



Surrey Coastal Flood Adaptation Strategy

January 23, 2019

FBC Flood & Environment Workshop

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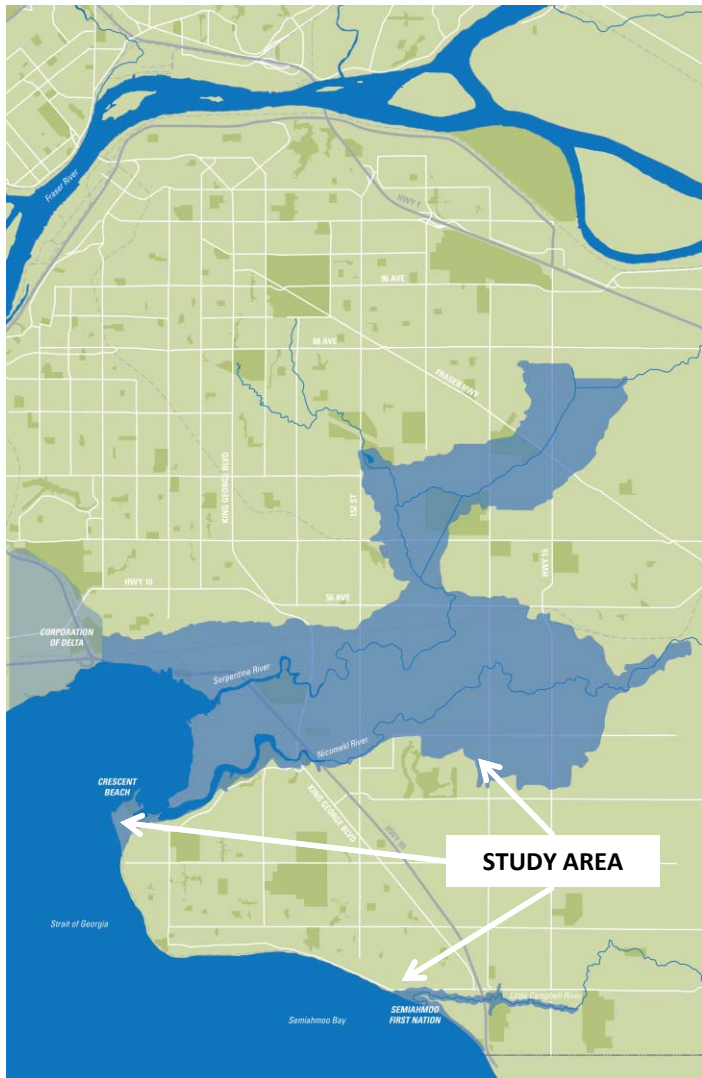


Surrey Climate Change Planning

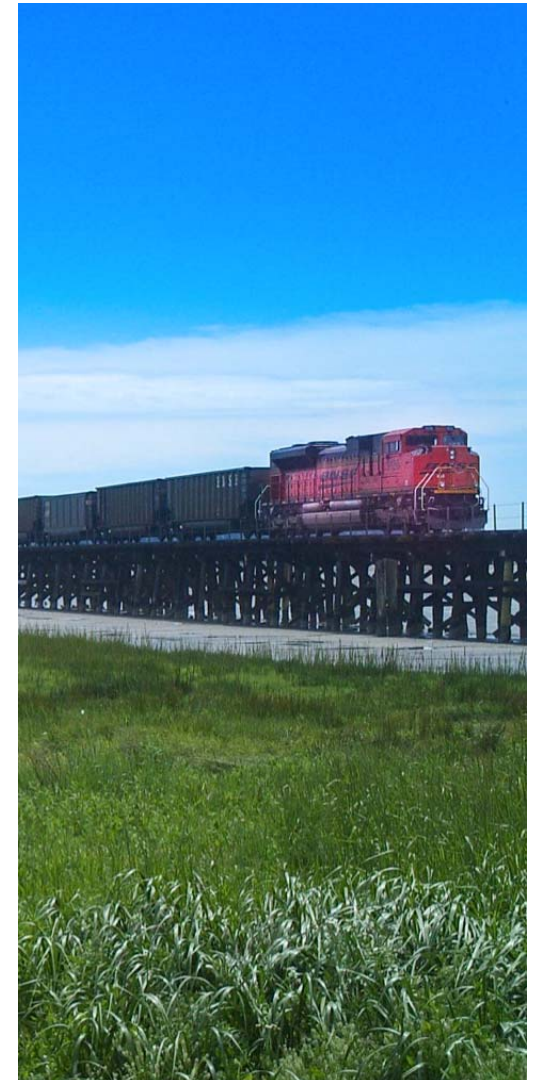


Priority Actions:

“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”

