

City of Vancouver

COASTAL ADAPTATION



Values-based Planning Primer
August 2021

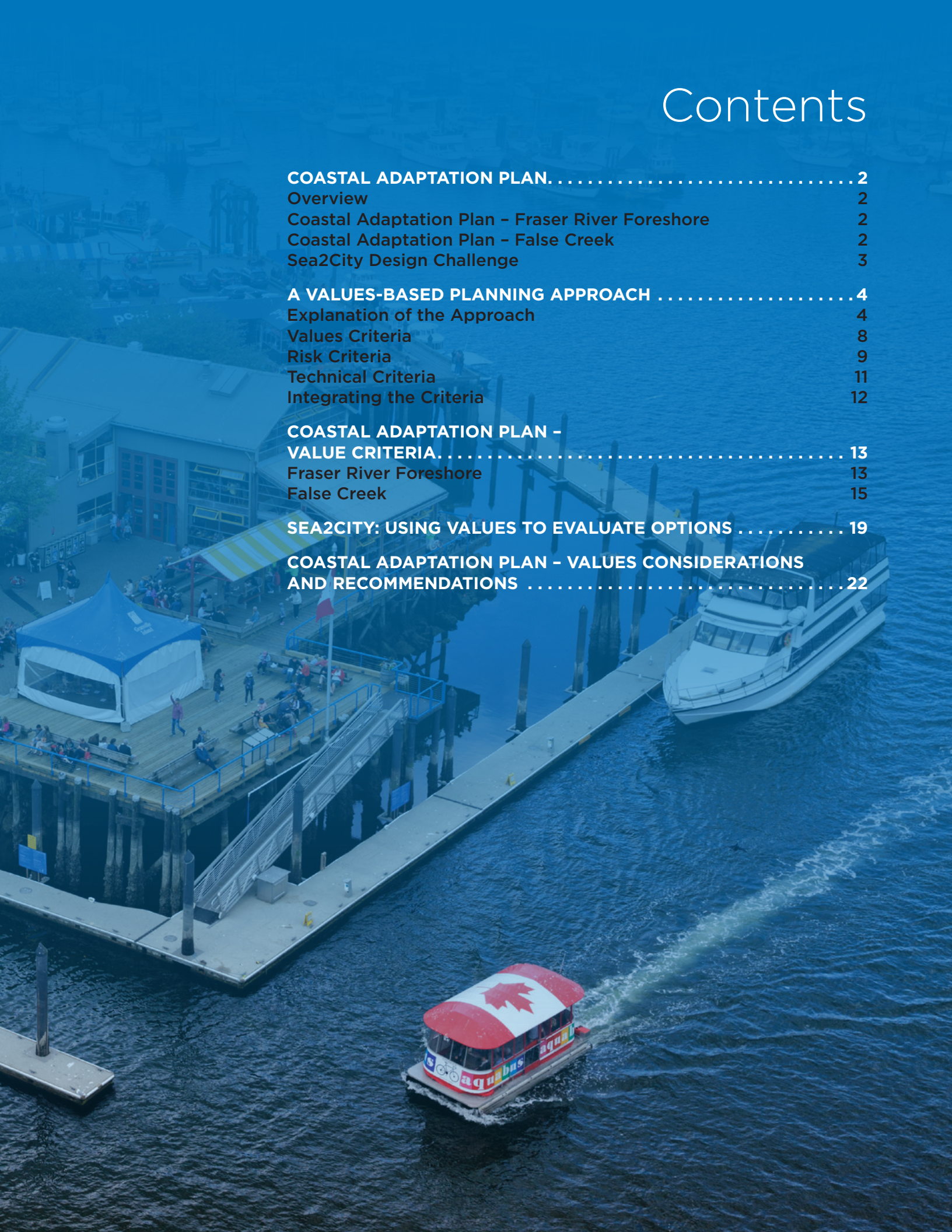


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Coastal Adaptation Plan

OVERVIEW

Vancouver's Coastal Adaptation Plan is a participatory, structured, values-based planning effort to address sea level rise and identify coastal adaptation options for the City of Vancouver. The Coastal Adaptation Plan will use both technical and values-based criteria to assess medium and long-term coastal adaptation options. The values-based criteria were developed through public engagement in the Fraser River Foreshore and False Creek areas of the city.

This values-based approach will help ensure that coastal flood adaptation options address community issues. It will make the process more transparent and support the difficult conversations to come by providing an evaluation framework that reflects shared community values.

This Primer summarizes how community values were elicited during the first two Coastal Adaptation Plan project phases – Fraser River Foreshore and False Creek – and illustrates how the values are to be used in future phases of project work, including the evaluation of specific place-based coastal adaptation options. These options will be developed in later phases of the Coastal Adaptation Plan, including the Sea2City Design Challenge which is scheduled to launch in 2021.

COASTAL ADAPTATION PLAN – FRASER RIVER FORESHORE

The first phase of Coastal Adaptation Plan was completed in 2018 along Vancouver's Fraser River foreshore. The Fraser River Foreshore is the most at-risk area of the city to coastal flooding today. The 2018 process engaged almost 1,400 residents, business owners, and other stakeholders to (1) identify community values to be addressed when developing flood adaptation approaches for the area; (2) collect input on high-level adaptation approaches; and (3) develop design and planning principles to use when developing future flood management options for the Fraser River. The process included additional engagement directly with Musqueam Indian Band.

COASTAL ADAPTATION PLAN – FALSE CREEK

The False Creek Coastal Adaptation Plan was developed in 2020. It was informed by the Fraser River Foreshore process and incorporated lessons learned from that phase of work. The objectives of the False Creek Coastal Adaptation Plan were to:

