

Surrey Coastal Flood Adaptation Process

City of Surrey initiated its coastal flood climate change planning process over ten years ago. Since then, a series of initiatives that addressed climate risk assessment, flood mapping, mitigation planning, and, recently, mitigation projects have been completed. The issues are complex, and the process iterative, incorporating stakeholder and partner input using best available information. The table below summarizes the process to-date, along with ongoing and anticipated projects and links to key materials.

Year completed	Process Item	Description	Category
2009	Crescent Beach Climate Change Adaptation Study	Assessed the potential impact of climate change on the Crescent Beach community and developed strategies for upgrading municipal drainage infrastructure to handle growth.	-Risk Assessment -Mitigation Planning
2009	Mud Bay and Colebrook Dike Assessment and Functional Plan	Discussed conceptual criteria for addressing erosion and sea level rise in Mud Bay and along the Colebrook Dike. Available upon request.	-Risk Assessment -Mitigation Planning
2012	Serpentine, Nicomekl, Campbell Rivers – Climate Change Floodplain Review PHASE 1	Developed a scientifically defensible modelling approach to characterizing flood hazards under sea level rise and undertook a preliminary assessment of infrastructure vulnerability and flood risk from ocean and riverine sources. The 200-yr flood level was determined to increase by 0.9 to 1.1 m to the year 2100 along the coast, and it was found that the present 200-yr flood level would occur at a more frequent return period within the river system.	-Risk Assessment -Flood Mapping
2015	Serpentine, Nicomekl, Campbell Rivers – Climate Change Floodplain Review PHASE 2	Incorporated climate change impacts on precipitation and recently updated subsidence estimates. In addition to the base year (2010) and year 2100, the modelling was extended to include years 2020, 2040, 2070 and 2200. Floodplain extents corresponding to estimated 200-year flood levels were evaluated for all modelling scenarios and preliminary vulnerability assessments were completed. Based on 2-dimensional modelling, water depths and flow velocities caused by select dike breaches were simulated.	-Risk Assessment -Flood Mapping
2015	Flood Backgrounder 1-4	Simple narrative described flood mechanisms, history of flooding (including personal stories). Summarized graphics, web information on flood history. Itemized vulnerable elements in floodplain. Provided graphics and accompanying text on climate science basics, including sea level rise, increasing rain intensities, increasing flood hazard, and increasing dyke vulnerability. Included map of cascading impacts (infrastructure & utilities disruption) from flood event. Provided an overview of approaches to reducing risk (protect, adapt, retreat) and associated graphics. Backgrounders available upon request.	-Informed scoping of mitigation planning -Developed communication materials for risk assessments and flood mapping
2016	Boundary Bay Climate Change Adaptation Geotechnical Review	Assessed the feasibility and constraints of various flood protection alternatives in Boundary Bay, including higher sea dikes, new setback dikes and offshore barriers. A qualitative comparison of the different options was provided and the options were ranked in terms of their favourable aspects.	-Provided technical information to support Mitigation Planning

	<u>Coastal Flood Adaptation Strategy (CFAS)¹</u> : To help prepare Surrey for a changing climate and to help coastal communities become more resilient, City of Surrey is developing CFAS.		
2017	Phase 1: <i>What Matters Most and Who is Affected?</i> <ul style="list-style-type: none"> • Primer Part I • Phase 1 Video • Focus Group Report • Stories of Change 	This phase developed hazard communication materials to communicate current and future flood risks across the study area to all stakeholder group. A series of workshops, an online survey and an open house helped identify preliminary community values to support the evaluation of flood protection alternatives.	-Risk Assessment
2018	Phases 2 and 3: <i>What Can We Do and What is Acceptable?</i> <ul style="list-style-type: none"> • Primer Part II: Ch 1 Mud Bay • Primer Part II: Ch 2 Crescent Beach • Primer Part II: Ch 3 Semiahmoo Bay • Options Video • Open House Display Boards 	In this phase, adaptation options are envisioned, refined and evaluated. This is a highly technical phase to assess the appropriateness of a wide range of adaptation options across engineering, economic, social, cultural and ecological indicators. Adaptation strategies are being refined with stakeholder and partner input. A project Advisory Group of more than 30 organizations was established to assist in refining strategies and refining options.	-Mitigation Planning
2019*	Phase 4: <i>How Will We Do It?</i>	A few robust, broadly supported adaptation strategies with phasing are refined based on cost, funding and partnerships.	-Mitigation Planning
2019*	Phase 5: <i>Reporting Back</i>	Final reporting and visual materials for broad dissemination are developed and delivered through broad communications.	-Mitigation Planning
	Supporting Studies		
2017	LINT UBC Mud Bay Surrey Design Research Report²	Designers from researchers from UBC's School of Architecture and Landscape Architecture in conjunction with designers and engineers in the Netherlands prepared conceptual approaches for using international best management to consider in the Mud Bay Area.	-Mitigation Planning
2018	Improving Coastal Flood Adaptation Approaches¹ <ul style="list-style-type: none"> • Flood Control Video 	Flood risk assessment workshops using the Engineers Canada's PIEVC framework (including triple bottom line assessment). Recommended development of frameworks between agencies.	-Risk Assessment
2019*	Prioritizing Infrastructure and Ecosystem Risk¹	Assessing vulnerabilities of the green and grey infrastructure in Mud Bay, prioritizing high risk areas, and recommending priority actions. Phase 1 completed, Phases 2 and 3 currently underway.	-Risk Assessment -Mitigation Planning
2019*	Utilization of Multi Radar data sets with Advanced Data Fusion Techniques	TRE Altamira with grant funding from the Canadian Space Agency is completing research on ground movement rates to quantify relative sea level rise variation within Surrey.	-Risk Assessment
2029*	Infrastructure Canada: Disaster Mitigation and Adaptation Fund (DMAF) funded structural adaptation projects	The proposed bundle of projects comprises of a variety of initiatives in different jurisdictions (City of Surrey, City of Delta and Semiahmoo First Nation) that seek to address the common climate change hazard of coastal flooding and will increase the resiliency of local communities and critical infrastructure through structural and nature-based infrastructure works to be completed over 10 years.	-Investing in Large-Scale Mitigation Projects

*20XX denotes anticipated year of completion for activities underway or proposed

Note: Additional risk assessment work has been completed by City of Delta and Semiahmoo First Nation that has informed City of Surrey Planning.

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² Financial support provided by the Kingdom of the Netherlands through the Creative Industries Fund