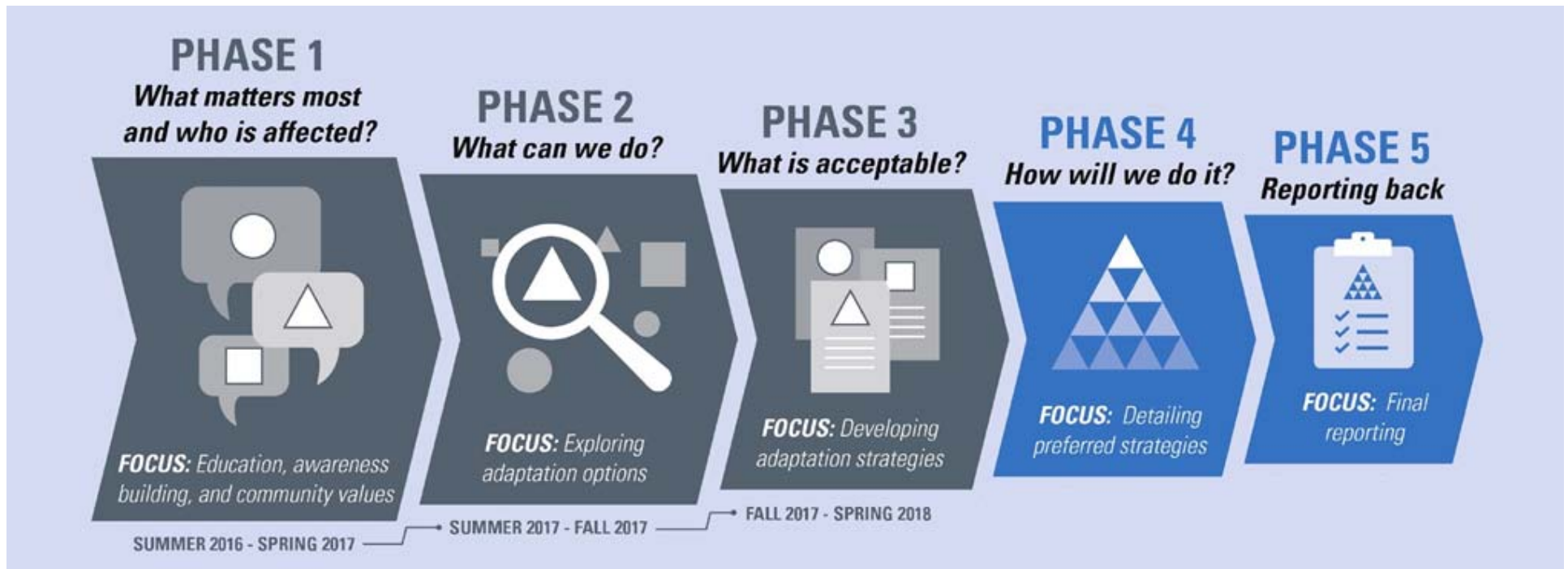


- Mayor & Council adopted recommendations to develop a Coastal Strategy Feb 22, 2016 under Corporate Report No. R034;2016
- Continuing commitment to participatory planning
- 3 year project
- Large study area with many communities, stakeholders and partners



Adaptation Planning Process

Coastal Flood Adaptation Strategy (CFAS)



Study area @ a glance



COMMUNITIES AND PEOPLE
Many residential areas and neighbourhoods
Semiahmoo First Nation
3,500 residents
Approximately 20% of Surrey's land area



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



LOCAL AND REGIONAL ECONOMY
3,500+ jobs
Over \$100M in annual farm gate revenue
Over \$2B in assessed property value
Almost \$25B annual truck and rail freight traffic



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



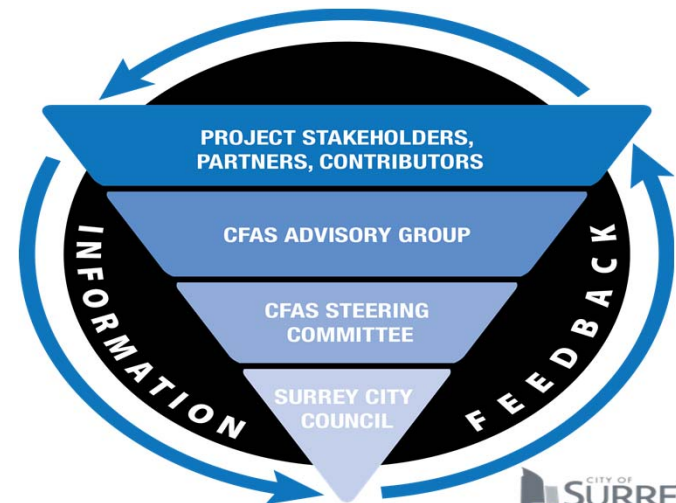
FOOD SECURITY
~ 60 km² agricultural land
~10% of Metro Vancouver's farmland



What is at Risk?

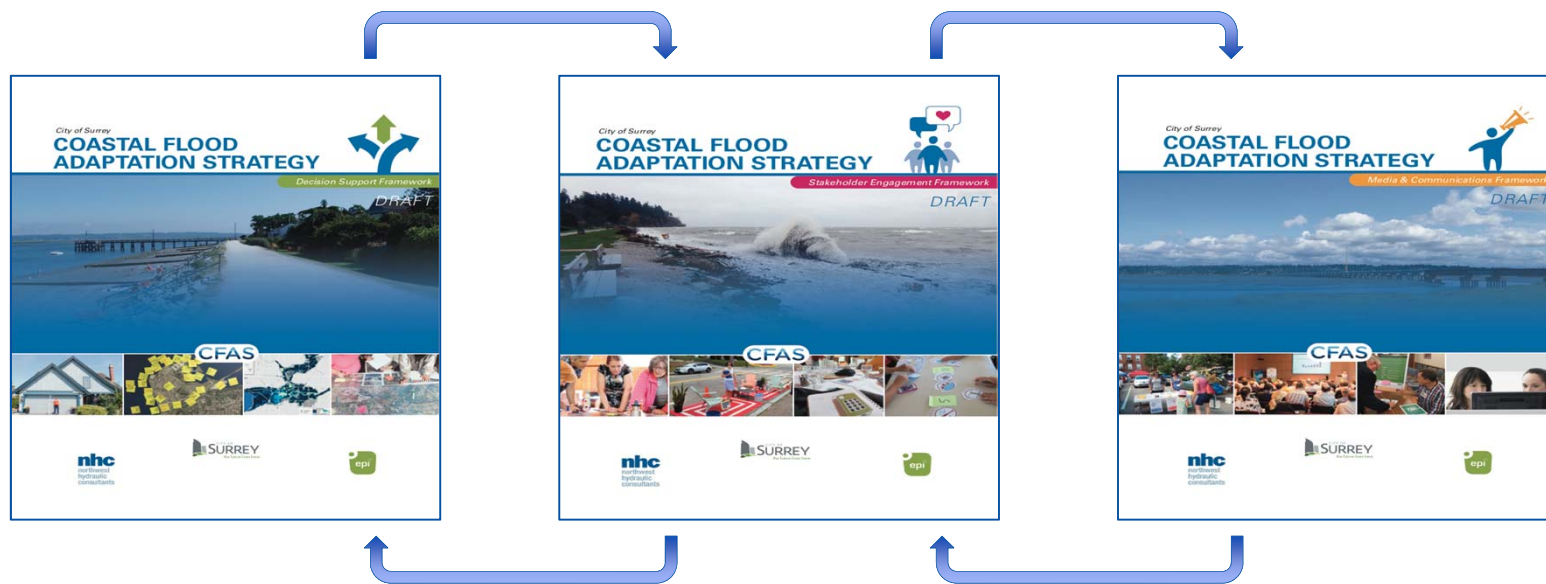
Surrey CFAS Process

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



Approach & Process

- Participatory, values-based, iterative



Process Flexible to fill data gaps

- More engagement = more questions!
- Data on land assets exceeded marine asset data
- What gets measured gets managed
 - Partnered with Ducks Unlimited and Friends of Semiahmoo Bay to secure grant funding and collect information
 - Funding Partner (FCM MCIP) wanted more than data, required recommendations for action and risk assessment
 - Reserved >10% of budget for communication

