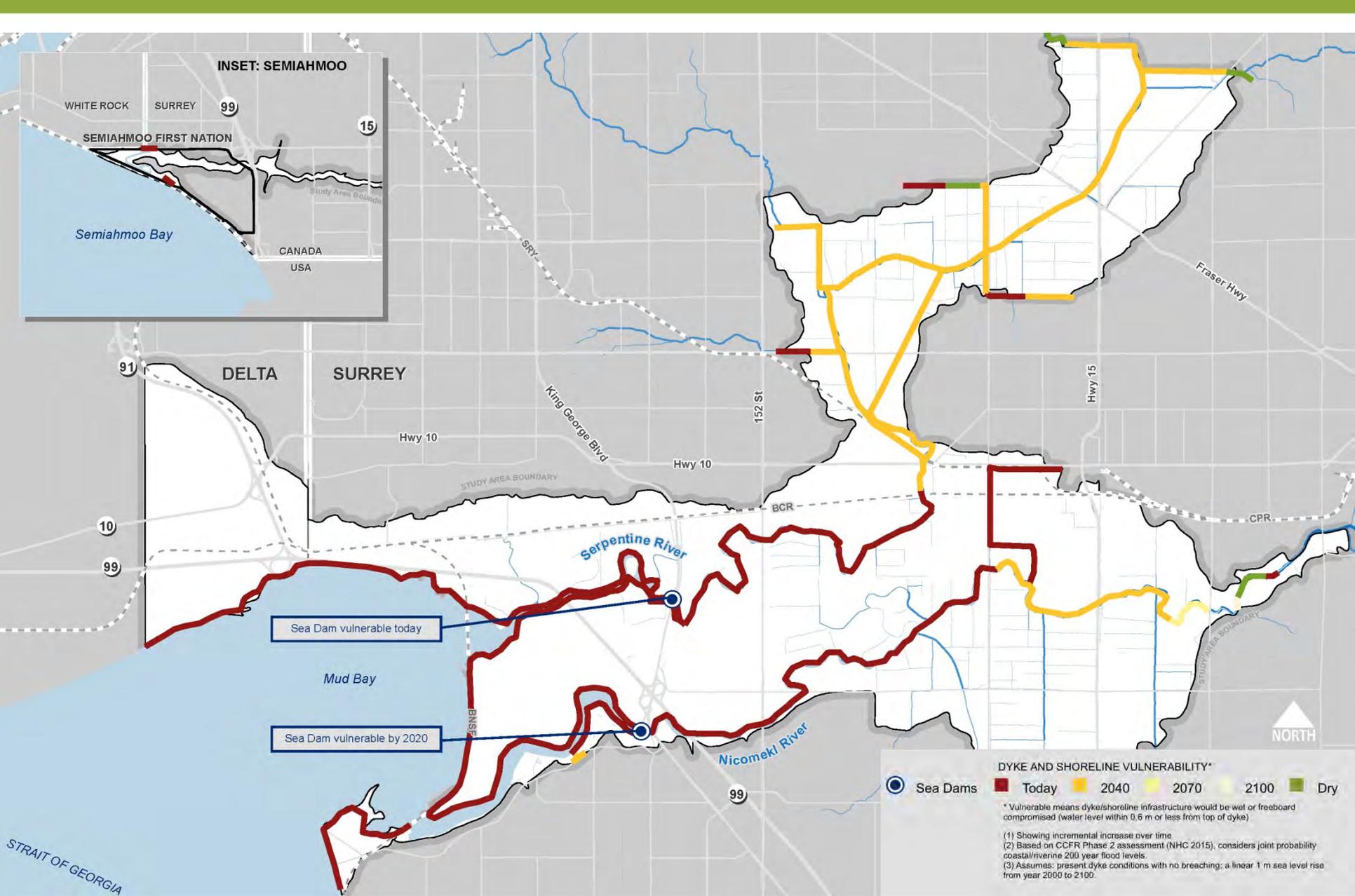
20 cm

0 cm

What are we seeing?

Photos from December 20, 2018 high wind event





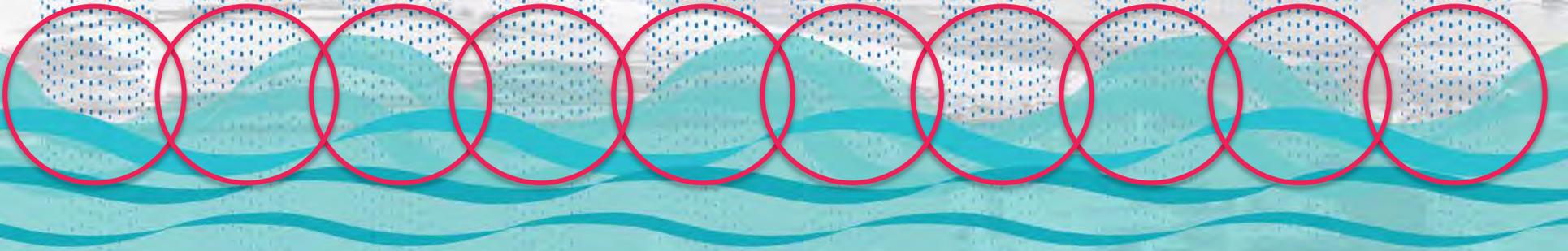
Flood Frequency

0.5%
chance of an
extreme
flood today



Flood Frequency

50%
chance of an
extreme
flood in
2100



Community, Stakeholder & Partner Engagement



4

MEETINGS AND SITE VISITS
with Semiahmoo First Nation

3

FOCUS GROUPS
(Agriculture & Farming, Community & Residential, Environment & Recreation)
60+ participants

