Coastal Hazard and Risk Communication: *Perspectives from Practitioners, Policy-Makers, and Researchers*

Developing a Coastal Flood Adaptation Strategy (CFAS)

Hazard Mitigation

= flood = seismic = drought

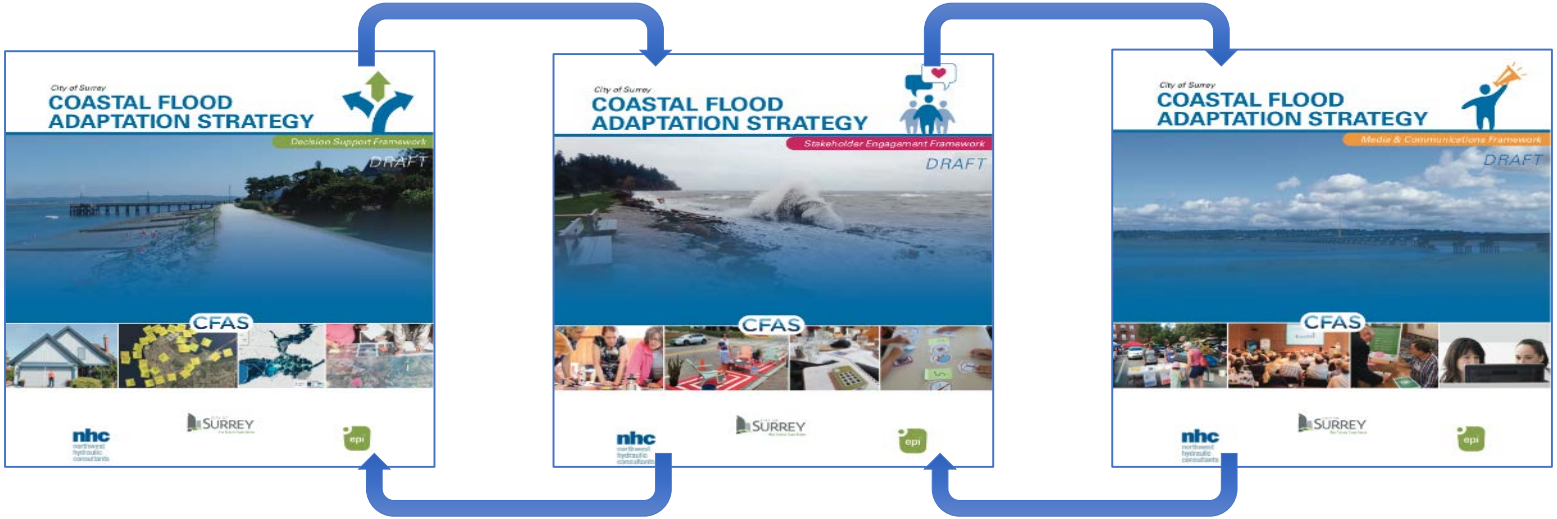
Values Protected

= economy = infrastructure = environment = communities

Project Summary

Coastal Flood Adaptation Strategy

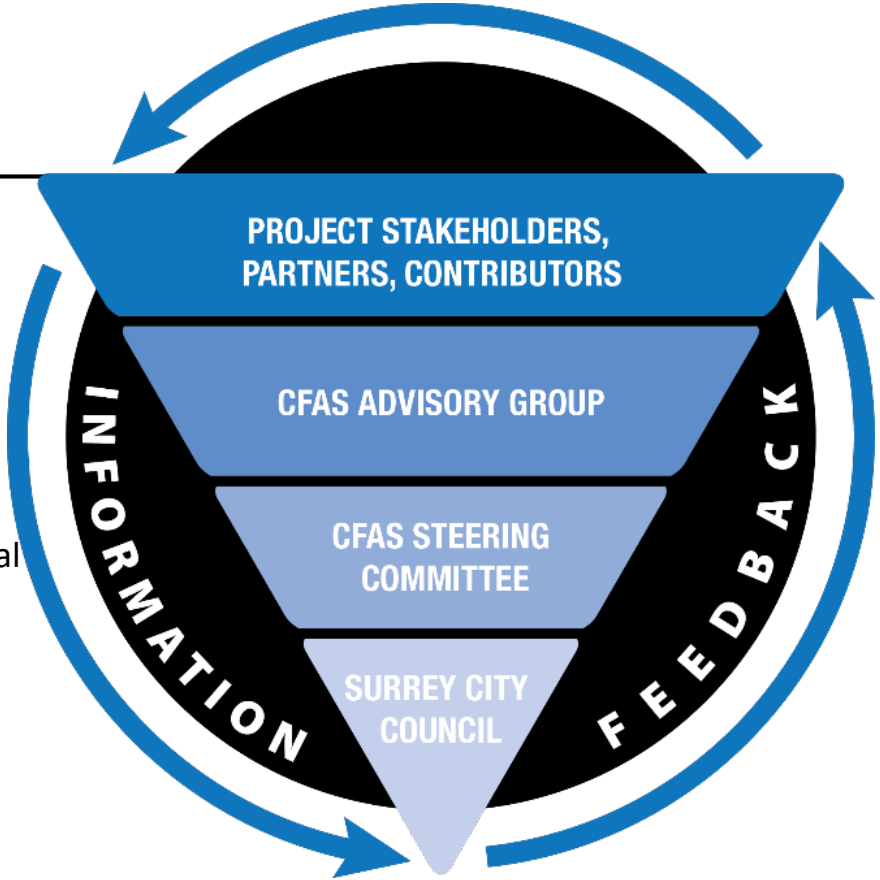
- What
  - Engage public, stakeholders and partners in a participatory, decision-making process
- Purpose
  - Develop a broadly supported strategy to increase resilience to coastal flooding
- How
  - Through a linked and integrated framework of decision support, engagement and communication



What Worked?