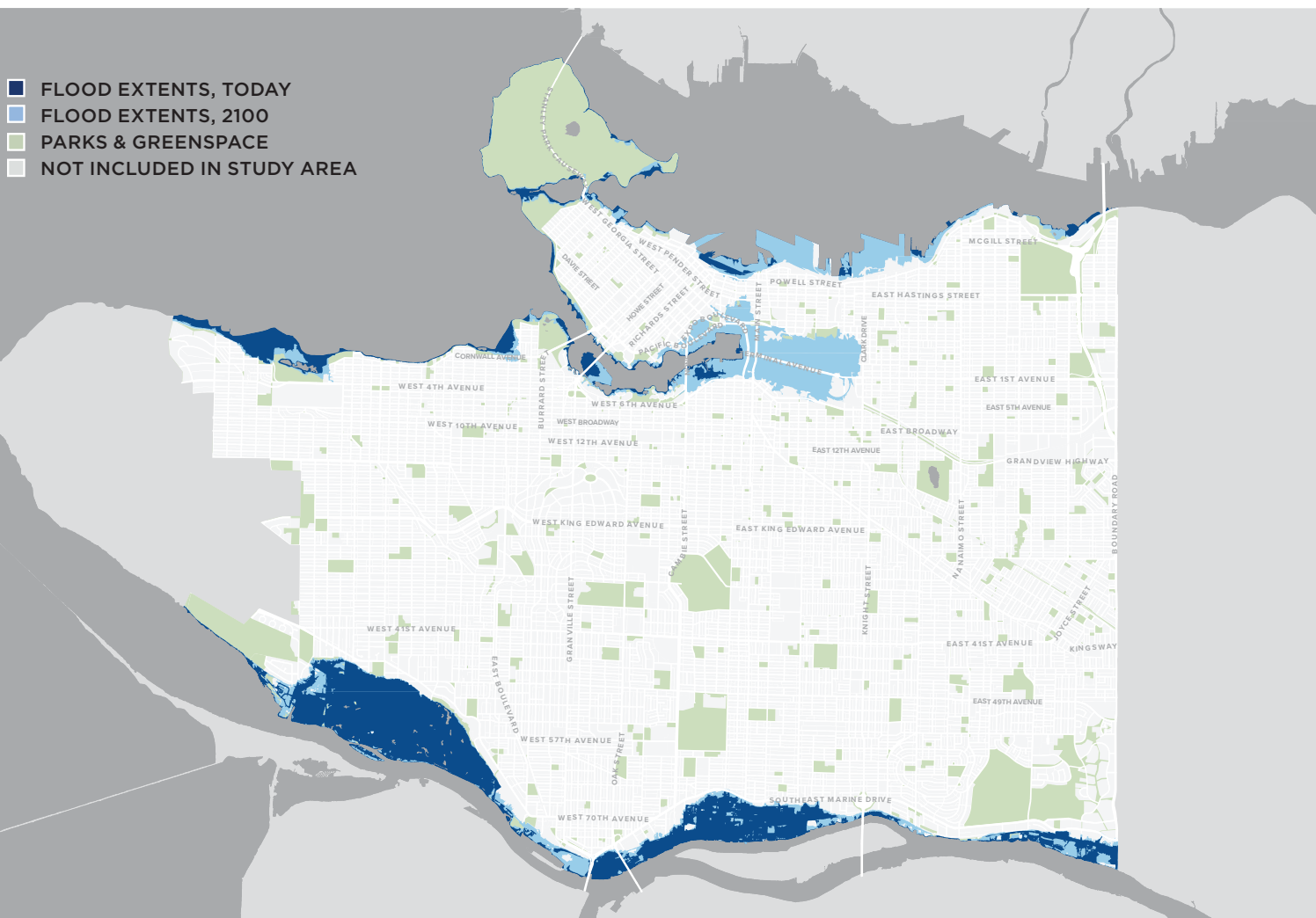
- Build awareness of sea level rise and coastal flooding risks for False Creek.
- Identify and confirm community values to help guide future work.
- Explore potential adaptation approaches to look at in more detail during the next phase of work.
- Introduce the next phase of the Coastal Adaptation Plan for False Creek, the Sea2City Design Challenge.

The process involved over 2,000 residents, youth, business owners, and other stakeholders in two rounds of engagement that were conducted almost entirely on-line due to the global COVID-19 pandemic.

SEA2CITY DESIGN CHALLENGE

Starting in late 2021, the Sea2City Design Challenge will be a collaborative and participatory process involving multidisciplinary planning and design teams, the City of Vancouver, and project partners. The Challenge will expand the City's toolbox of coastal flood management approaches. Incorporating the community values identified in the False Creek Coastal Adaptation Plan, the Sea2City Design Challenge will create a vision to guide urban development and ecological revitalization in False Creek. The Challenge will focus on two sites on the south shore False Creek and two sites on the north shore of False Creek. A fifth site, currently an undeveloped City-owned property on the south shore of False Creek, will be the focus of a design charrette. This event will include two Sea2City Design Challenge teams, the City of Vancouver, and other project partners, stakeholders, and collaborators.





decisions, values-based planning helps build project transparency. It can also result in a more engaged process where project partners and stakeholders remain more committed throughout the process. This continuous stakeholder involvement can provide the technical team with valuable local knowledge and perspectives that a more conventional flood planning process may fail to surface.

Both the Fraser River Foreshore Coastal Adaptation Plan and False Creek Coastal Adaptation Plan use Structured Decision-Making and Impact Scenario Planning. These two methodologies help set them apart from conventional flood planning work.

- **Structured decision-making:** An approach for helping groups, stakeholders, technical experts, and decision makers to think through complex problems that are layered with uncertainty, involve diverse stakeholders with competing values and preferences, and require a final decision that is embedded with difficult trade-offs. Structured decision-making is a rigorous, deliberative decision-making process that provides insights about the decision by:
 - Focusing on the things people care about (values)
 - Systematizing what we know about the problem and mitigation options (facts)
 - Identifying whether any disagreements are about facts (i.e., uncertainty) or values
 - Allowing for iterative and creative flood adaptation option generation
 - Allowing groups to explore the trade-offs between flood management approaches so that more transparent, informed, and defensible decision can be made
- **Impact scenario planning:** Scenario planning is a planning approach for exploring uncertainties and gaining insight into possible futures. It is based around the construction of a small number of scenarios about what could happen. The goal is not to identify as closely as possible what will happen (i.e., a forecast), or what should be done (e.g., a policy recommendation), but to explore a range of possibilities for what the future can bring. This helps build a better understand the inherent uncertainty in the problem being addressed. The intent is to provide a mechanism for testing options, strategy, and behaviours under a range of credible future scenarios. The Coastal Adaptation Plan presents project participants with a range of potential future scenarios around coastal flooding and sea level rise.