7

TECHNICAL WORKSHOPS
2 Greenshores™ Shoreline Design workshops, 2 PIEVC™ infrastructure operators workshops, 2 Design workshops with Dutch engineering design experts and UBC researchers, Coastal regulators, Coastal stewards

3

CFAS ADVISORY GROUP WORKSHOPS
With project stakeholders and partners, including local governments, infrastructure operators, provincial agencies, organizations, residents and farmers

5

CRESCENT BEACH COMMUNITY WORKSHOPS
140+ attendees



BUS TOURS
Site tour and "walk-shops" around the CFAS study area
70+ participants



SURREY YOUTH ENGAGED
5 sessions with high school students, 2 youth events at City Hall, and 80 CFAS postcards completed by elementary school students



COMMUNITY CONVERSATIONS
at Crescent Beach pop-up event hosted with 40+ University of the Fraser Valley Geography and Environment students



POP-UP PROJECT OUTREACH STATIONS
Crescent Beach, Blackie Spit, SFU Surrey, Surrey Centre/Ocean Park/ Semiahmoo Public Libraries, Surrey City Hall, Alexandra House (Crescent Beach)



WORKSHEETS COMPLETED
At various engagement events and workshops



SOCIAL MEDIA IMPRESSIONS
Instagram & Twitter (200+ #SurreyCoastal mentions), Facebook (100+ CFAS comments), LinkedIn, YouTube (1,000+ hours of CFAS video views), CFAS website and StoryMaps (10,000+ views)



1,000+
COMMUNITY MEMBERS
directly involved to date



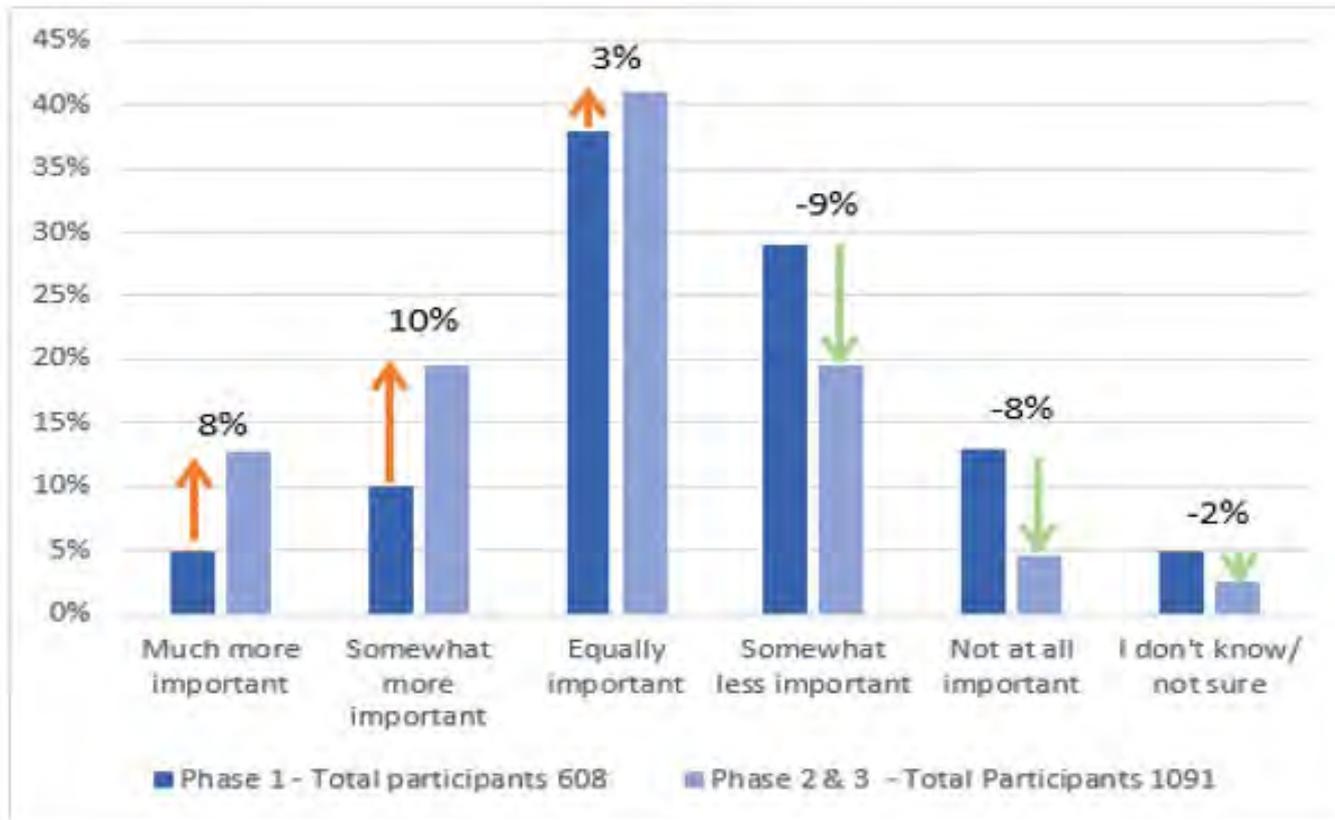
#SURREYCOASTAL PHOTO CONTEST
200+ submissions on Facebook, Twitter, and Instagram with winners in three categories



1,000+
SURVEYS
Completed online, at CFAS workshops, at community events, and by CitySpeaks Members

Public Awareness

By comparison to other issues Surrey is facing, how important is the issue of sea level rise and coastal flooding?