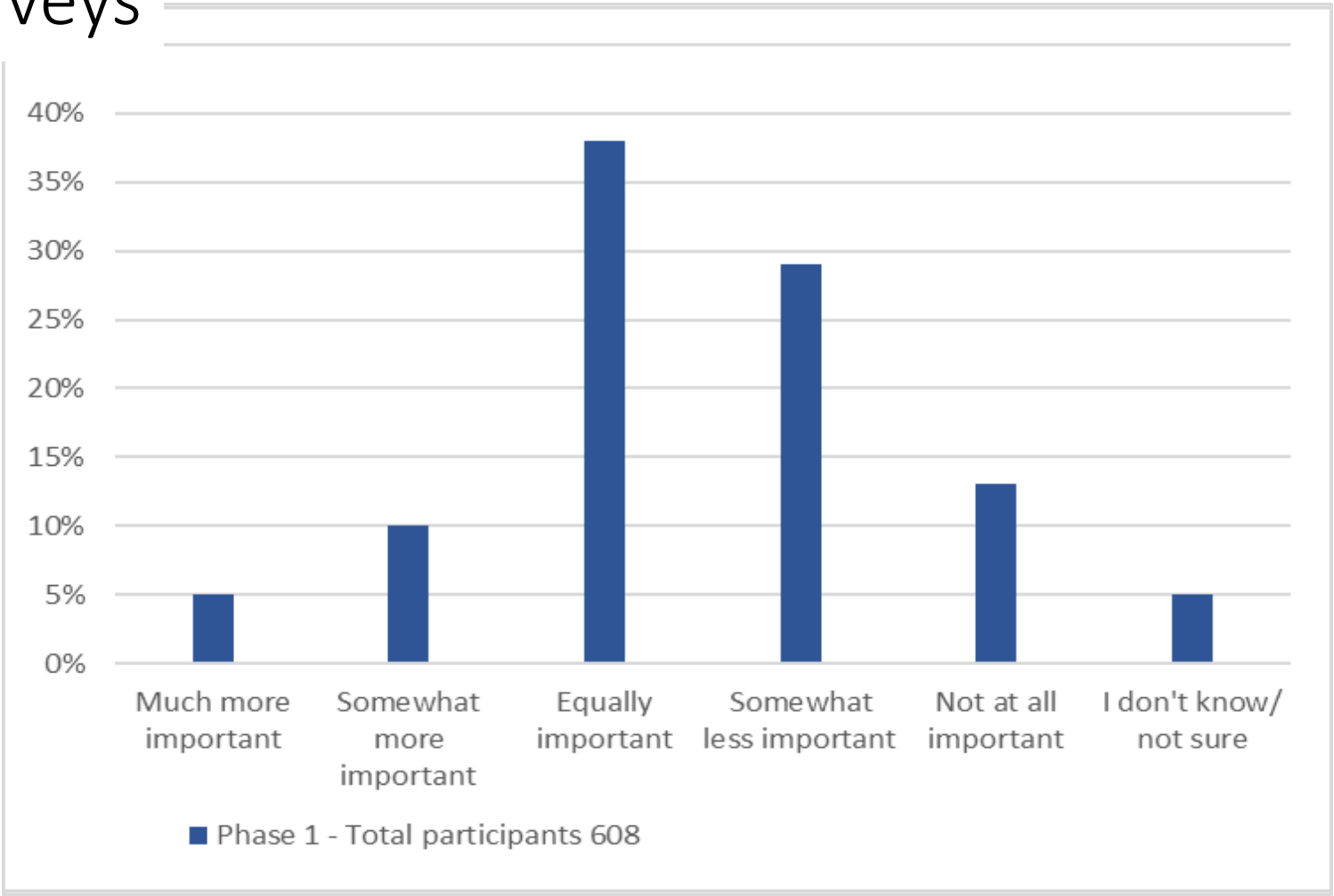
Coastal Flood Adaptation Strategy

- Establishing effective two-way dialogue
- Testing materials first on students to ensure language easy to follow and understand
- Consulting with experts during project definition through hosting a peer learning exchange
- Participatory process with interactive/engaging material
- Making broad technical expertise available during events to stakeholders with staff and consultants
- Co-developing solutions early in evaluation process empowered participants
- Evaluating risk to community values
- Strengthening relationships with key stakeholders and developed partnerships
- Online materials (City Speaks, YouTube, resources)
- Monitoring effectiveness of engagement with metrics and adjusting approach to meet targets



Online Surveys

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



CRAIG CUNNINGHAM: Ex-Giant finds new life after

THURSDAY, FEBRUARY 22, 2018
VANCOUVER, BRITISH COLUMBIA
The Provi

SURREY

BRACING FOR HIGH WATER

Officials say 20 per cent of the city could be flooded by 2100 if sea levels rise as predicted PAGE 3

Arnold Wieners fears his Surrey dairy farm could be wiped out within 80 years if something is not done to addres

Preparing for floods of the future

STRATEGY: Surrey, other Lower Mainland municipalities study how to mitigate higher water level threat

JENNIFER SALTMAN

For the past 45 years, Arnold Wieners' family has farmed hundreds of acres of land in Surrey, which he hopes to be able to pass on to his children and grandchildren.

But, if something is not done to address the risk of flooding due to climate change from the nearby Serpentine River, Wieners' property could be wiped out within 80 years.

"We have a river running right through our property, and right now it's protected by approximately 14-foot-high dikes. If we get rising water and those dikes top, we will be under water," Wieners said.