Trade-offs and Values-based Planning

With sea levels projected to rise up to two metres over the longer-term, Vancouver's coastal adaptation planning will inevitably involve difficult trade-offs. A values-based planning process can help illuminate and inform potential trade-offs. Example questions around trade-offs may include:

- *"If we avoid developing on City-owned land within the False Creek floodplain, how much affordable housing are we potentially losing the opportunity to develop on this land?"*
- *"How do we balance the restoration and protection of shoreline habitat and biodiversity with accessibility of the shoreline for humans?"*
- *"Considering the high cost of a shoreline dike, are we willing to see industrial properties along the Fraser River occasionally flood if we 'pull back' the flood protection to Kent Avenue?"*

These two methodologies were used in both the Fraser River Foreshore Coastal Adaptation Plan and False Creek Coastal Adaptation Plan. Impact Scenario Planning was used to elicit public values and options for addressing coastal flood hazards under a set of different possible futures (i.e., 1:500/0.2% AEP storm event; 1:500/0.2% AEP storm event with 1 m sea level rise).

Initial steps in Structured Decision-Making were used by asking participants in public engagement to provide feedback on how and what things they value could be impacted by sea level rise-driven coastal flooding scenarios and by potential mitigation approaches (i.e., resist, accommodate, move/avoid).

The central organizing feature in Structured Decision Making is an integrated, highly visual scenario evaluation tool. The simplest version of this tool compares flood management options for different sites against a baseline (i.e., no adaptation) and to each other based on their relative scores against three types of criteria: **1) Values Criteria; 2) Risk Criteria,** and **3) Technical Criteria.** The illustrative example shows three options that each take a different coastal adaptation approach (i.e., resist, accommodate, move/avoid).

FIGURE 1: *SDM Evaluation Approach*

	BASELINE NO ADAPTATION	OPTION 1 RESIST	OPTION 2 ACCOMMODATE	OPTION 3 MOVE/AVOID
Values Criteria				
Value 1	<div> <div>RELATIVE SCORES HERE</div> </div>			
Value 2				
Etc.				
Risk Criteria				
Risk Indicator	<div> <div>RELATIVE SCORES HERE</div> </div>			
Technical Criteria				
Technical Criteria 1	<div> <div>RELATIVE SCORES HERE</div> </div>			
Technical Criteria 2				
Etc.				

The following pages explain how structured decision-making can be used to develop and evaluate adaptation options developed through the Coastal Adaptation Plan and the Sea2City Design Challenge using these assessment criteria.

Coastal Adaption and Values-based Planning

For coastal adaptation planning in Vancouver, a values-based approach is being used to ensure that coastal flood management approaches reflect the vision that residents want to see for their city, communities, and shoreline. The Coastal Adaptation Plan's values-based planning approach incorporates the following features.















- **Supporting equity and considering multiple perspectives:** The approach facilitates a broad understanding of the variety of perspectives that are important to consider when making decisions about the future of our shorelines. Values-based planning is an effective way of involving community stakeholders who have traditionally been left out of decision-making processes, enhancing the equity and inclusivity of planning.
- **Incorporating local knowledge:** The approach uses multiple types of knowledge, expertise and qualitative information from community members and local experts, in addition to scientific information from studies, engineering, and assessments.
- **Adaptive and resilient:** Values-based planning is structured in a way that explicitly addresses multiple objectives across a range of shoreline planning concerns. Rooting options in stakeholder values provides a consistent base for evaluation while technical criteria and external factors (such as rate of sea level rise, development in area, etc.) are evolving. This makes it well suited for evaluating complex and dynamic issues like flood protection and climate change adaptation.
- **Building common ground:** Acknowledging the different values that people hold can build common ground and enable a better, shared understanding of present issues. The likelihood that local stakeholders and residents will support strategy options is higher if they have been meaningfully engaged in the decision process and their local values have helped shape and refine plan options. And while stakeholders may disagree about specific facts, values tend to be held in common.
- **Ensuring transparency:** Values-based planning processes allow stakeholders to see exactly how their inputs are carried forward into decisions. This can be especially important for groups that have historically been kept out of decision-making processes and may rightfully distrust public engagement. It is also important for maintaining trust over long-term projects such as coastal adaptation planning.
- **Holistic:** A values-based planning approach is typically the best way to incorporate non-material aspects of community wellbeing and to ensure these aspects are understood by decision makers.

VALUES CRITERIA

Figure 2 provides an example illustration of how values criteria can be used to assess flood management options against a baseline, or no-adaptation approach. The scoring uses indicators developed to measure each value criterion. Direct measures, constructed scales, and proxy indicators are used in the option evaluation to generate a simple visual scale which illustrates how an option would perform against the baseline, or no-adaptation approach (i.e., better, worse, no change).








The example is provided for illustrative purposes only. Future phases of the Coastal Adaptation Plan, including the Sea2City Design Challenge will develop flood management options for evaluation. In the example, the option is based on the “resist” adaptation approach.

FIGURE 2: Example Value Criteria Assessment

OPTION 1: RESIST		
Values Criteria	Description	Indicator
 Communities, People, and Homes	<i>Example:</i> No residents are relocated. Views of False Creek would be impacted by an onshore dike (~5m).	<p>Indicator: People permanently displaced</p>  <p>NO CHANGE</p>
 Health and Safety	<i>Description of option's impact on value criterion.</i>	<p>Indicator: Linked to criterion</p>  <p>SLIGHTLY BETTER</p>
 Infrastructure and Transportation	<i>Description of option's impact on value criterion.</i>	<p>Indicator: Linked to criterion</p>  <p>SLIGHTLY WORSE</p>
 Environment	<i>Description of option's impact on value criterion.</i>	<p>Indicator: Linked to criterion</p>  <p>FAR BETTER</p>
 Local and Regional Economy	<i>Description of option's impact on value criterion.</i>	<p>Indicator: Linked to criterion</p>  <p>SLIGHTLY BETTER</p>
 Arts, Culture, and Heritage	<i>Description of option's impact on value criterion.</i>	<p>Indicator: Linked to criterion</p>  <p>NO CHANGE</p>
 Recreation	<i>Description of option's impact on value criterion.</i>	<p>Indicator: Linked to criterion</p>  <p>SLIGHTLY WORSE</p>

Multiple site options (i.e., resist, accommodate, move/avoid) can be compared to one another and to the no-adaptation base case using the values criteria assessment, as illustrated in Figure 3.