Building Partnerships

UNIVERSITY
OF THE FRASER VALLEY



\$272,525 received to date
\$176,600 eligible upon completion



Options Development – What can we do?

Preliminary Options Development with
Community and Professionals



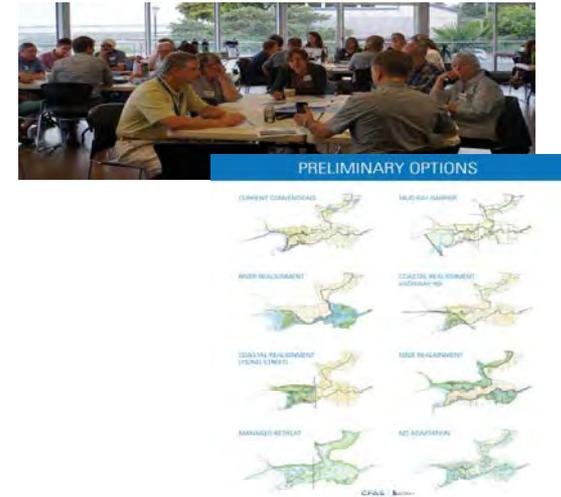
Options Development – What can we do?

Preliminary Options Development with
Community and Professionals



HIGH-LEVEL FEASIBILITY
ANALYSIS

Community Review of
Preliminary Options



Options Development – What can we do?