The Wieners' dairy farm is part of the 20 per cent of Surrey that could be under water by 2100 if sea levels rise and weather patterns change as predicted. That area includes agricultural land, residential neighbourhoods, Semiahmoo First Nation, parks, wildlife habitat, highways, railways and infrastructure.

Widespread flooding could affect more than 1,500 residents, hundreds of jobs, millions in revenue, more than $1 billion in assessed property value and more than $25 billion in truck and rail traffic.

"It's jaw dropping if you do nothing," said Surrey Mayor Linda Hepner.

That's why the City of Surrey decided to develop a coastal flood adaptation strategy, which is intended to look at the potential impacts of climate change on Surrey's coastal flood plain and come up with short, medium and long-term adaptation options.

On Thursday, Surrey will release a survey to collect feedback on adaptation options for flood management in the Mud Bay study area.

Surrey currently relies on a network of river and sea dikes, drainage ditches, spillways, floodboxes and pumps to protect its floodplain.

However, the changing climate means that existing measures will likely not perform well with rising sea levels, more frequent storm surges and increased rain. When sea levels rise, the amount of time that rivers will be able to freely drain will be shorter.

"We have all these years of experience dealing with current conventions and it's looking like they're not going to be sufficient," said Matt Christensen, a conservation programs specialist with Ducks Unlimited.

Christensen said that although the fallout from climate change may seem far away, it's important to start planning now. "We need to be acting proactively rather than reactively," said Christensen. "It will be more sustainable and cost effective."

Although the strategy won't be finalized until the fall, it's estimated that the cost of upgrades and new flood control systems for Surrey's coastal flood plain will be at least $1.5 billion.