Prioritizing Infrastructure and Ecosystem Risk

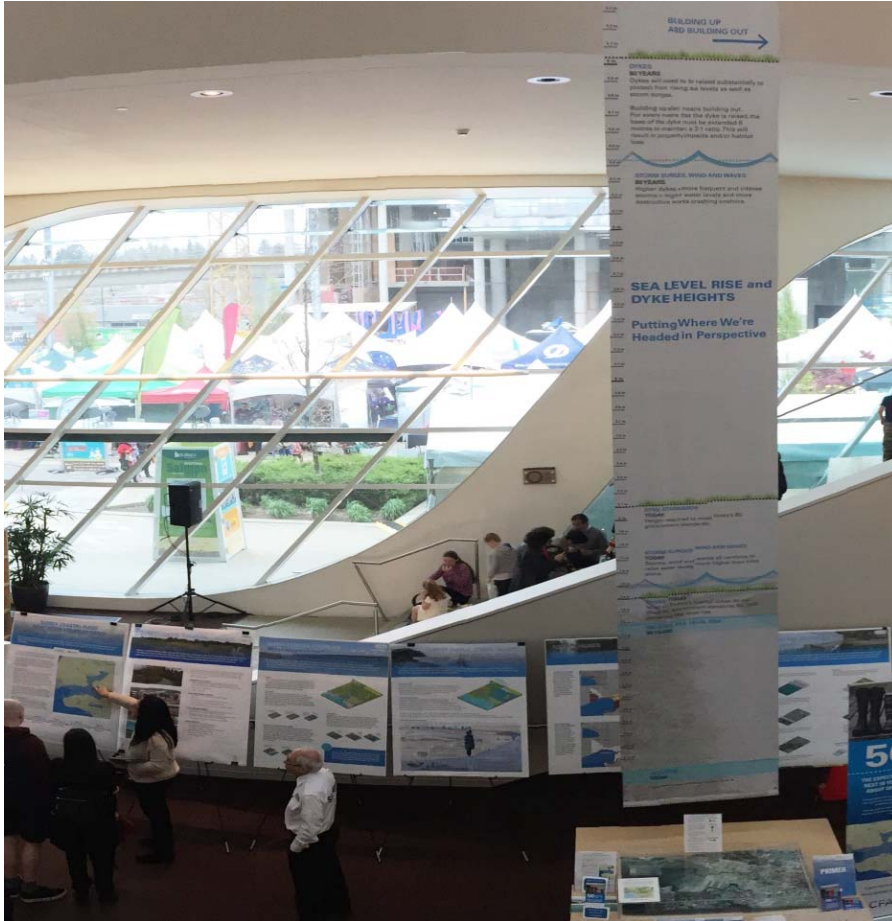
- Collaboratively assessing information and identifying top threats and possible responses
- Hosted workshop on November 27, 2018
- Stay tuned for findings on www.surrey.ca/coastal



Engagement Highlights

- 1,000+ directly engaged (workshop, focus group, etc.)
- 8 pop-up events
- 2 bus tours
- 200+ students (elementary & high school)
- 30+ organizations involved
- Advisory Group representing wide range of organizations, agencies, and governments
- 3 surveys, including technical options review
- Engaging and partnering with local expertise and capacity – UBC, SFU, UFV

Communications Highlights



50cm

THE EXPECTED SEA LEVEL RISE OVER THE NEXT 50 YEARS IN SURREY, IMPACTING ABOUT 20% OF SURREY'S LAND AREA

Choosing a Future for Crescent Beach

PROTECT, ACCOMMODATE OR RETREAT?

Join in an important community conversation

As the climate changes, coastal areas can expect more frequent and severe flooding from storm surges and sea level rise.

Facing a big challenge and to be proactive, the City of Surrey is developing a Coastal Flood Adaptation Strategy.

The City of Surrey invites your input

See reverse for workshop RSVP and details.

CFAS | **CITY OF SURREY**

Options Development – What can we do?

Preliminary Options Development with Community and Professionals



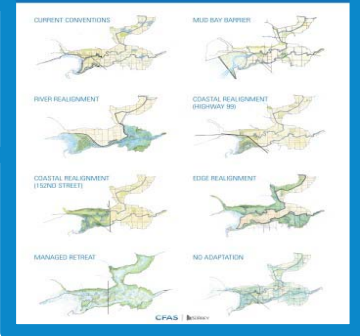
Community Review of Preliminary Options



HIGH-LEVEL FEASIBILITY ANALYSIS

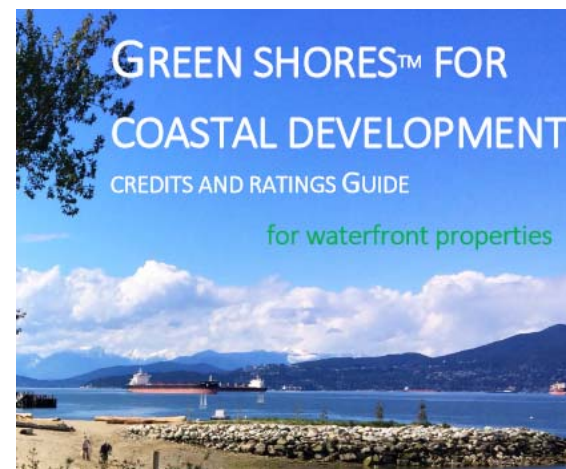
REFINEMENT & TECHNICAL ANALYSIS

PRELIMINARY OPTIONS




Shortlisted Options






Engagement Material



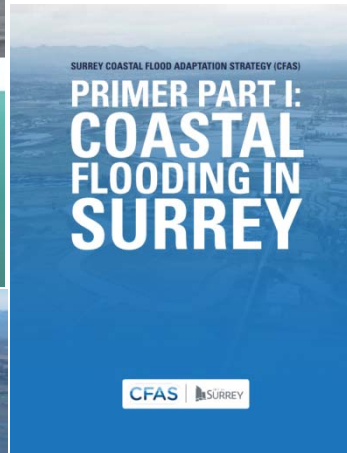
CRESCENT BEACH
COMMUNITY MEETING SERIES: **SUMMARY REPORT**
ON COASTAL FLOODING
AND CLIMATE CHANGE



SURREY COASTAL FLOOD ADAPTATION STRATEGY (CFAS)

#SurreyCoastal Photo Contest
January 30 to March 12, 2017

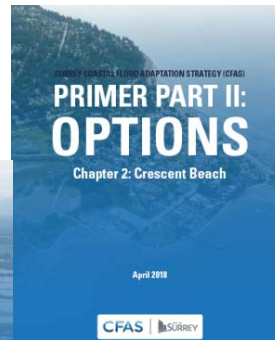
CFAS | SURREY



SURREY COASTAL FLOOD ADAPTATION STRATEGY (CFAS)