Preliminary Options Development with
Community and Professionals

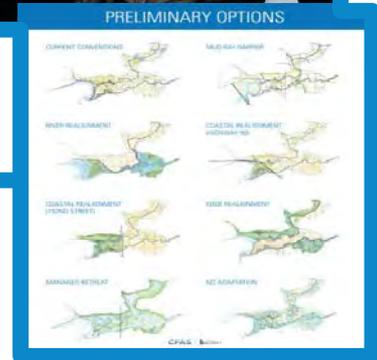


Community Review of
Preliminary Options

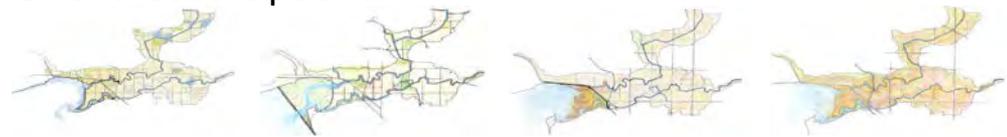


HIGH-LEVEL FEASIBILITY
ANALYSIS

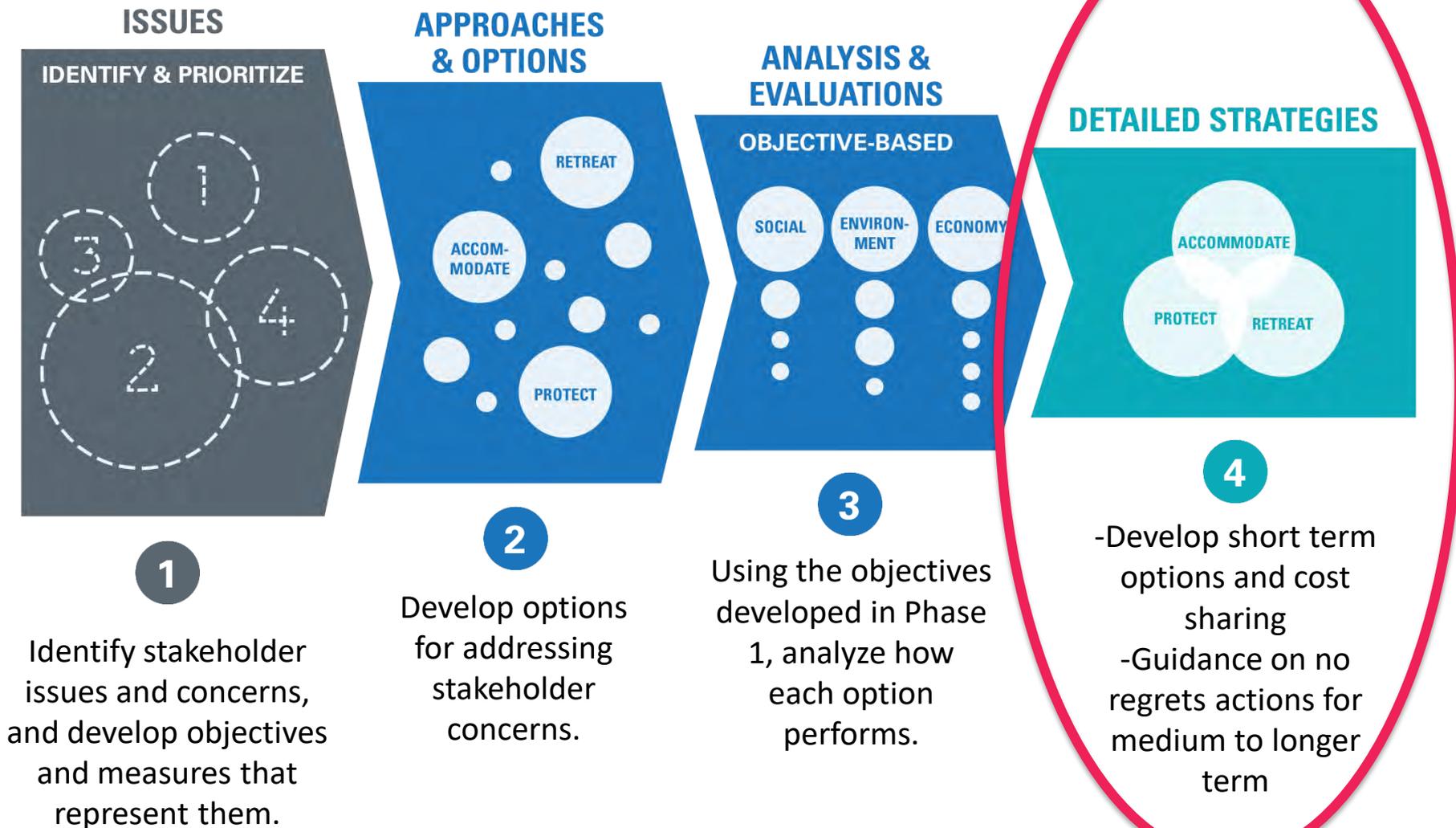
REFINEMENT & TECHNICAL
ANALYSIS



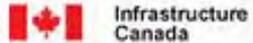
Shortlisted Options



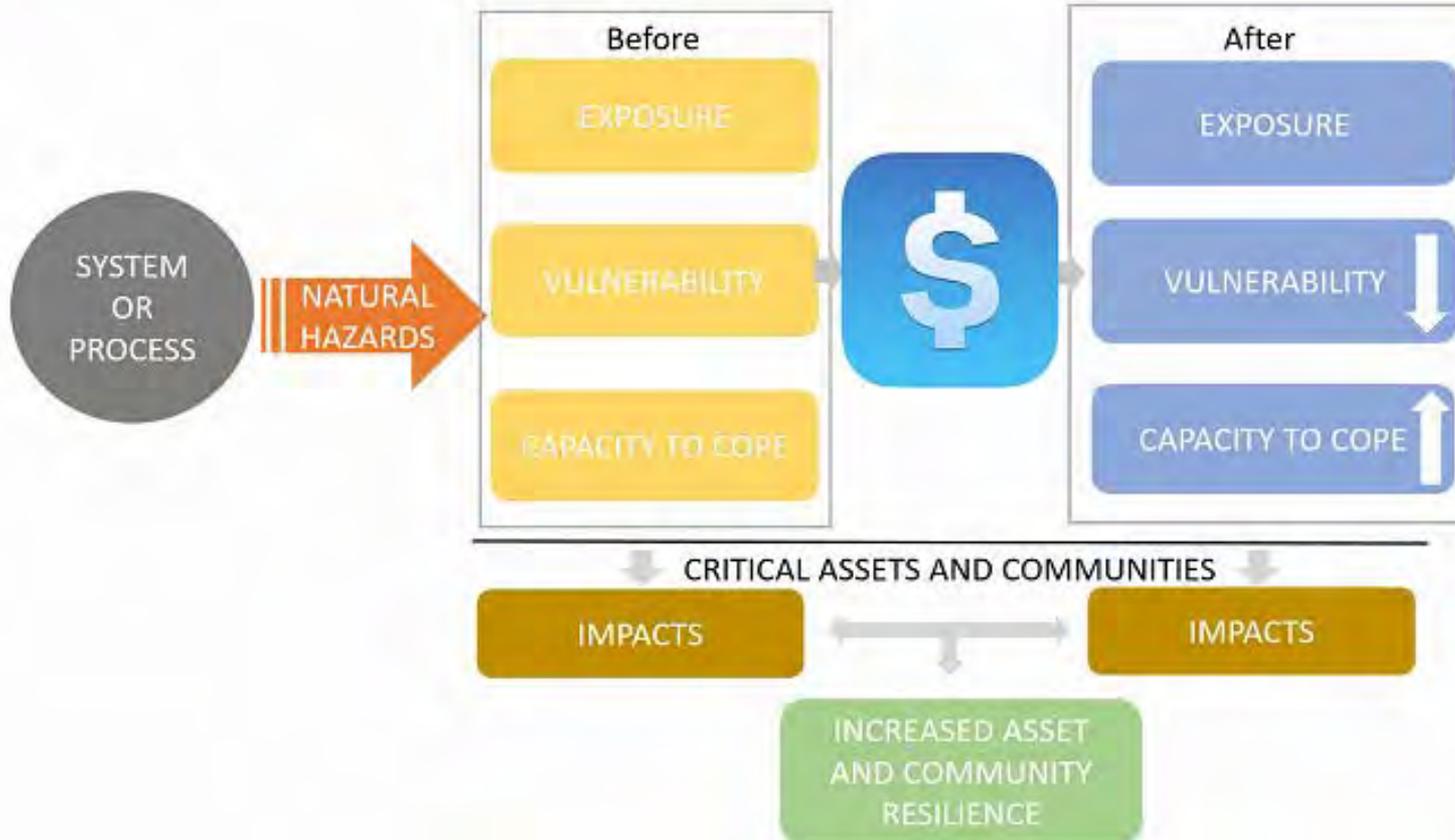
Developing Solutions



Federal Disaster Mitigation Adaptation Fund (DMAF)