Hepner admitted that it's a lot of money and the city will need help from other levels of government to pay for it, but "the cost of not investing will be much more disruptive."

Surrey appears to be ahead of the curve, but is not alone in planning for climate-change-related flooding.

Delta, Vancouver and the City and District of North Vancouver have climate change adaptation plans and strategies that look at flooding mitigation.

Metro Vancouver is in the early stages of developing its climate 2050 strategy, which will see the regional district determine its role in adapting to climate change — including flooding — and reducing greenhouse gas emissions in the region.

"We're watching Surrey's action on this really closely," said Conor Reynolds, program manager, air quality and climate change policy with Metro Vancouver. "They're certainly a leader in terms of one of our member municipalities that's really trying to figure out a path forward on flooding, and coastal adaptation in particular."

Reynolds said the goal is for Metro to have an overarching strategic plan in place by this fall.

Communities from Hope to Lions Bay, along with the federal and provincial governments and other entities, are also participating in the development of the Fraser Basin Council's Lower Mainland flood management strategy, which looks at developing a regional approach to protecting communities from flooding along the lower Fraser River.

Wieners and his daughter Rebecca Senicar, who works on the farm, said they never considered the effects of climate change on their property before Surrey started working on its strategy.

"I believe everyone should have their part in stewardship of the land and the younger generation should be invested in the future. I believe this is a way I can do my part in that," said Senicar. "It's a family farm. It's been in our family for generations and I have a little one as well, so I want her to have the same opportunity that I've been given."

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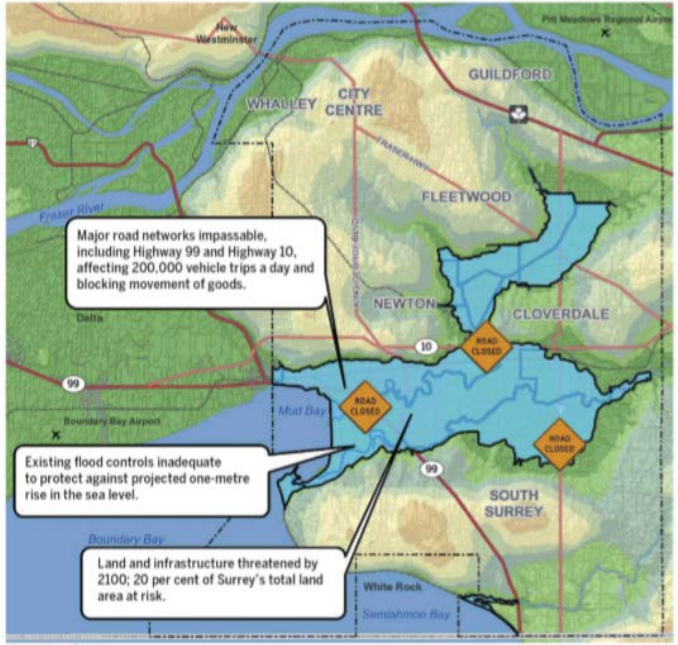
SURREY UNDER THREAT

What doing nothing would mean to Surrey as sea levels rise.



Map: City of Surrey

video
See a video with this story at **theprovince.com**

Options to Strategic Directions and CFAS Actions

Shortlisted Options

ADDITIONAL REVIEW AND CITY-WIDE SURVEY

Strategic Directions

Mud Bay
Coastal Works / Highway 99

Crescent Beach
Expanded Edge

Semiahmoo Bay
Infrastructure Improvements and Land Raising

TECHNICAL ANALYSIS – PATHWAY DEVELOPMENT

Disaster Mitigation & Adaptation Fund (DMAF)