FIGURE 3: Example Value Assessment

		BASELINE NO ADAPTATION	OPTION 1 RESIST	OPTION 2 ACCOMMODATE	OPTION 3 MOVE/AVOID
Values Criteria					
	Communities, People, and Homes	MODERATELY WORSE	NO CHANGE	MODERATELY BETTER	FAR WORSE
	Health and Safety	SLIGHTLY WORSE	SLIGHTLY BETTER	SLIGHTLY BETTER	MODERATELY BETTER
	Infrastructure and Transportation	FAR WORSE	SLIGHTLY WORSE	SLIGHTLY WORSE	FAR BETTER
	Environment	NO CHANGE	FAR BETTER	NO CHANGE	FAR BETTER
	Local and Regional Economy	FAR WORSE	SLIGHTLY BETTER	SLIGHTLY WORSE	MODERATELY WORSE
	Arts, Culture, and Heritage	NO CHANGE	NO CHANGE	NO CHANGE	MODERATELY BETTER
	Recreation	FAR WORSE	SLIGHTLY WORSE	SLIGHTLY BETTER	FAR BETTER

RISK CRITERIA

Recognizing that all flood protection infrastructure carries some risk of failure, a description of the anticipated impacts to community values from a failure of an option’s flood protection infrastructure would be provided in an **impact and risk of failure assessment**.






























Risk is defined as the product of the likelihood that an option will fail with the impact its failure would have on identified community values. A detailed description of how the likelihood of a failure is calculated for each option would be developed and a detailed description of the impact of the failure of an option on community values would be provided for each option.

To quantify this risk, the likelihood of a failure of an option to provide flood management would be assessed with the consequences that failure would have on identified community values. Impact and risk of failure would be assessed for each option using a common scenario (e.g., 1:500/0.2% AEP storm event with 1 m sea level rise). For each option, a detailed description of the anticipated impacts to community values would be developed using a scale from Very Low to Very High. This would include:

- **Impact of a Failure:** A description of the consequences to a given value from a catastrophic flooding event due to the failure of the option to provide protection
- **Likelihood of Failure of Option:** A summary evaluation of how likely the option is to fail in the future
- **Risk:** The combination of the likelihood that an option will fail with the impact its failure would have on the value

The overall risk would be identified across all identified community values. Figure 4 illustrates potential impact and risk of failure for an example option.

FIGURE 4: Sample Impact and Risk of Failure

OPTION 1: RESIST				
Values Criteria		Impact of Failure on Value	x Likelihood of Failure of Option	= Risk
 Communities, People, and Homes	<i>Example:</i> Homes within floodplain could be affected, and a sudden dike/seawall breach could lead to injuries from inundation.			
 Health and Safety	<i>Description of impacts related to value from failure of option.</i>			
 Infrastructure and Transportation	<i>Description of impacts related to value from failure of option.</i>			
 Environment	<i>Description of impacts related to value from failure of option.</i>			
 Local and Regional Economy	<i>Description of impacts related to value from failure of option.</i>			
 Arts, Culture, and Heritage	<i>Description of impacts related to value from failure of option.</i>			
 Recreation	<i>Description of impacts related to value from failure of option.</i>			
OVERALL RISK				

A risk assessment heat map similar to the example provided in Figure 5 would also be developed for site options. The example is based on each site design option using a different adaptation approach (i.e., resist, accommodate, move/avoid) and is used here for illustrative purposes.

FIGURE 5: *Sample Risk Heat Map*

		IMPACT				
		Very Low	Low	Medium	High	Very High
LIKELIHOOD	Very High					
	High				OPTION 1	
	Medium			OPTION 2		
	Low					
	Very Low	OPTION 3				

TECHNICAL CRITERIA

A **technical assessment** of each option would also supplement the value assessment. The range of technical criteria to be considered would be determined in future phases of work but would likely include a high-level overview of the cost of implementing the option along with other technical criteria. Likely cost criteria would include:

- **Capital Cost:** Capital infrastructure cost, estimated land purchase costs, decommissioning existing infrastructure and land remediation costs
- **Operation & Maintenance Cost:** The yearly operations and maintenance costs
- **Other Infrastructure Cost:** The additional cost of adapting non-flood related infrastructure (e.g., roads and seawall, utilities and services, etc.)
- **Future Adaptation Cost:** Estimated cost of continued adaptation requirements from both upgrading flood management infrastructure beyond 1 metre of sea level rise and future replacement costs of aging flood management infrastructure

Other technical criteria to be considered could include:













- **Seismic performance:** option performance in an earthquake
- **Stormwater management:** option’s ability to incorporate and manage stormwater on site
- **Relocated roads or seawall (i.e., pedestrian and bicycle pathways):** the primary transportation corridors that would need to be raised, relocated, or otherwise adapted for the option

The technical criteria assessment would include a summary **technical overview** highlighting the technical merits of each option. The review would also provide more detailed information on technical criteria scoring (i.e., financial costs and option performance).

INTEGRATING THE CRITERIA

Figure 6 illustrates what a complete preliminary impact assessment table might look like that includes value criteria, risk criteria, and technical criteria on a single table. The table is an example and for illustrative purposes only. Budget bins or cost ranges would be developed for the cost criteria during the option development phase.

FIGURE 6: Sample Preliminary Assessment Table

		TECHNICAL CRITERIA RANKING			
		VALUES CRITERIA RANKING			
		FAR WORSE ← NO CHANGE → FAR BETTER			
		VERY LOW LOW MEDIUM HIGH VERY HIGH			
		BASELINE NO ADAPTATION	OPTION 1 RESIST	OPTION 2 ACCOMMODATE	OPTION 3 MOVE/AVOID
Values Criteria					
	Communities, People, and Homes	MODERATELY WORSE	NO CHANGE	MODERATELY BETTER	FAR WORSE
	Health and Safety	SLIGHTLY WORSE	SLIGHTLY BETTER	SLIGHTLY BETTER	MODERATELY BETTER
	Infrastructure and Transportation	FAR WORSE	SLIGHTLY WORSE	SLIGHTLY WORSE	FAR BETTER
	Environment	NO CHANGE	FAR BETTER	NO CHANGE	FAR BETTER
	Local and Regional Economy	FAR WORSE	SLIGHTLY BETTER	SLIGHTLY WORSE	MODERATELY WORSE
	Arts, Culture, and Heritage	NO CHANGE	NO CHANGE	NO CHANGE	MODERATELY BETTER
	Recreation	FAR WORSE	SLIGHTLY WORSE	SLIGHTLY BETTER	FAR BETTER
Risk Criteria					
	Overall Risk	HIGH	MEDIUM	MEDIUM	VERY LOW
Technical Criteria					
	Capital Cost	--	\$25M - \$50M	\$10M - \$25M	MORE THAN \$100M
	Operation & Maintenance Cost	MORE THAN \$10M	\$1M - \$10M	\$1M - \$10M	--
	Other Infrastructure Cost	MORE THAN \$10M	MORE THAN \$10M	LESS THAN \$10M	LESS THAN \$10M
	Future Adaptation Cost	\$100M - \$200M	\$25M - \$50M	\$10M - \$25M	--

Coastal Adaptation Plan – Value Criteria

FRASER RIVER FORESHORE

Through several community workshops, two community open houses, and a City-wide TalkVancouver survey, community engagement helped identify many consistent and broadly shared values in the Fraser River Foreshore area. Representing the community concerns and desires that residents and other stakeholders care about most, the values were organized into seven themes and validated and prioritized through community open houses and a TalkVancouver survey.