Strengthening Resilience



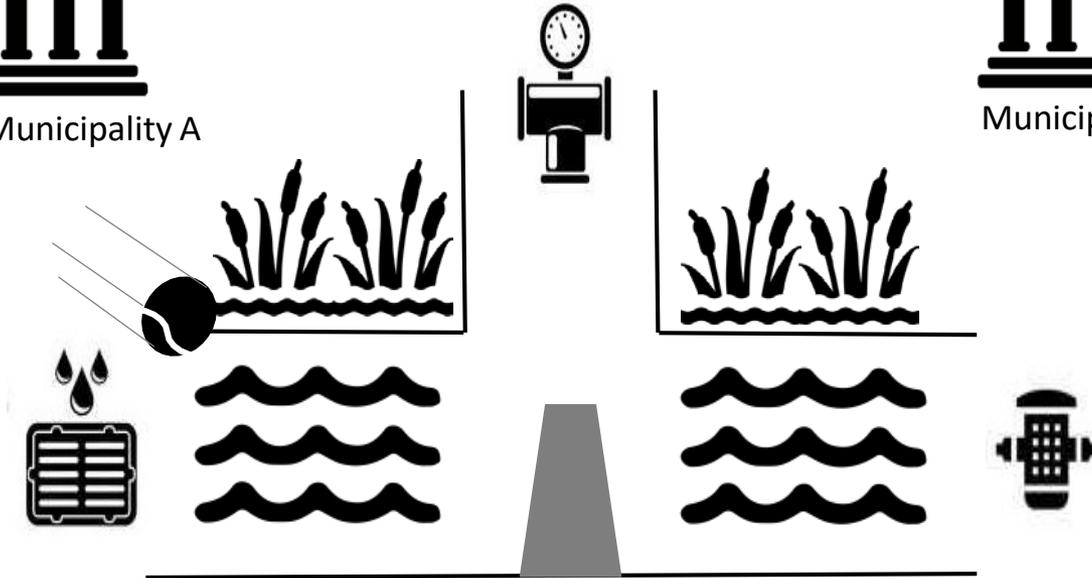
A Bundled Project Requirement



Municipality A



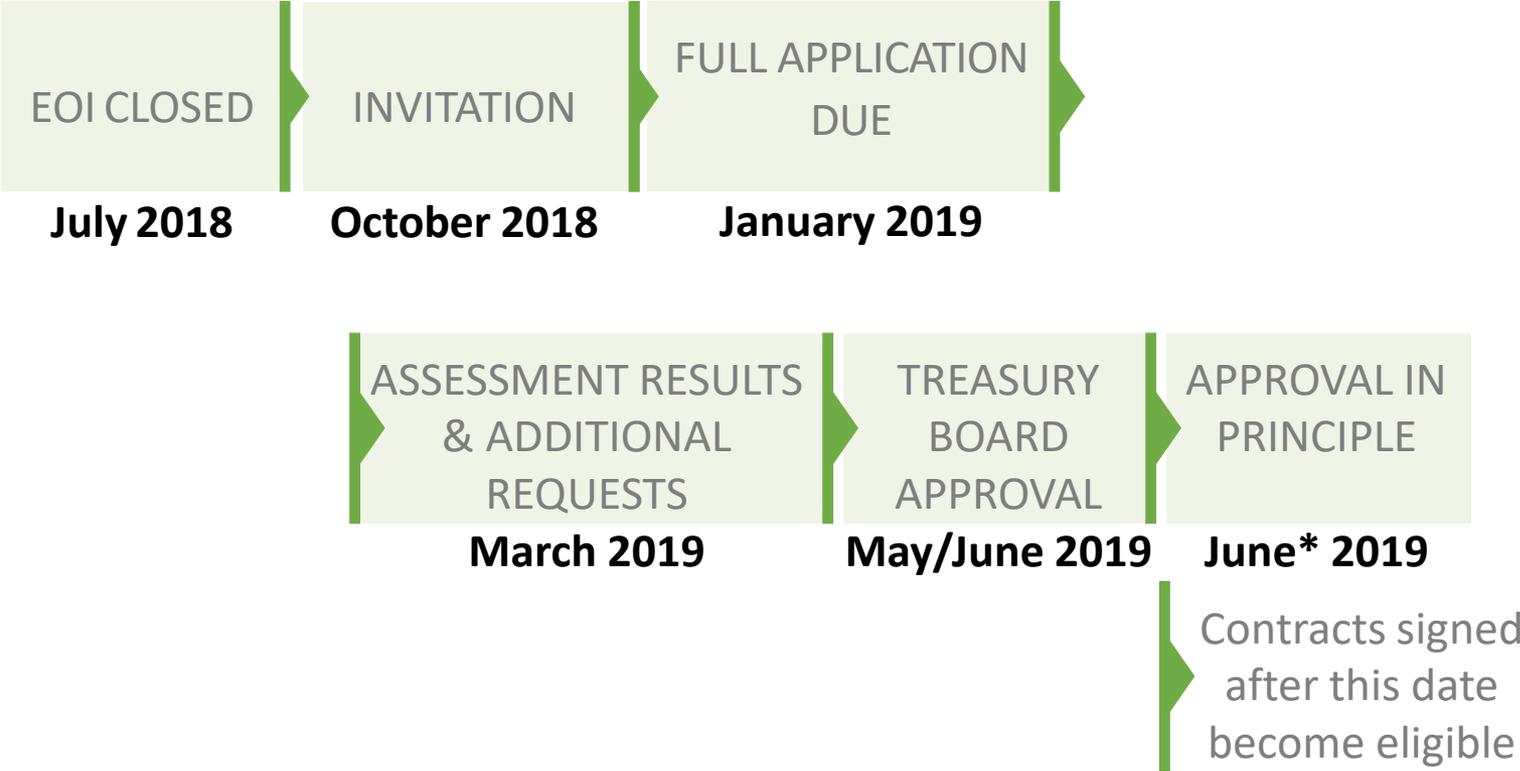
Municipality B



Condition: natural and/or structural infrastructure solutions **MUST** work systematically to reduce the identified common risk



DMAF ASSESSMENT PROCESS



DMAF Application

“Reducing coastal flood vulnerability in the coastal lowlands of City of Surrey, City of Delta and Semiahmoo First Nation in British Columbia, through structural and nature-based infrastructure works”

Common hazard addressed through proposed projects: Coastal Flooding