**PRIMER PART I:
COASTAL FLOODING IN SURREY**

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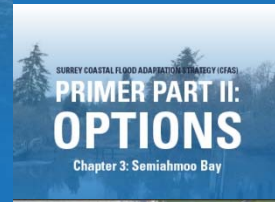
SURREY COASTAL FLOOD ADAPTATION STRATEGY (CFAS)

**PRIMER PART II:
OPTIONS**

Chapter 2: Crescent Beach

April 2018

CFAS | SURREY

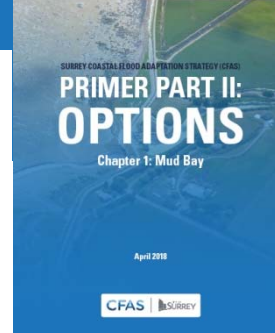


SURREY COASTAL FLOOD ADAPTATION STRATEGY (CFAS)

**PRIMER PART II:
OPTIONS**

Chapter 3: Semiahmoo Bay

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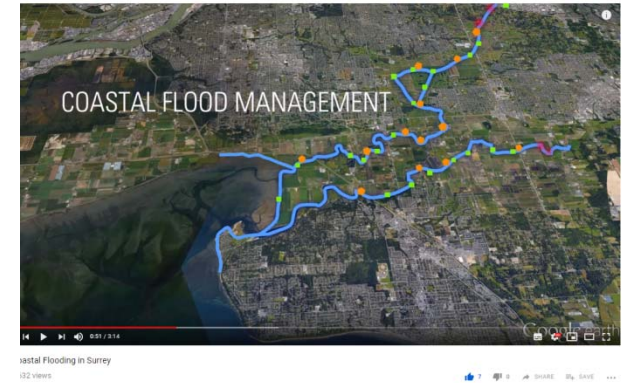
SURREY COASTAL FLOOD ADAPTATION STRATEGY (CFAS)

**PRIMER PART II:
OPTIONS**

Chapter 1: Mud Bay

April 2018

CFAS | SURREY



COASTAL FLOOD MANAGEMENT

Coastal Flooding in Surrey

132 views



SURREY COASTAL FLOOD ADAPTATION STRATEGY (CFAS)

**WORKSHOP
BACKGROUNDER**

Infrastructure Owners, Managers
and Emergency Responders

OCTOBER 19, 2017

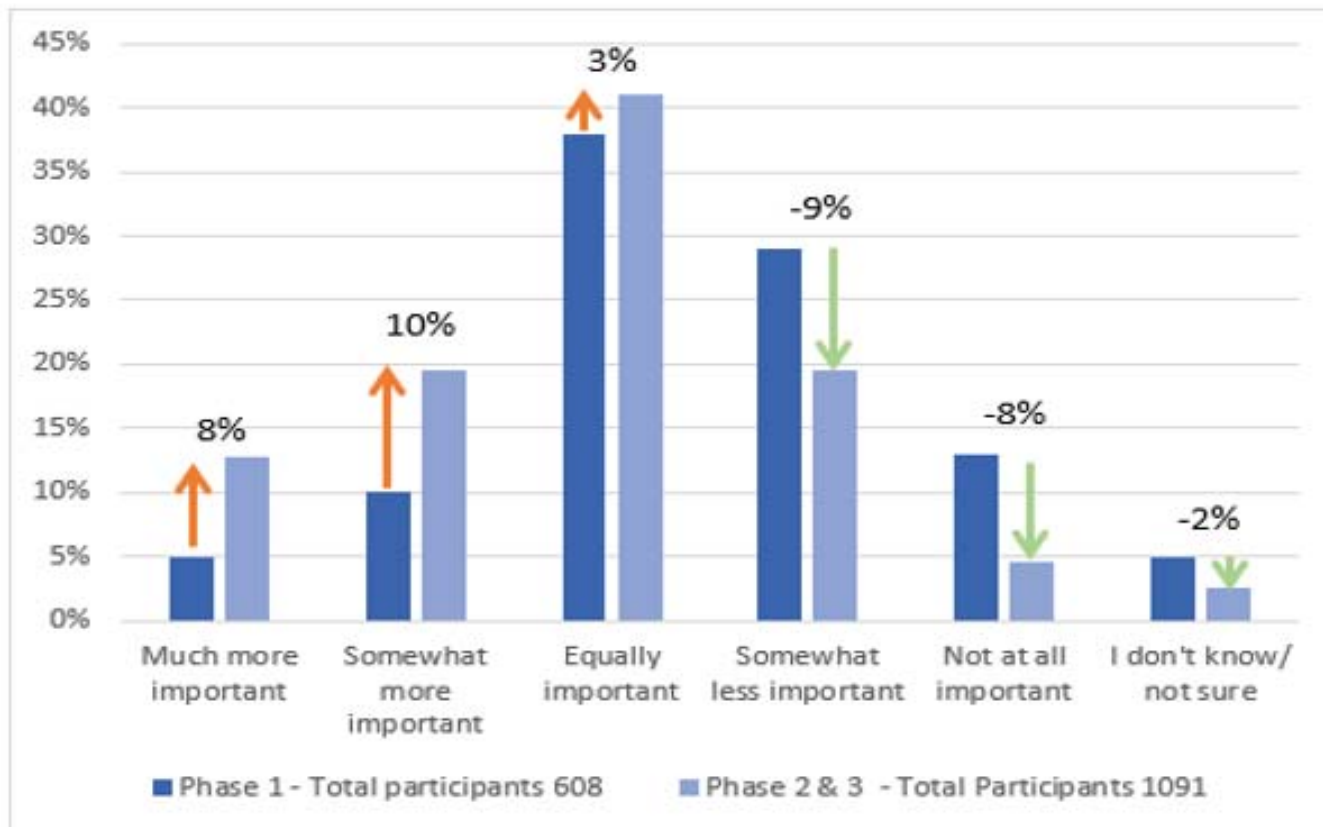
CFAS | SURREY

VALUES CRITERIA <i>Do you agree/disagree with the scoring and why?</i>	Agree			Comments	OPTION IMPROVEMENT <i>How could the option be improved to score better when measured against the values criteria?</i>
	Strongly	Slightly	Disagree		
RESIDENTS <i>Number of people permanently displaced by the option</i>					
ENVIRONMENT <i>Anticipated impact to wetlands, habitats, freshwater fish habitat and riparian areas that could be expected from the option</i>					
INFRASTRUCTURE <i>Anticipated societal transportation infrastructure assets vulnerable by the option</i>					
ECONOMY <i>Permanent loss of businesses that could be expected from the option</i>					
RECREATION <i>The diversity of recreation opportunities that could be expected from the option</i>					

TECHNICAL CRITERIA
Do you have any comments on any technical criteria scoring? Please note them here with the technical criteria you have questions about.