The final values criteria are presented in general order of priority and importance based on community feedback. Each value is accompanied by a potential measure or indicator that can be used alongside technical criteria for the assessment of future coastal flood adaption options.

FIGURE 7: *Fraser River Foreshore Values Criteria*

VALUES IMPACTED – FRASER RIVER FORESHORE		Indicator
Communities and People	<p>The Fraser River Foreshore area is home to multi-family housing units in the eastern part of the floodplain, mostly detached homes in the Southlands neighbourhood towards the west, and a mix of dwellings within Musqueam’s principal reserve, which is also home to large number of leaseholder homes.</p> <p>Future flood management approaches must consider impacts on communities and people and should minimize permanent displacement of residents.</p>	<ul style="list-style-type: none"> Number of people permanently displaced by implementing the option
Environment	<p>The Fraser River Foreshore includes marine, inter-tidal and terrestrial habitat areas of various sizes, condition and connectivity. Individually and collectively, they provide critical habitat for juvenile salmon and migratory birds, as well as function as wildlife corridors along Vancouver’s southern border.</p> <p>Future flood management approaches should minimize negative impacts to wetland, freshwater and riparian habitats, while seeking opportunities to enhance and expand them.</p>	<ul style="list-style-type: none"> Anticipated impact to inter-tidal habitats (mud flats, saltwater marsh, intertidal areas) that could be expected from the option
Health and Safety	<p>Public safety and wellbeing are critical community concerns that only become heightened during an emergency (i.e., flooding). While flood events pose life safety concerns, recovery from flood events can also pose significant health and safety challenges.</p> <p>Future flood management approaches should minimize health and safety impacts and integrate with existing emergency response planning.</p>	<ul style="list-style-type: none"> Anticipated health and safety impacts that could be expected from implementing the option

VALUES IMPACTED – FRASER RIVER FORESHORE		Indicator
Infrastructure and Transportation	<p>From lifeline services supporting both the local area and larger city (e.g., natural gas, hydro, cellular, water, sewer) to important transportation corridors (Kent Street) and the TransLink Transit Centre, the Fraser River Foreshore area is home to a range of critical infrastructure and services.</p> <p>Future flood management approaches should minimize service disruptions where possible.</p>	<ul style="list-style-type: none"> · Transportation and utilities service disruptions (or increased vulnerability) that could be expected from the option
Local and Regional Economy	<p>The Fraser River Foreshore area is home to about 280 industrial, warehouse and commercial buildings, concentrated within the floodplain area south of Marine Drive. This area is home to approximately 700 businesses. There are also a number of businesses located there that rely on access to the Fraser River for their operations.</p> <p>Future flood management approaches should, where practical and feasible, minimize permanent displacement of businesses and/or loss of employment lands.</p>	<ul style="list-style-type: none"> · Permanent loss of businesses that could be expected from the option
Culture and Heritage	<p>From sites of spiritual, historic and archeological significance to the Musqueam People, such as middens and ceremonial sites, to the unique agricultural character of the Southlands, culture and heritage are deeply rooted along the Fraser River Foreshore. Additionally, Musqueam members use some foreshore areas near their reserve for traditional use activities (e.g., fishing, gathering).</p> <p>Future flood management approaches should recognize the importance of cultural and traditional use sites and strive to retain these sites as much as possible.</p>	<ul style="list-style-type: none"> · Cultural impacts (e.g., loss of lands for traditional use) that could be expected from the option
Recreation	<p>From trails to and along the Fraser River for walking, cycling, horseback riding, bird watching and the like, to three golf courses and many horse stables, the Foreshore area is also home to multiple recreational opportunities.</p> <p>Future flood management approaches should maintain and, where possible, increase the diversity of recreation opportunities in the area.</p>	<ul style="list-style-type: none"> · Diversity of new or enhanced recreation opportunities that could be expected from the option

FALSE CREEK

The first round of False Creek community engagement (Community Conversations, Talk Vancouver community survey) presented the seven community values that were identified as part of the 2018 Fraser River Coastal Adaptation project.

False Creek Coastal Adaptation participants confirmed the applicability of the community values for False Creek and identified specific gaps, themes, and priorities for the False Creek floodplain area. While the community values are presented as separate categories for discussion and evaluation purposes, it is acknowledged that there is considerable connection and reinforcement between them.

The final values are presented in general order of priority and importance based on community feedback. Each value is accompanied by a potential indicator that can be used alongside technical criteria for assessment of future coastal flood adaption options.

FIGURE 8: *False Creek Values Criteria*

VALUES IMPACTED – FALSE CREEK		Indicator
Communities, People, and Homes	<p>Over 38,000 people live in the area around False Creek in a variety of housing types. There are tight knit and unique residential communities living on and around False Creek, including long-running housing co-ops in South False Creek, live-aboard boats, unique houseboat communities, and strata corporations. Further, Indigenous peoples are often impacted most heavily and often first by natural disasters. Based on feedback and participant discussions, the value was changed from “Communities and People” to “Communities, People, and Homes” to reflect the importance, quantity, and diversity of housing in the False Creek area.</p> <p>Future flood management approaches must consider impacts on communities, people, and homes and minimize permanent displacement of residents.</p>	<ul style="list-style-type: none"> Number of people permanently displaced by implementing the option
Health and Safety	<p>Health and safety include the possible direct impacts of a flood event on the health, wellbeing, and safety of people in the area, and the impact of sea level rise on lifeline infrastructure such as health facilities, police and fire services, and water, sewer, and power services and infrastructure. These impacts range from the immediate physical safety of people during a flood event, to the longer-term mental health and wellbeing impacts of recurring flooding or the implementation of flood adaptation options.</p> <p>Future flood management approaches should minimize impacts to community safety, mental health, and wellbeing.</p>	<ul style="list-style-type: none"> Anticipated mental and physical health and wellbeing impacts that could be expected from the option
Infrastructure and Transportation	<p>Significant infrastructure and transportation facilities and networks are spread throughout the False Creek floodplain area. These include major energy facilities such as the False Creek Energy Centre which provides heat to the Olympic Village area and a growing number of buildings in the False Creek Flats area. It also includes telecommunications infrastructure, Metro Vancouver and City of Vancouver water, wastewater and green infrastructure assets, major SkyTrain stations and sections of both the Canada Line and Expo Line, and transportation arteries, including roads, bridges, bike paths, and the False Creek Seawall.</p> <p>Future flood management approaches should minimize service disruptions where possible.</p>	<ul style="list-style-type: none"> Transportation and utilities service disruptions (or increased vulnerability) that could be expected from the option