Federal: \$76.6M (Infrastructure Canada)

Surrey: Estimated at \$61.3M

3rd Party Funding: Estimated at \$49.1M (Province, FortisBC, City of Delta, etc.)

Total application value: \$187M

Note: Estimates include contingency

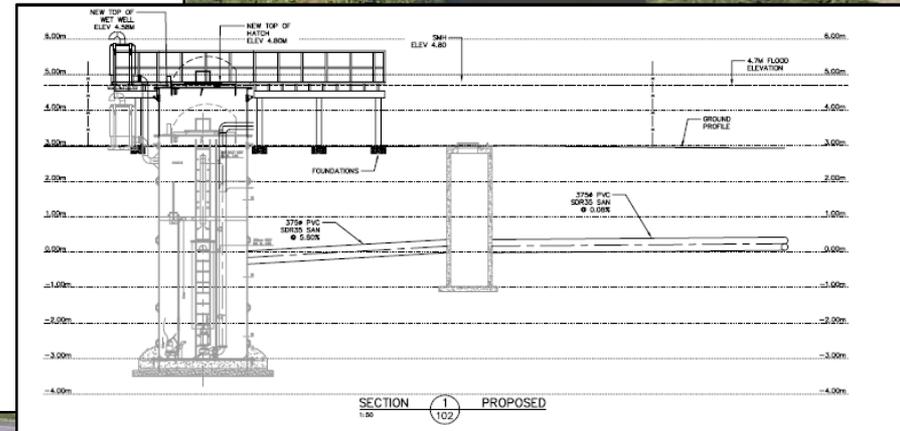
Shovel Ready Projects

City of Surrey

- Colebrook Dyke Upgrades
- Stewart Pump Station
- Burrows Pump Station
- Southern Railway of BC

City of Delta

- Boundary Bay Dyke Upgrades



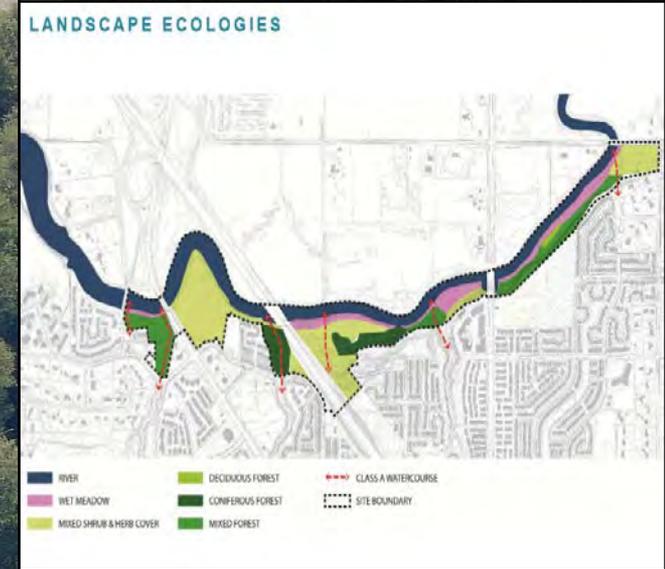
High Priority Projects

Conceptual designs:

- Nicomekl King George Blvd Bridge
- Nicomekl Riverfront Park
- 152 St Raising and Widening