PARTICIPANT NAME: _____

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



Adaptation Through Collaboration

Sector based engagement

- Agriculture, environment, infrastructure focus groups
- Education – Green Shores & PIEVC workshops
- Local tours with diverse stakeholders to discuss the issues and build understanding
- Online through web based information, surveys, social media, videos

Collaboration

- Across region with Fraser Basin Council and MV
- Across City departments
- Across external groups through a project advisory group
- Post secondary institutions and global experts
- Community Charrettes and community groups

Broad engagement

- Libraries, public spaces, school district, contests



Building Partnerships for Adaptation



SEMAIHMOO FIRST NATION



Climate Action Initiative
BC AGRICULTURE & FOOD



THE UNIVERSITY
OF BRITISH COLUMBIA



STEWARDSHIP CENTRE
FOR BRITISH COLUMBIA



Friends of Semiahmoo Bay Society

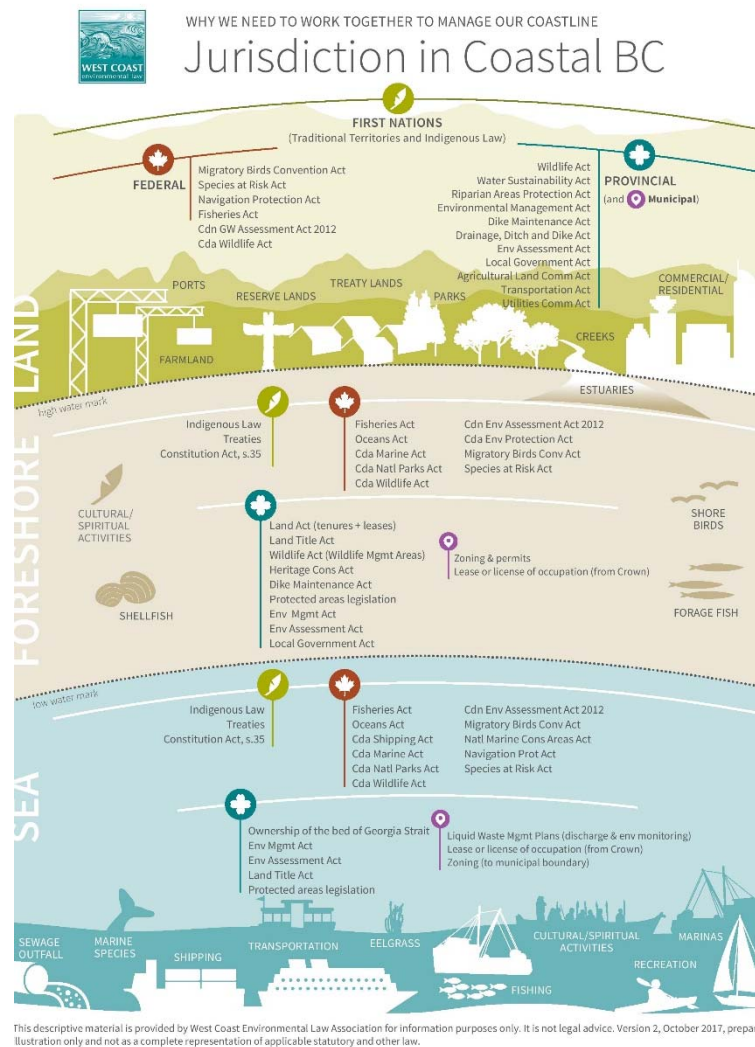


Implementation Challenges

- Trade-offs in implementing solutions
- Regulations that preserve the status quo
- Lack of integration in coastal regulation across jurisdictions
- Need a robust process to resolve based on values

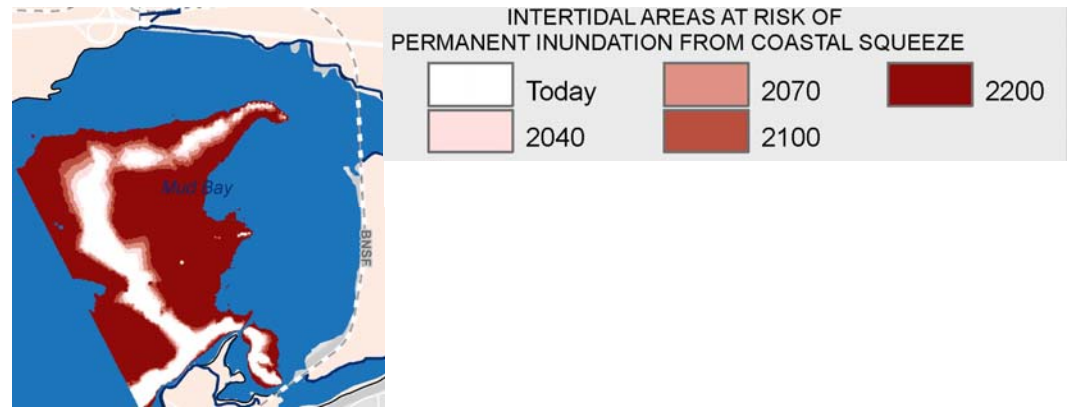
Legislation

- Existing freshwater habitat poses constraint
- Existing land rights poses constraint (Agricultural Land Reserve, Highway dedications, Railway lands etc.)
- Coastal regulators meeting held Nov 16, 2017



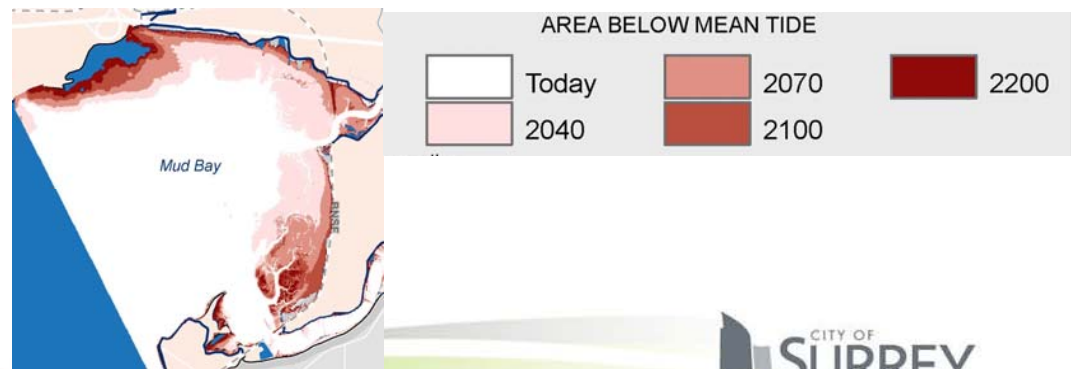
Offsetting Environmental Impacts (Coastal Squeeze)