VALUES IMPACTED – FALSE CREEK		Indicator
Environment	<p>The marine and terrestrial environment in and around False Creek has undergone profound change over the past 150 years. The area transformed from a productive intertidal area surrounded by old-growth forests and fed by salmon bearing streams to a heavily polluted industrial waterbody with no remaining areas of natural shoreline. The area has undergone further transformation from its heyday as an industrial area less than 60 years ago. Water quality is improving, areas of the shoreline are being restored, and life is slowly returning to the water and intertidal areas. While it remains a predominantly urban waterway, False Creek is widely seen and appreciated as an urban refuge and its environmental features are highly valued by residents and stakeholders.</p> <p>Future flood management approaches should support the ecological revitalization of False Creek while minimizing negative impacts to existing shoreline and intertidal habitat areas.</p>	<ul style="list-style-type: none"> Ecological and environmental benefits that could be expected from the option (e.g., shoreline habitat restoration/creation, marine habitat, remediation and removal contaminated soils/pilings)
Local and Regional Economy	<p>The False Creek floodplain is a significant component of Vancouver's local economy. Many small and medium sized enterprises are located within the area, alongside hundreds of industrial properties, including a growing number of high tech and knowledge-based companies. Property tax revenue from the False Creek area is important to the City budget, and there are significant sites within the area that have yet to be developed. False Creek, including Granville Island, Science World, BC Place, Rogers Arena and Chinatown is a major tourism destination. False Creek also sits directly between the two largest employment centers in the province (Downtown Vancouver and the Broadway Corridor) and provides the backdrop for a significant amount of economic activity.</p> <p>Future flood management approaches should, where practical and feasible, minimize permanent displacement of businesses and/or loss of employment lands.</p>	<ul style="list-style-type: none"> Permanent loss of jobs that could be expected from the option
Arts, Culture and Heritage	<p>False Creek is an area with significant cultural and heritage value. Before the area became known as False Creek, it was known by many names and was used by the Musqueam, Squamish, and Tsleil-Waututh people since time immemorial. Today, False Creek is home to a range of arts venues and theatres, public art, art education and production venues, community cultural spaces, and historically meaningful sites. Many of these venues are clustered on Granville Island, which is both one of the most at-risk areas from a major flood event today and outside of the City's management authority as a federally managed area. Portions of Chinatown and the Hogan's Alley communities are within the False Creek area and are neighborhoods of significant cultural value.</p> <p>Future flood management approaches should seek opportunities to incorporate Indigenous design and interpretation, while impacts to existing cultural facilities and event spaces should be minimized.</p>	<ul style="list-style-type: none"> Displacement of facilities, damage to heritage buildings, or disruptions of events that could be expected from the option
Recreation	<p>False Creek functions as major recreational centre for many Vancouver residents and visitors alike with its network of parks and public spaces along the Seawall. Playing fields, tennis and basketball courts, dog parks, playgrounds, plazas, and natural areas provide areas for sport, recreation, play, and relaxation. The Seawall is used by many for walking, running, rolling, and cycling. Rowing and paddling occur on the still waters of False Creek itself, and False Creek provides a gateway for boaters to access the Salish Sea.</p> <p>Future flood management approaches should maintain and, where possible, increase the diversity of recreation opportunities in the area.</p>	<ul style="list-style-type: none"> Diversity of new or enhanced recreation opportunities (on-shore and on-water) that could be expected from the option



Indigenous Knowledge

In collaboration with Musqueam, Squamish and Tsleil-Waututh the following text was created. This important work aims to provide a foundation of understanding and to support Sea2City Design Challenge participants to move forward in a good way with respect to building better relations with Indigenous peoples.

Musqueam, Squamish and Tsleil-Waututh hold millennia of knowledge about these lands. Through the processes of decolonizing and Indigenizing civic processes and planning, barriers can be removed to learn from the Host Nations in the spirit of reciprocity so that the land is better stewarded, and communities are supported. This community value honours the wisdom and stewardship of Musqueam, Squamish and Tsleil-Waututh peoples and calls upon the City to listen and act on this wisdom and stewardship in a good way. Discussion points and considerations around this value include:

- Musqueam, Squamish, and Tsleil-Waututh have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge, and cultural expressions as they see fit.
- Musqueam, Squamish, and Tsleil-Waututh history, presence, and culture in and around False Creek is highly valued but could be better shared and celebrated as the Nations see fit.
- Acknowledgement and conservation of archeological sites and objects as well as historic places and objects.
- Learning from Indigenous environmental efforts and projects that are leading the way in understanding and revitalizing local ecosystems and their processes. This work should guide current environmental efforts and projects.

Continued...

- Support the environmental restoration and remediation of the shoreline and lands of False Creek. This may include daylighting historical creeks where appropriate.
- Support Indigenous use of the waterfront.
- Desire to see knowledge and design elements from Indigenous peoples incorporated into any future coastal flood adaptation work.

Incorporating Indigenous knowledge into the Sea2City Design Challenge in the short-term and, more importantly, over the longer-term, will require the City of Vancouver to commit to strengthening and supporting collaborative relationships with Musqueam, Squamish and Tsleil-Waututh.

Musqueam, Squamish, and Tsleil-Waututh will be invited to provide input on design concepts.

Host Nations have expressed interest in providing feedback in writing. Flexibility and openness in how Musqueam, Squamish, and Tsleil-Waututh choose to review this work and to incorporate Indigenous knowledge and values in it will ultimately be advanced as each Nation sees fit.