13

Canada

CFAS Actions

18 Area-wide

28 Area-specific

32 shorter-term (2020-2030), Area-specific tactical Actions

CFAS

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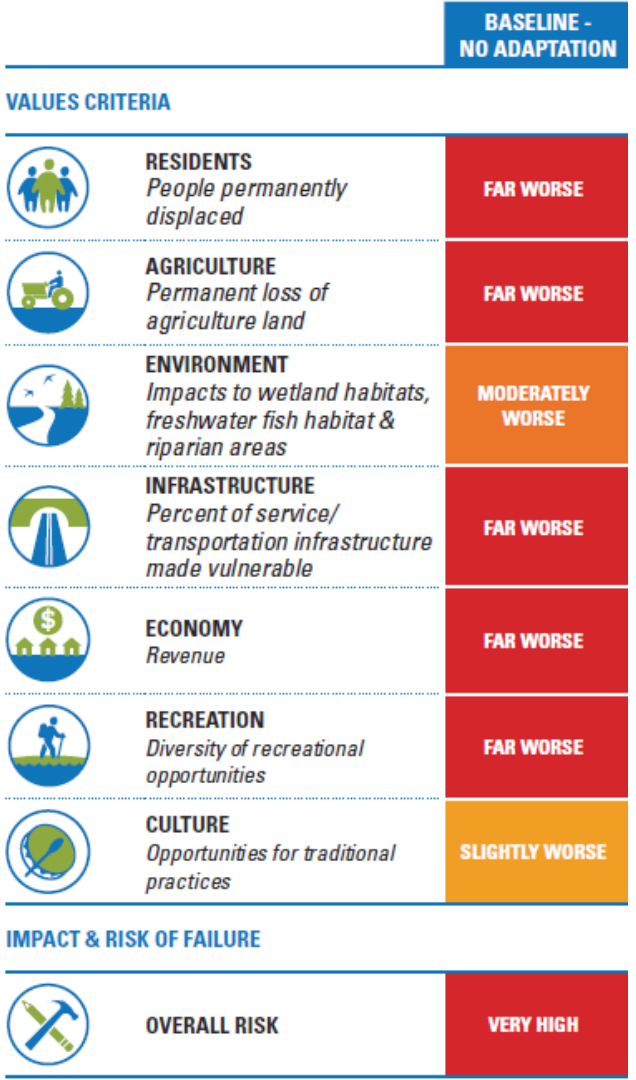
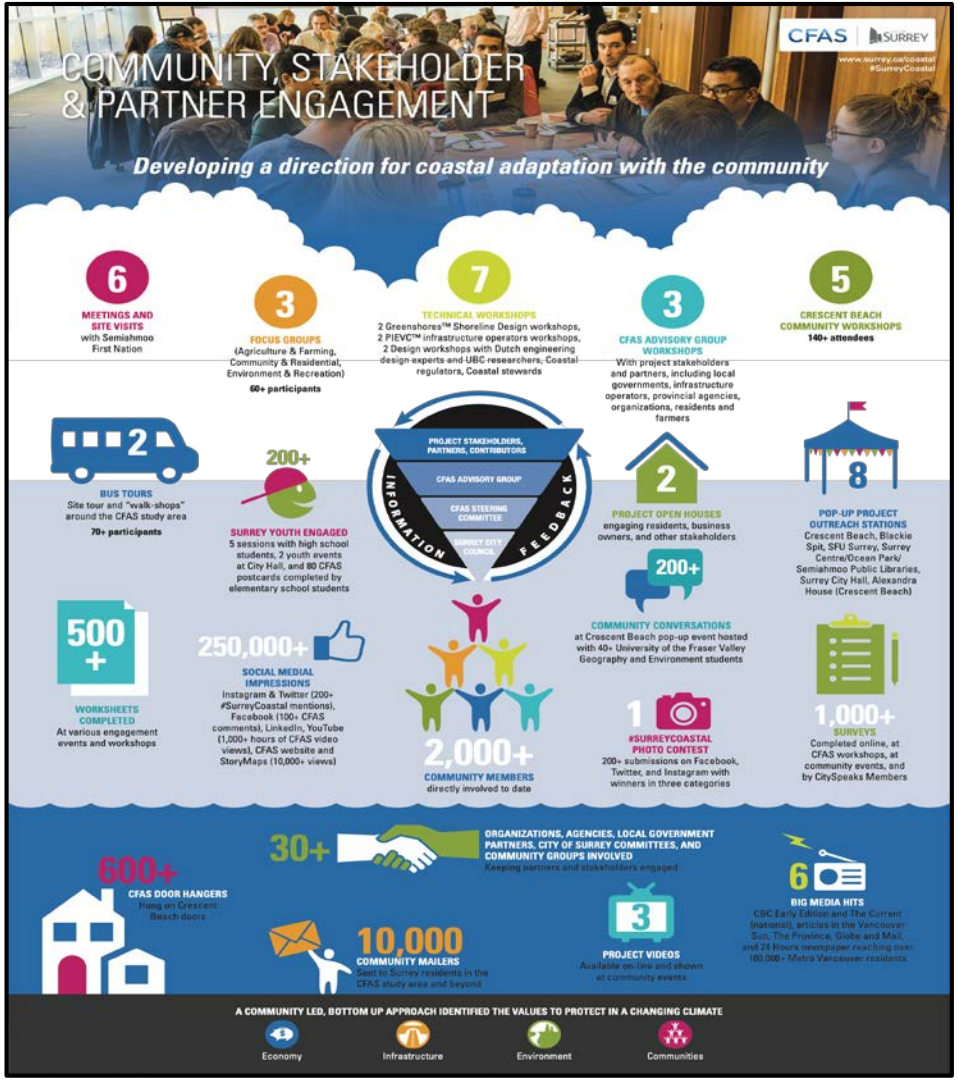
Participant Worksheets