Year	Cumulative Percent Permanently Inundated	Additional Area drowned relative to 2010 (m ²)
2010	6.7%	
2020	7.4%	87,500
2040	8.8%	182,700
2070	11.3%	315,800
2100	14.0%	344,900



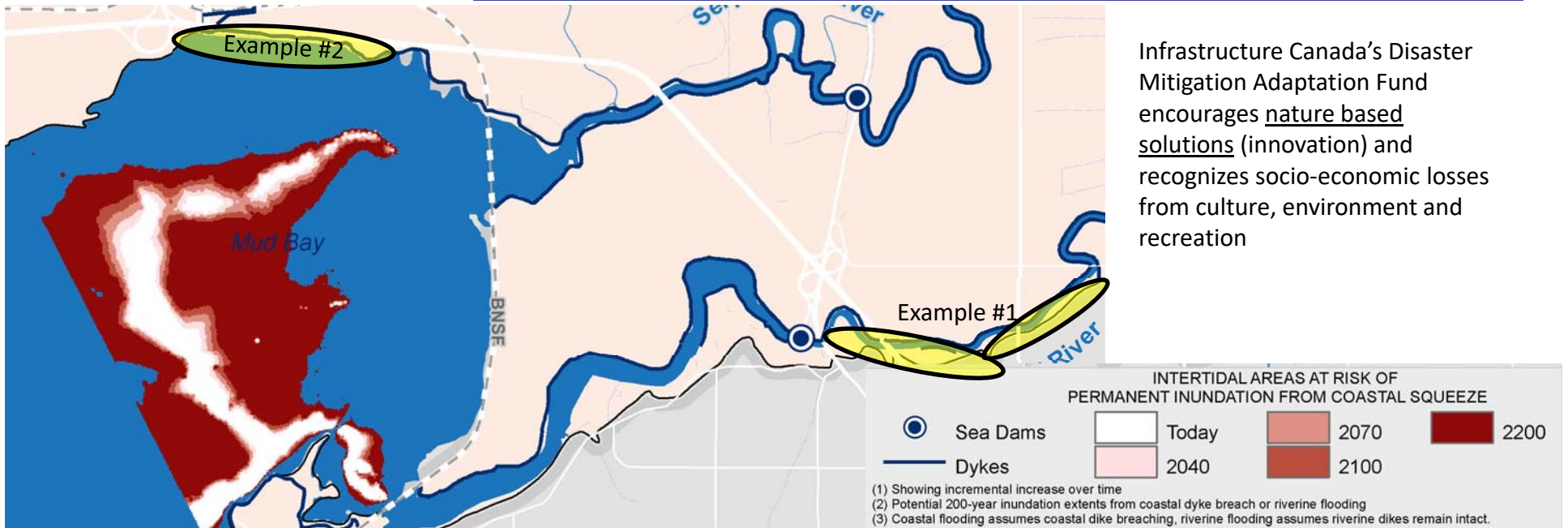
Examples:

- 1) Internal Cross Departmental Collaboration Example
- 2) External Collaboration with Delta with technical and secretariat support from WCEL, LFFA



Offsetting Environmental Impacts

Year	Cumulative Percent Permanently Inundated	Additional Area drowned relative to 2010 (m ²)	Proposed Habit Area to Offset coastal squeeze	Percent Damage Offset 2010 (m ²)
2010	6.7%			
2020	7.4%	87,500	109,000	125%
2040	8.8%	182,700	109,000	60%
2070	11.3%	315,800	109,000	35%
2100	14.0%	344,900	109,000	32%

