



SURREY

Rising sea levels and coastal flood adaptation

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THE SCIENCE

The City of Surrey manages the largest flood control system in British Columbia, with nearly 40 kilometres of coastline and over 100 kilometres of dikes along rivers and coastal waters. As a result of climate change, coastal communities like Surrey are projected to experience more frequent and severe flooding from sea level rise and storm surges. The coastal flood plain comprises 20 percent of Surrey's land base, and includes residential neighbourhoods, businesses, the Semiahmoo First Nation, productive farmland, internationally significant natural habitats, and both provincial and national critical infrastructure and transportation routes. Over 2,500 people will be affected by rising sea levels in Surrey's residential areas and neighbourhoods.

Surrey's coastal lowlands already experience nuisance flooding, especially during storm surge and king tide events. Additional sea level rise and storm surge impacts could include rising groundwater levels, saltwater intrusion, increased shoreline erosion, and higher water levels and duration of flood events. Studies show that the existing flood control protection and drainage systems will not be sufficient to deal with the projected future impacts of sea level rise and climate change, and significant investments in upgrading existing flood control measures will be required.

THE TRIGGER

In 2011, the Province of British Columbia released the Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use. It outlined the requirements for flood protection that municipalities were expected to meet, which included measures to manage a one-metre rise in sea level by the year 2100 and a two-metre rise by 2200. In 2014, the city started an engineering review of climate change impacts on the drainage utility. "We decided to do our own technical studies to look at sea level rise and how it would impact us over time," explained Carrie Baron, Drainage Manager at the City of Surrey. "We have a lot of dikes and we wanted to know where to go first. The technical studies showed us where and when we were the most vulnerable, and why we needed to do this. We then needed to involve the community." In 2016, the City of Surrey launched the Coastal Flood Adaptation Strategy (CFAS), a three-year planning effort to increase the resiliency of Surrey's coastal communities to climate change and flooding from sea level rise.

THE APPROACH

According to the City of Surrey, the "CFAS takes a participatory, community-driven planning approach directly engaging residents, stakeholders, and other partners, including Semiahmoo First Nation, community and environmental organizations, business associations and groups, senior governments, farmers, the agricultural community, and neighbouring jurisdictions to identify short, medium and long-term options to adapt." The participatory values-based approach used by CFAS was chosen to ensure that the adaptation options developed would be broadly supported, robust, transparent and defensible. CFAS looked at three low-lying areas: Mud Bay, Crescent Beach, and Semiahmoo Bay. Four general adaptation approaches were introduced: Protect, Accommodate, Retreat, and Combination. From these, a



Figure 11: Surrey's coastal lowlands already experience nuisance flooding, especially during storm surge and king tide events. (Source: City of Surrey)

diverse set of options was developed with stakeholders.

The Coastal Flood Adaptation Strategy has five phases. Phase 1 (2016) centered on extensive public and stakeholder engagement to establish an understanding of the challenges posed by sea level rise, and also to identify shared values in the community and preliminary adaptation options. Phase 2 and Phase 3 (2016-winter 2018) focused on what could be done and what would be acceptable to residents and stakeholders. It centered on envisioning, refining, and evaluating various adaptation options. The appropriateness of a wide range of adaptation options was assessed across engineering, economic, social, cultural and ecological indicators, and were then refined with stakeholder and partner input. Among these adaptation options were status quo, managed retreat, coastal realignment, building coastal barriers and barrier islands/spits, elevating structures and key infrastructure, and building super dikes. The coastal flood adaptation options were shortlisted through a participatory process involving community members, stakeholders, and experts from local universities, government, and environmental organizations, as well as multi-disciplinary staff, planners, and engineers from the City of Surrey and multiple consultancies.

Phase 4 includes further development of the preferred options using more technical analysis. A small number of robust, broadly supported adaptation strategies will be refined into preferred strategies based on cost, funding and partnerships. The results will be presented to the broader stakeholder community, with another round of engagement to inform the final recommendations. Phase 5, to be completed by early 2019, is the final phase of the project, and will combine the final preferred options into a long-term strategy for the City of Surrey.

THE OUTCOME

With a strong focus on community engagement and education, the CFAS project used multiple forms of outreach. Descriptive videos were utilized to help residents visualize the impacts of sea level rise. Workshops were held to engage and educate key stakeholders and public participants, including some bus and foot tours of the study area. Local residents, farmers, First Nations, and business owners were included as speakers at these events and in marketing materials to provide a compelling local narrative. CFAS also used community mailers, online surveys, social media outreach, photo contests, interactive story maps, youth events, stakeholder-specific workshops, and pop-up outreach stations in the most vulnerable communities.

Currently in Phase 4 of the project, the Coastal Flood Adaptation team have narrowed down to ten the number of adaptation options for coastal flooding in Surrey across the three study areas. Through a participatory process, the city heard from the public and several diverse stakeholders on the benefits and trade-offs associated with various adaptation options. The remaining ten options have been grouped based on timescale (short, medium and long-term solutions) and budget pathways. CFAS should be completed by early 2019. The findings will also feed into the Lower Mainland Flood Management Strategy, a regional study by the Fraser Basin Council.

A WORD FROM SURREY

The CFAS project has been praised for its community engagement efforts. Carrie Baron emphasized the importance of making complex information accessible. "The complexity of the issue is very challenging. Don't talk at your residents, listen to them. It is important to get people to the sites to see what these areas look like and to hear from local speakers. You have to make it real, but you don't want to scare people. It's a fine line, and the narrative is important." Ms Baron also stressed the need to engage multiple levels of government. "We are a local government, but there is a lot of federally and provincially regulated infrastructure that goes through our area, like highways and railways."

When it came to the controversial topic of managed retreat, the CFAS team seeded the discussion by starting with the four broad pathways for adaptation, one of which includes retreat. "Retreat doesn't necessarily mean full-scale retreat. It is not black and white, and having the iterations of workshops with residents helped us to delve into the different criteria and what made the most sense for the community," said Matt Osler, Senior Project Engineer with City of Surrey. "A powerful part of the project was having three study areas, so no one community felt singled out and it showed it was a city-wide issue."

In a February 2018 interview for WaterCanada, Surrey's mayor Linda Hepner stated, "The complexity and cost of coastal flood protection issues are significant. By getting ahead of the issue, and setting a direction now for where we want to be in 100 years, we are positioning Surrey to make smarter investments in the protection of residential neighbourhoods, businesses, significant habitat areas and provincially critical infrastructure."