Question	Response
Do you agree with the option evaluation? (Advisory Group)	71%
Do you agree with the Emerging Direction? (Open House)	86%

Event Exit Surveys

Question	Response
You understood the information that was presented	99% Agree
The logistics (location, time) of the Workshop were suitable:	97% Agree
You felt your opinion was heard	96% Agree
You will like to continue to be involved in the CFAS planning process	86% Agree
The length of the workshop was:	85% just right





Engagement Highlights

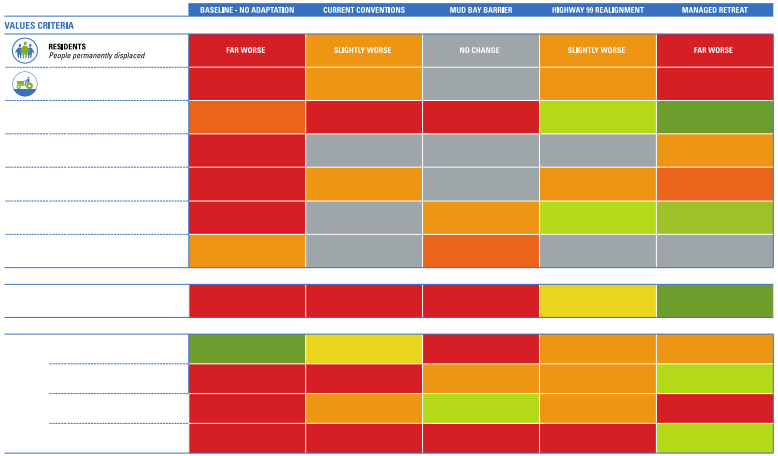
- 2,000+ directly engaged (workshop, focus group, etc.)
- Connecting Dutch experts with stakeholders
- 8 pop-up events
- 2 bus tours
- 200+ students (elementary & high school)
- 30+ organizations involved
- Advisory Group representing wide range of organizations, agencies, and governments
- 3 surveys,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

Risk Evaluation

IMPACT & RISK OF FAILURE		Impact of Failure on Value	X	Likelihood of Failure of Option	=	Risk
RESIDENTS	All housing within floodplain could be affected. Some loss of life possible from sudden dyke breaching irrespective of failure mode. Restrict future development and limit the population of the area.					
AGRICULTURE	Some agricultural land within floodplain potentially affected but land partly recoverable over time.					
ENVIRONMENT	Contamination from septic fields, sewage backflow, manure, and chemical storage.					
INFRASTRUCTURE	A failure of a dyke would likely disrupt multiple transportation corridors and utilities.					
ECONOMY	Extensive direct and indirect losses.					
RECREATION	Temporary disruptions but trails/ parks likely recoverable.					
CULTURE	A dyke breach and flood event would have limited archeological impacts.					
				Overall Risk:		

ED OPTIONS – MUD BAY

The summary table compares the short-listed options for the Mud Bay study area. The overview includes a "Baseline" or "No Adaptation" option for reference. Full descriptions of the short-listed options are available in the Primer (Primer Part II: Options) and at the video station.



Emerging Directions (Summer 2018)

- 4 options shortlisted for two primary study areas – Mud Bay, Crescent Beach
- Survey, Advisory Group, Focus Group review and evaluation narrowed down to single "emerging direction" for each area

What Would You Do Differently?