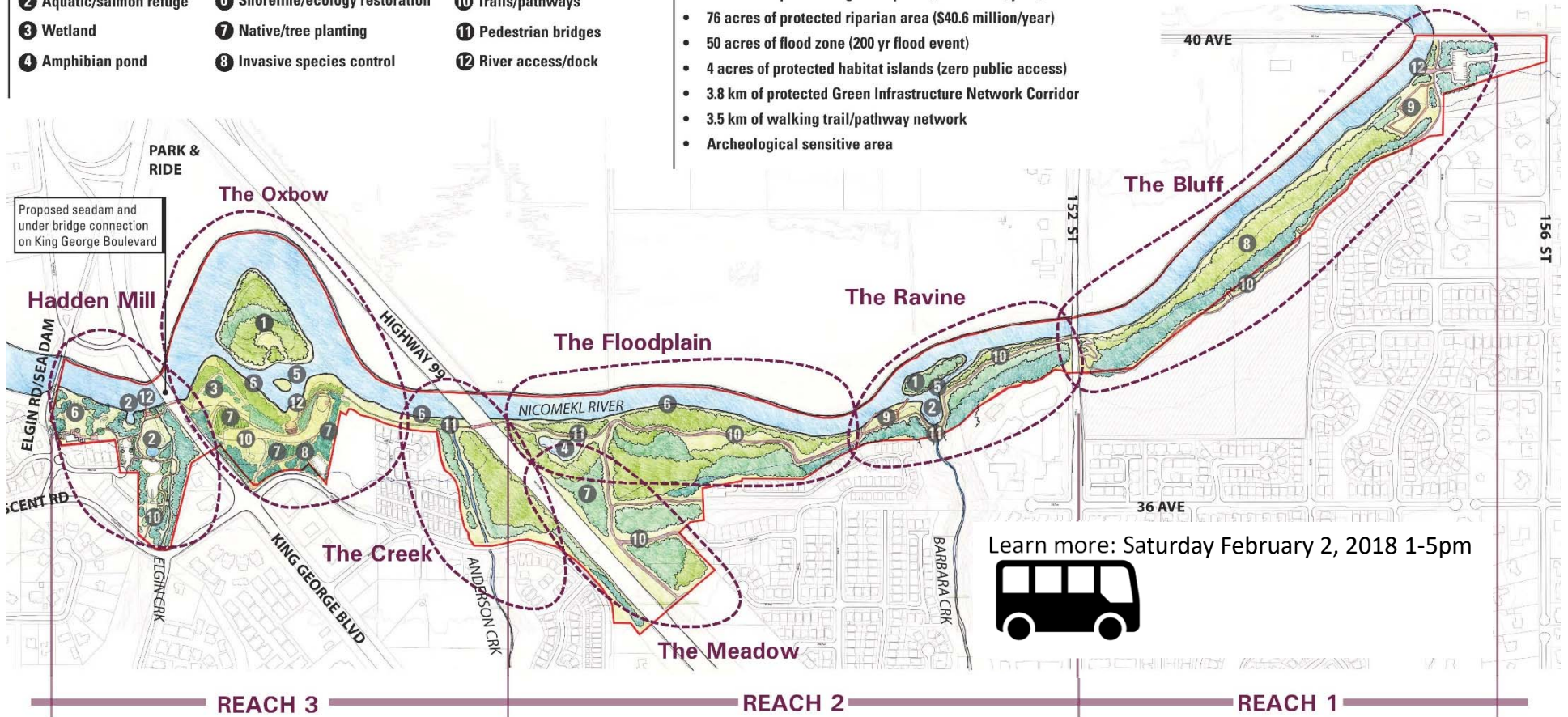


Example #1: Internal Collaboration

- | | | |
|-------------------------|---------------------------------|-----------------------|
| 1 Habitat island | 5 Flood channel | 9 Boardwalk |
| 2 Aquatic/salmon refuge | 6 Shoreline/ecology restoration | 10 Trails/pathways |
| 3 Wetland | 7 Native/tree planting | 11 Pedestrian bridges |
| 4 Amphibian pond | 8 Invasive species control | 12 River access/dock |

84 acres / 3km of protected parkland:

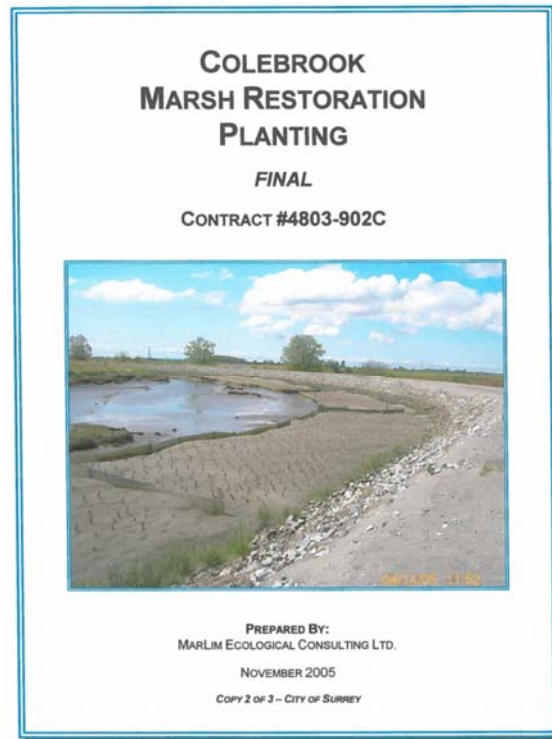
- 82 acres of protected green space (\$9.1 million/year)
- 76 acres of protected riparian area (\$40.6 million/year)
- 50 acres of flood zone (200 yr flood event)
- 4 acres of protected habitat islands (zero public access)
- 3.8 km of protected Green Infrastructure Network Corridor
- 3.5 km of walking trail/pathway network
- Archeological sensitive area



The 3km linear riverfront park spans several character zones defined by unique ecologies, topographic conditions, adjacencies and histories.

Example #2: Living Dike

- Adaptive Process proposed to assist nature adapt to rising sea levels



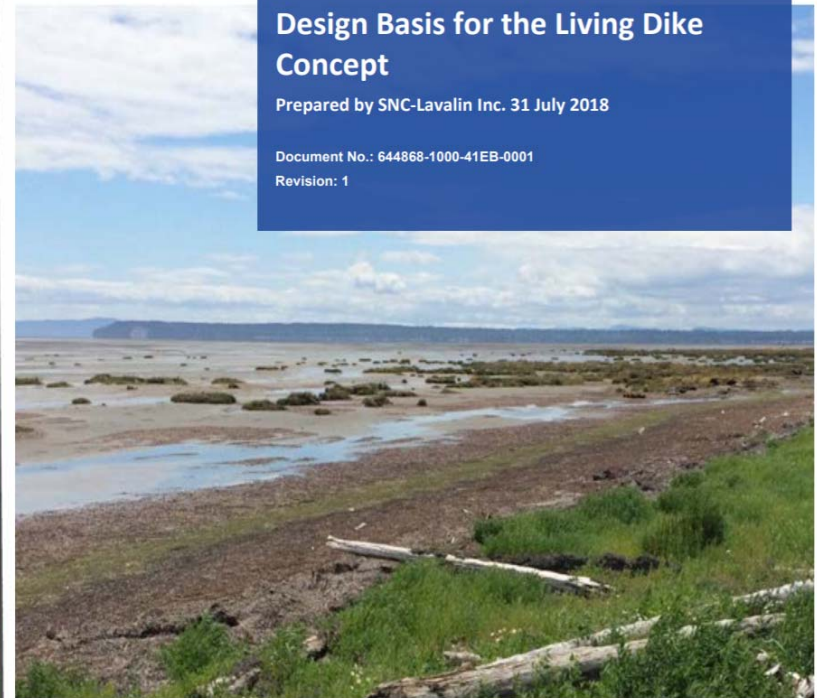
West Coast Environmental Law

Design Basis for the Living Dike Concept

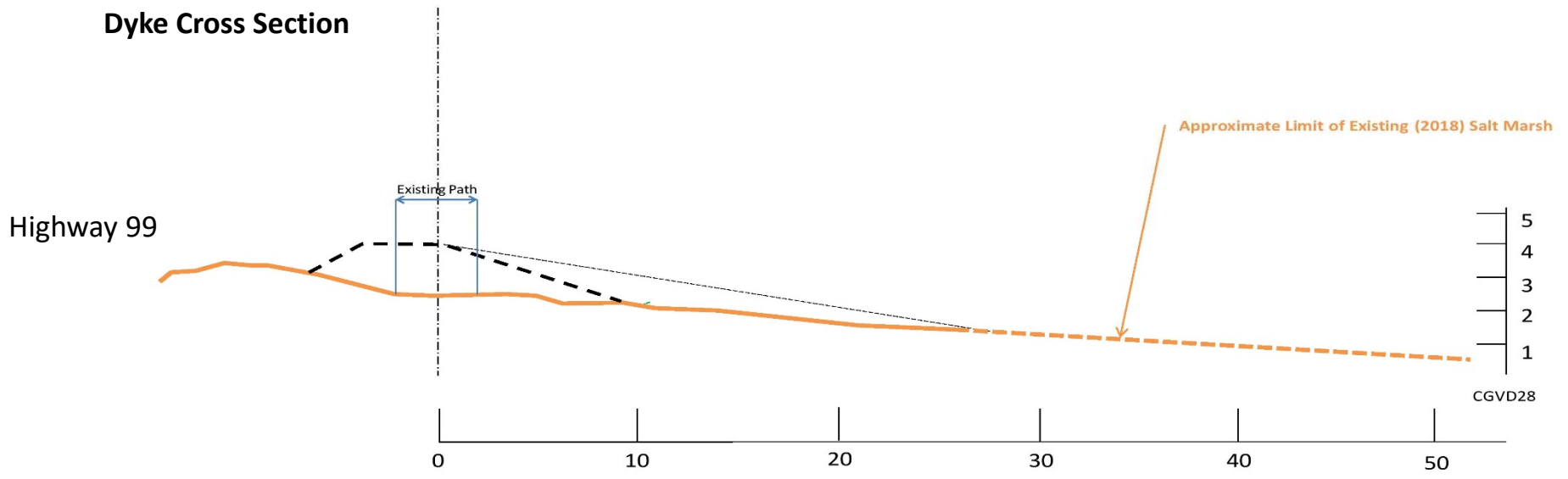
Prepared by SNC-Lavalin Inc. 31 July 2018