In developing concept designs, Sea2City Design Teams will also be asked to reflect on, and where appropriate and as directed by Musqueam, Squamish and Tsleil-Waututh, incorporate the Indigenous design principles that were developed through the Northeast False Creek parks planning process, which are noted below.



Guiding Principles from the Northeast False Creek Indigenous Engagement Report (2018)

IDENTITY

Rooted In Local First Nations' Cultures

- Make apparent in the park the long and continued presence of the Musqueam, Squamish and Tsleil-Waututh peoples in their own lands
- Reflect Musqueam, Squamish and Tsleil-Waututh values and principles
- Create a place inspired by and supporting Indigenous cultural practices

The Sea2City Design Teams will also be asked to incorporate planning and design principles developed for the False Creek Coastal Adaptation Plan.

Sea2City: Using Values to Evaluate Options

The Coastal Adaptation Plan is integrating a values-based planning process through the following steps. For Sea2City, the first two steps – Identifying Values and Refining and Prioritizing Values – have been completed through the Coastal Adaptation Plan Fraser River Foreshore and Coastal Adaptation Plan False Creek projects.

1. Value elicitation

- Broad-based community and stakeholder engagement centered around the question of “what matters most to you?”. Presentation of the decision context and open discussions on community issues, values, and concerns. Use of impact scenario planning techniques to elicit values. Special effort made to reach those who have historically not be part of the decisions that affect them.

2. Refining and prioritizing values

- Consolidating the results of values identification into a set of draft community values. Confirming, refining, and prioritizing these values with the community. Identifying any gaps or issues that need further attention.

Once values are identified and prioritized, they can be used to develop, evaluate, and refine options following these general steps.

3. Identifying value indicators

- Translating community values into a set of indicators (criteria) that can be measured. Natural indicators, proxy indicators, or constructed scales may be used. Baseline scenario (i.e., business as usual, no decision made) evaluated based on these measures. This baseline will form the basis for the comparison of options alongside technical criteria.

4. Developing preliminary flood management options

- Building on engagement and values elicitation to-date, development of high-level options approaches with community. High level feasibility analysis to narrow options, and community review stages to refine options to be brought forward to technical analysis. Preliminary options will be screened through the planning principles.

The Coastal Adaptation Plan design principles to inform option development. The design principles were first developed during the 2018 Fraser River Coastal Adaptation Plan project. They were based on the accumulated knowledge and experience of the City and consultant team with coastal flood management. Used alongside the community values, design principles function as a non-negotiable set of characteristics that all adaptation options must incorporate. See Figure 9.

FIGURE 9: *Coastal Adaptation Plan Design Principles*



Design for safe-to-fail infrastructure systems: Ensure risks to lifeline infrastructure and services are minimized, and that redundant systems are in place in case of failure.



Design for safety and public health: Ensure risks to lifeline infrastructure and services are minimized, and that public health and wellbeing are protected.



Design for adaptability: Develop flexible options that can adjust to a wide range of future conditions, including the pace of sea level rise, the height of sea level rise, and future land uses.



Design with nature: Ensure that approaches support ecological revitalization.



Design for co-benefits: Ensure that new approaches support multiple community values (e.g., recreation, health and wellbeing, communities and people).



Design for access: Improve access to False Creek and include recreational and interpretive opportunities where feasible.

5. Technical review

- A technical assessment that would be supported by a **technical summary** of each option. Technical criteria would be developed with the Sea2City teams in partnership and collaboration with the City and the Sea2City Technical Advisory Group. Technical review would also include development of a **risk assessment** for each option

6. Value review

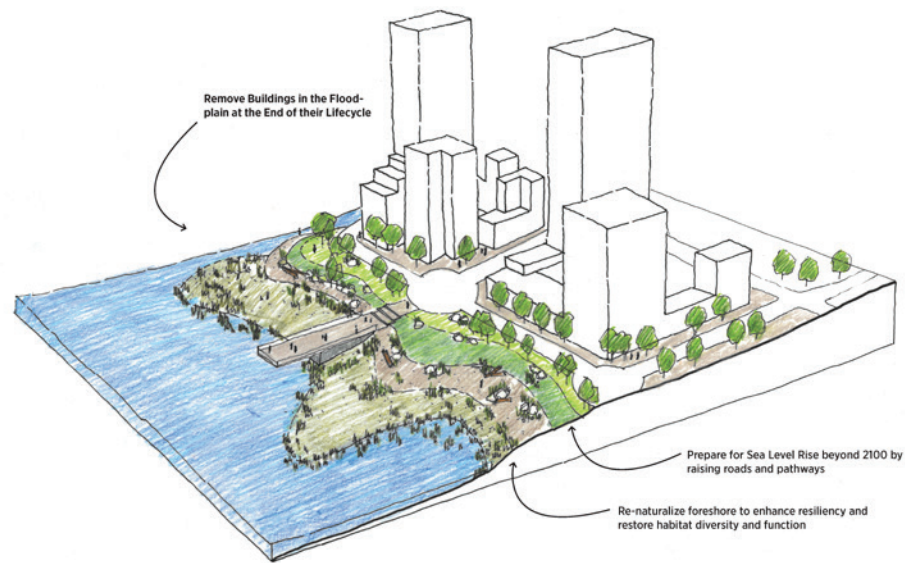
- A value review of each option and how it would perform against the baseline, or no-adaptation approach (i.e., better, worse, no change) for each value.

7. Option shortlist and further refinement















- Based on the results of the values and technical evaluation, revisiting options to explore creative approaches to addressing trade-offs. Multiple rounds of options evaluation and refinement may occur in order to reach final set of options for decision makers.

The following is an example of how the values criteria are used in completing a high-level values assessment of an example site option for one of Sea2City Design Challenge sites in False Creek, Between Bridges. In this example, the adaptation approach of move/avoid is being assessed.