Coastal Flood Adaptation Strategy

- Anticipate more **staff time** to manage stakeholders and build relationships
- Establish **expectations** with directly impacted stakeholders upfront
- Allow more time and resources to resolve trade-offs between overall City priorities and directly impacted stakeholders
- Establish **expectations** with other governments/jurisdictions to be involved (White Rock, Delta, City of Langley, Township of Langley)
- Anticipate **resources** for developing graphical materials to illustrate and simplify material for stakeholders
- Think of engagement not as a “one off project” but part of ongoing engagement and communication on a **priority issue**

Key Take-Aways

Coastal Flood Adaptation Strategy

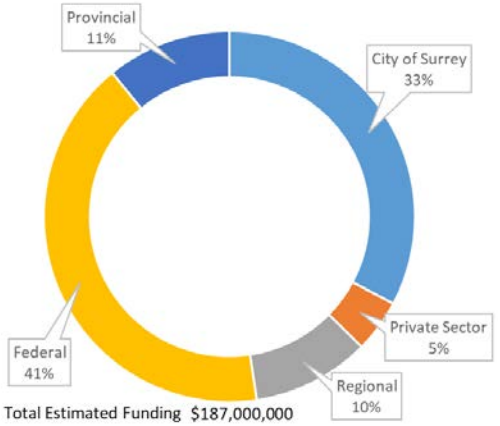
- **Transparency** is critical in decision making process
  - All materials posted online
  - Multiple formats needed (print, web, social media, e-news)
- Allow **time** to prepare staff and involve staff from multiple departments in project to facilitate workshops
- Ones size does not fit all participants
  - Information in multiple formats needed for meaningful input
  - Different venues, formats and activities needed for all voices to be heard
- Developing **interest in community** to participate in civic projects takes time
- Complex fuzzy problems benefit from **more engagement**
- Moving forwards on sea level rise adaptation required finding **win-win-win solutions** (multi-solving)
- Successful engagement supports obtaining federal and provincial **funding for implementation**

Results

#	Component	Asset Type
1	Colebrook Dyke Upgrades	Coastal Dyke
2	Colebrook Drainage Pump Station Replacement	Drainage Pump Sta
3	Sea Dam – Serpentine River	Sea Dam (drainage irrigation)
4	152 St Road Upgrades and Raising	Transportation Net
5	Nicomekl Riverfront Park - Phase 1	Flood Storage
6	King George Boulevard Bridge and Nicomekl River Sea Dam Replacement	Arterial Bridge
7	Crescent Beach Storm Sewer System Upgrades - Perforated Piping	Flood Protection
8	Dyking - Lower reaches of Nicomekl and Serpentine	Flood Protection
9	Serpentine SRY Rail Link Bridge Replacement and Dyking	Flood Protection
10	Burrows Drainage Pump Station Upgrade	Drainage Pump Sta
11	Stewart Farm Sanitary Pump Station Coastal Flood Proofing	Sanitary Sewer Network
12	Campbell River Pedestrian and Emergency Access Bridge Replacement	Transportation Net
13	Foreshore Enhancements	Flood Control

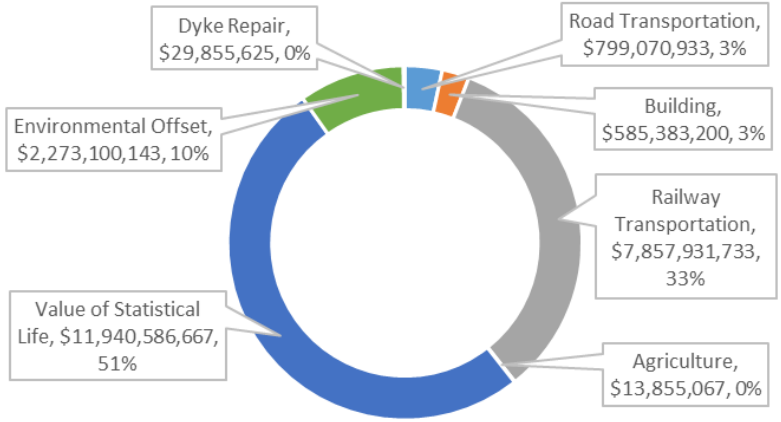
Hazard Mitigation = flood = seismic = drought

Percent of Investment per Source



Total Estimated Funding $187,000,000

Percent of Avoided Damages per Sector



Total Avoided Damages $23,499,783,368

A COMMUNITY LED, BOTTOM UP APPROACH IDENTIFIED THE VALUES TO PROTECT IN A CHANGING CLIMATE

- Economy
- Infrastructure
- Environment
- Communities

More information?

CFAS

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