Document No.: 644868-1000-41EB-0001

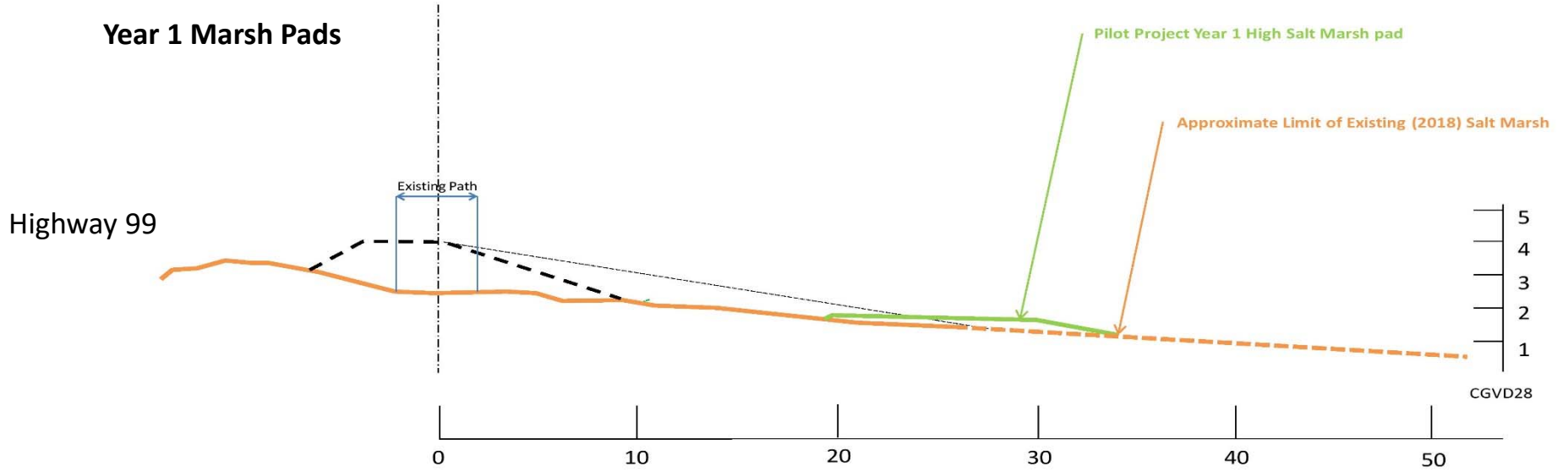
Revision: 1



Dyke Cross Section

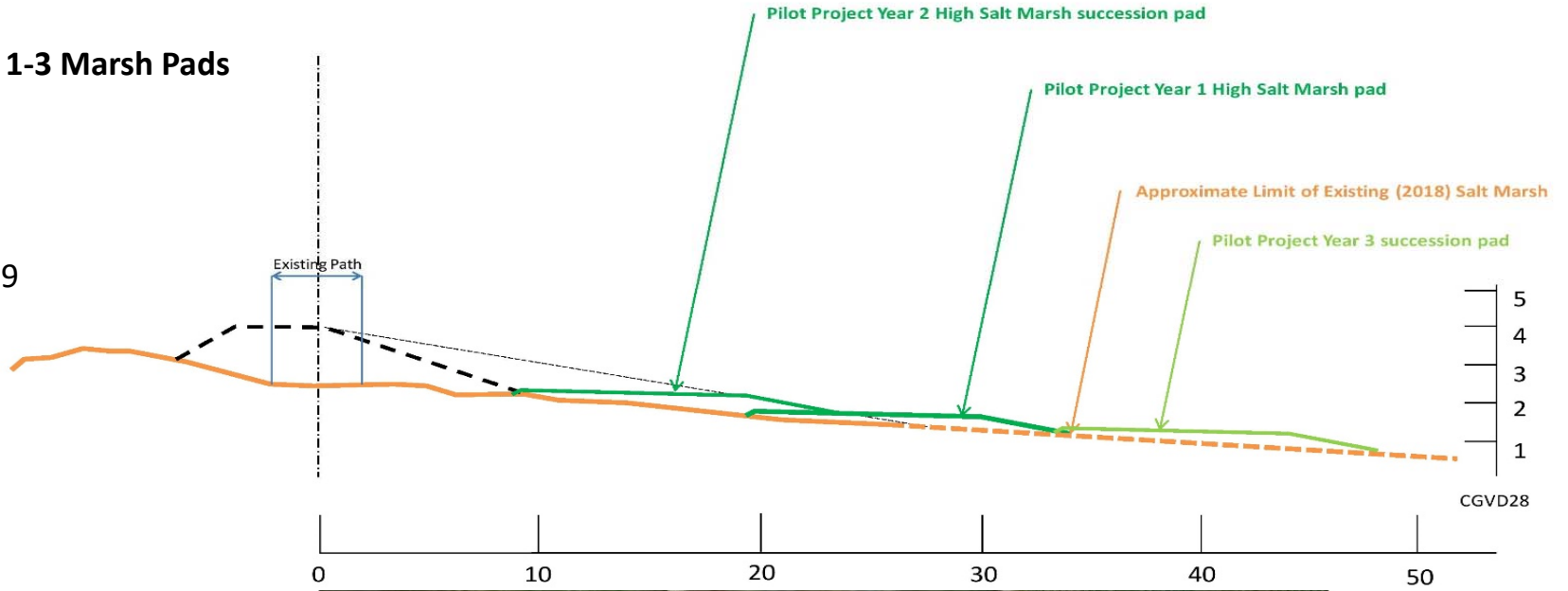


Year 1 Marsh Pads



Years 1-3 Marsh Pads

Highway 99



- New pads with planting
- One year old pads with supplemental planting
- Two year old pads with established planting

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#SurreyCoastal



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- SNC Lavalin
- LFFA