FIGURE 10:
Example: Between
Bridges – Move/Avoid



OPTION 3: MOVE/AVOID

Values Criteria		Indicator
	Communities, People, and Homes	Residents in shorefront buildings are permanently relocated. Land available for housing is permanently lost.
		<i>Indicator: Number of people permanently displaced</i>
		
		FAR WORSE
	Health and Safety	People are no longer living or working in vulnerable buildings. Aging decking is removed, and wave action attenuated through naturalized shoreline. Accessible shoreline and improved public realm with natural elements.
		<i>Indicator: Anticipated mental and physical health and wellbeing impacts</i>
		
		MODERATELY BETTER
	Infrastructure and Transportation	Potentially vulnerable shoreline infrastructure replaced with more resilient green shores approach. Seawall path moved back from shoreline edge. Aquabus stop relocated.
		<i>Indicator: Transportation and utilities service disruptions (or increased vulnerability)</i>
		
		MODERATELY WORSE
	Environment	Shoreline naturalized to create habitat and support aquatic and terrestrial biodiversity. Green infrastructure elements improve water quality of run-off. Mature trees lost and replaced.
		<i>Indicator: Ecological and environmental benefits</i>
		
		FAR BETTER
	Local and Regional Economy	Businesses (including offices and restaurants) in the shorefront buildings are permanently relocated. Marina removed.
		<i>Indicator: Permanent loss of jobs</i>
		
		FAR WORSE
	Arts, Culture, and Heritage	Public art and Indigenous design and interpretive elements integrated option design.
		<i>Indicator: Displacement of facilities, damage to heritage buildings, or disruptions of events</i>
		
		FAR BETTER
	Recreation	Marina removed. Seawall path re-routed away from shoreline. Access to water becomes possible through nature pathways and a launch for small paddle craft.
		<i>Indicator: Diversity of new or enhanced recreation opportunities (on-shore and on-water)</i>
		
		MODERATELY WORSE

Coastal Adaptation Plan – Values Considerations and Recommendations

The following considerations and recommendations were developed by the project consultant team and City staff for the final False Creek Coastal Adaptation Plan. They are shared here for their relevance to future value-based coastal adaptation planning and should be carried forward to help guide future project phases, including the Sea2City Design Challenge.

Maintain values-based, participatory process through future project phases.

Participant feedback collected during engagement on the Coastal Adaptation Plan indicates that the City's commitment to participatory, values-based planning was strongly supported. Given that trade-offs and difficult conversations will be inevitable as the project moves into future phases, maintaining this commitment going forward will be a critical component of ongoing relationship-building with residents and key project partners. A continued focus on a values-based, participatory process will help maintain a transparent and open approach to planning with the community and project partners

Continue to refine and validate community values in future project phases.

As a values-based, participatory planning process, the community values identified during the first two phases of the Coastal Adaptation Plan (Fraser River and False Creek) will be a critical component of future planning work. This future work includes the Sea2City Design Challenge, planning in other Vancouver coastal neighbourhoods (Downtown and Port Lands, Jericho-Kitsilano), and longer-term work in False Creek and along the Fraser River Foreshore. Residents, business owners, and other stakeholders who did not participate in the first phases of the project will be engaged in future phases, particularly as preliminary flood adaption options are developed and evaluated beginning with the Sea2City Design Challenge. To ensure there are as few gaps as possible, and to fully engage new participants, it is important to continue eliciting, refining, and prioritizing community values in future project phases. Furthermore, over time and with growing awareness of the challenges posed by climate change, sea level rise, and coastal flooding, community values and priorities may shift.

Continue to collaborate with and engage youth and equity-seeking groups.

Climate change and sea level rise will continue to disproportionately impact equity-seeking groups and youth. Recognizing this, the City should continue to ensure that future planning and implementation integrates equity into project processes (how the City engages, and with whom) and outcomes (what is prioritized). Equity should be supported towards the promotion of justice and fairness and the removal of systemic barriers that may cause or aggravate disparities experienced by equity-seeking groups. Current and future coastal adaptation planning must also reflect youth perspectives and lived experience. A values-based planning approach supports an equity-based planning approach.

Continue public education around the existing coastal flood risk in Vancouver

Even without climate change and sea level rise, large areas of Vancouver are at risk from coastal flooding resulting from a major storm event. However, many residents, asset operators, and businesses who participated in the Coastal Adaptation Plan were not aware of the extent of potential flooding in the city's floodplain. Continued public education and awareness-building on the part of the City is required to address this issue and improve community resilience throughout Vancouver's floodplains.

Public education should also include frank and honest discussion around the accelerating pace of climate change and sea level rise, planning in a context of uncertainty, and the potential for Vancouver to expedite their planning program to better manage future risk.

Greater awareness and understanding of the challenges and opportunities embedded in coastal adaptation in a dense urban area like False Creek will also help build support for the eventual implementation of future flood management options.

An effective values-based planning approach incorporates education and awareness-building as a planning principle.

Continue to engage asset owners and operators.

Vancouver's floodplain is home to major infrastructure, including critical lifeline infrastructure. Feedback from a workshop for asset owners with facilities and linear utilities located within False Creek confirmed a strong desire to stay engaged in the Coastal Adaptation Plan process and to build on the preliminary vulnerability assessment carried out in the workshop. The workshop also underscored the need for the City to continue building relationships with the asset owners going forward into future phases of the project, particularly for those areas where City facilities and critical lifeline infrastructure are clustered in the False Creek Flats area.

Many asset owners are familiar with structured decision-making (SDM) and have explored its integration with coastal adaptation planning through the PIEVC process (Public Infrastructure Engineering Vulnerability Committee).

Be clear about the process.

Be clear that the process is not intended to arrive at a final decision based on values alone. It is deliberative, decision support process and not a decision-making process. It is intended to support decision-makers in making more informed and transparent decisions based on a combination of technical, practical, and values-based factors. Values-based planning is only one part of the larger decision-making process, and it is important to clearly communicate how values will be incorporated into the larger process.

Be open about uncertainty.

While climate change science is clear, there is still considerable uncertainty around the pace and scale of sea level rise. Going forward, some sea level rise scenario pathways may become more certain or the range of projected increases may narrow. The pace of sea level rise may also change. Despite these uncertainties, it is important to be clear that sea level rise of at least 1 metre (and likely 2 metres is unavoidable no matter the future GHG emissions scenario. This "baked in" sea level rise is very significant and will involve serious, value-laden discussion and debate going forward, along with likely very considerable trade-offs.

It is further advised to be honest and up front about trade-offs from the beginning. While listening to and noting all feedback, noting the potential trade-offs and considerations that are relevant can help to elicit deeper thinking about values. For example, noting the trade-off between flood protection and view preservation from a shoreline dike can help get clarity around the prioritization of values. Noting potential trade-offs from the beginning can also help avoid surprises later on when options are refined or only a subset of values can be achieved in an option.



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