Detailed Design

- Colebrook Pump Station



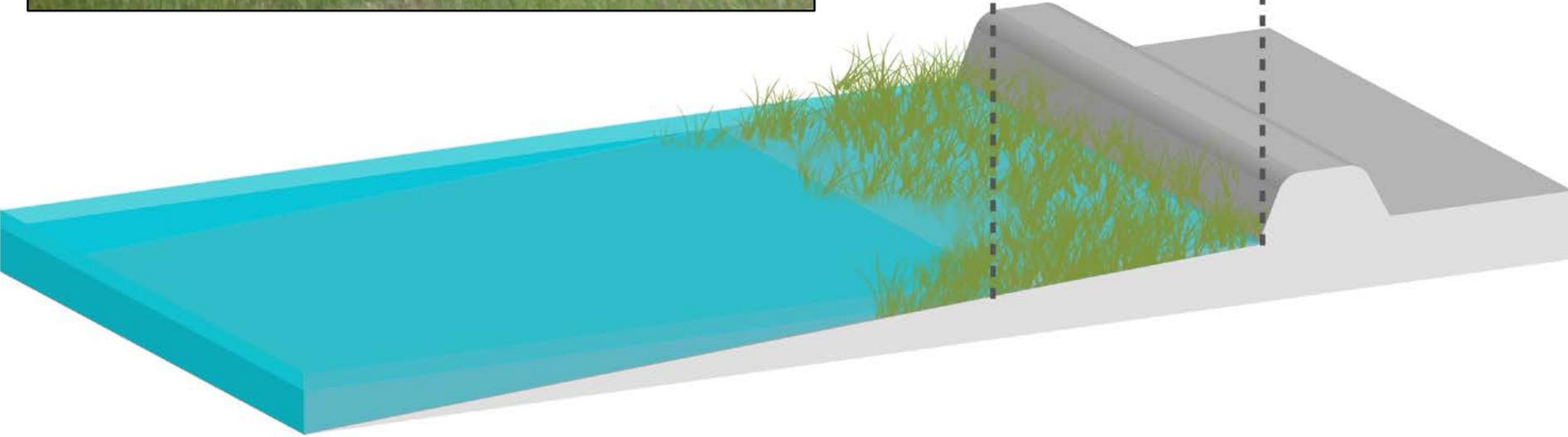
Innovative Projects



Foreshore Protection
Nature Based Solutions

INTERTIDAL
ZONE

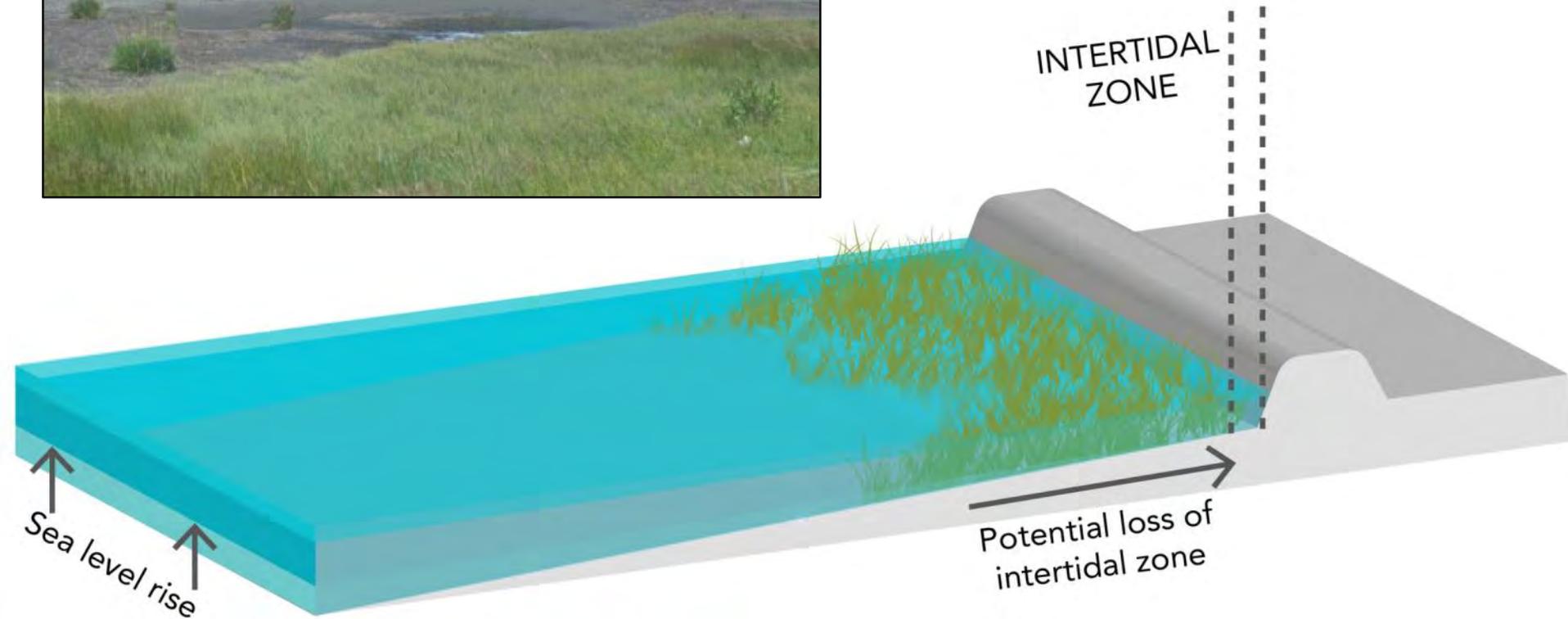
Coastal
squeeze
←



Innovative Projects



Foreshore Protection
Nature Based Solutions



DMAF PROJECT OVERVIEW

Hazard Mitigation



= flood



= seismic



= drought



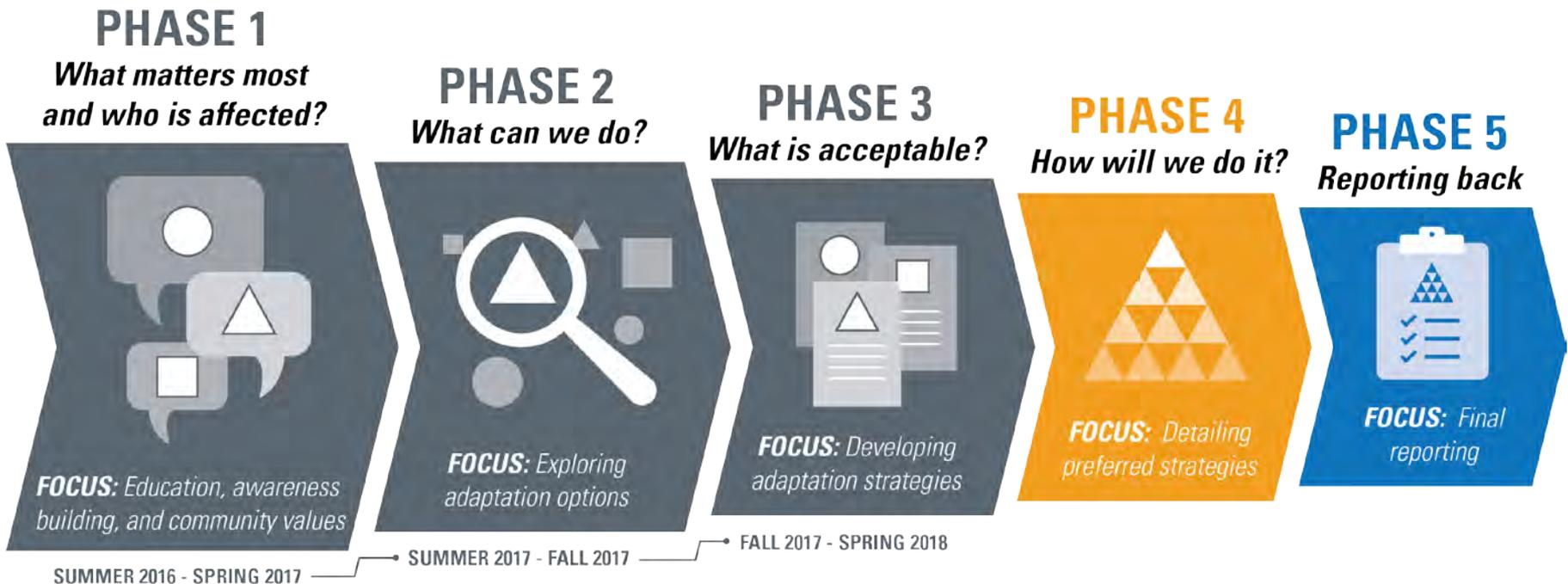
#	Name	Asset Type	Hazard Mitigation
1	Colebrook Dyke Upgrades	Coastal Dyke	
2	Colebrook Drainage Pump Station Replacement	Drainage Pump Station	
3	Sea Dam – Serpentine River	Sea Dam (drainage and irrigation)	
4	152 St Road Upgrades and Raising	Integrity of Transportation Network and Asset	
5	Nicomekl Riverfront Park - Phase 1	Flood storage alternative to riverine dyking	
6	King George Boulevard Bridge and Nicomekl River Sea Dam Replacement	Arterial Bridge (integrated with one sea dam) Integrity of Transportation Network and Asset	
7	Crescent Beach Storm Sewer System Upgrades - Perforated Piping	Flood Protection increases transportation resilience	
8	Dyking - Lower reaches of Nicomekl and Serpentine	Flood Protection (nuisance and extreme event)	
9	Serpentine SRY Rail Link Bridge Replacement and Dyking	Flood Protection (nuisance and extreme event)	
10	Burrows Drainage Pump Station Upgrade	Drainage Pump Station	
11	Stewart Farm Sanitary Pump Station Coastal Flood Proofing	Integrity of Sanitary Sewer Network	
12	Campbell River Pedestrian and Emergency Access Bridge Replacement	Integrity of Transportation Network	
13	Foreshore Enhancements	Structural and nature based flood control and environmental enhancements	

Return on Investment

- Suite of projects must be economically viable
- Nationally significant infrastructure is protected
- Avoided damages calculated over life of assets
- Benefit to Cost ratio **126:1**

Next Steps

- Technical work underway
- Await to hear outcome of DMAF (Spring 2019)
- Develop draft strategy for Council Review (Summer 2019)





SURREY COASTAL FLOOD ADAPTATION STRATEGY (CFAS)

Thank you!

