Lower Mainland Flood Management Strategy

Flood Strategy Briefing

Bulletin 3: July 2019

Lower Mainland Flood Forum

October 8-9, 2019

A briefing, dialogue and feedback event for partners.

See page 6

INSIDE

About the Flood Strategy Briefing

This is the third in a series of updates on the Lower Mainland Flood Management Strategy (LMFMS) — an initiative aimed at helping communities along BC's lower Fraser River and south coast reduce the risks of a major flood.

Flood Strategy Briefings are distributed to LMFMS partners and other entities participating in the Strategy development and are available online at **floodstrategy.ca**.

Fraser Basin Council

WHAT IS THE FLOOD STRATEGY?

The Lower Mainland Flood Management Strategy (LMFMS) initiative is aimed at the creation of a region-wide strategy to reduce flood risk and improve the flood resilience of communities along the lower Fraser River and south coast.

Funding partners and other participants in the LMFMS are the entities and agencies that have responsibilities or interests related to flood management. There are 50 partners in all, representing the Government of Canada, the Province of British Columbia, Lower Mainland local governments, First Nations and other organizations concerned about flood risk in the region. The LMFMS is an opportunity for decision makers to work collaboratively on flood risk reduction, find shared solutions and create consensus for action at all levels.

Strategic Direction for the Initiative

A Leadership Committee provides oversight and strategic advice on the LMFMS, particularly on funding and decision-making options that merit exploration. The Leadership Committee includes representation from the Government of Canada, Province of BC, local governments (through Metro Vancouver and Fraser Valley Regional Districts), First Nations governments and regional infrastructure agencies.

Work on the strategy is guided and supported by the Joint Program Committee (JPC) for Integrated Flood Hazard Management and technical advisory committees.

Fraser Basin Council

The Fraser Basin Council (FBC) is the facilitator and program manager for the LMFMS.

PHASES OF STRATEGY DEVELOPMENT

1

Phase 1 (2014-2016)
Understanding Lower Mainland Flood Risks

Phase 1 reported on:

- Coastal and Fraser River flood scenarios (Present Day and Year 2100)
- Projected economic losses and impacts from a major flood
- Assessment of Lower Mainland dikes.

Details are at **floodstrategy.ca.**

2

Phase 2 (2016-2020)
Building a Region-Wide Strategy

Phase 2 – now in progress – is aimed at developing a regional flood strategy. The work includes:

- Assessment of flood hazards, flood risk and certain flood risk reduction options through modelling, mapping, risk assessment and analysis
- Identification of priorities for flood risk reduction in the region
- Assessment of governance and funding options
- Ongoing input from partner and participant entities on key issues
- Public and stakeholder engagement on key issues
- Completion of the Strategy

3

Phase 3 (2020-)
Taking Action

Phase 3 will focus on implementation of the Flood Strategy, including opportunities for national, provincial, regional and local action.

PROJECT UPDATES

Lower Fraser River 2D Flood Modelling & Mapping

Completed: June 2019

Flood modelling and mapping is now complete for 27 flood scenarios along the lower Fraser River. The results clarify the nature of the flood hazard in the Lower Mainland, now and in the future, and information to better understand some potential flood mitigation measures.

The Lower Fraser River 2D Flood Model is a new tool developed to advance the Lower Mainland Flood Management Strategy and other flood planning work in the region.

The Fraser Basin Council retained Northwest Hydraulic Consultants (NHC) to develop the flood model. The model shows how water would move along the lower Fraser River and across the floodplain (from Hope to the Salish Sea) under different flood scenarios. NHC modelled and mapped 27 lower Fraser flood scenarios that reflect different river flows and ocean levels and the resulting extent and depth of flooding, including from dike overtopping. For eight of the scenarios, potential dike breaching is directly simulated at one or more sample breach locations.

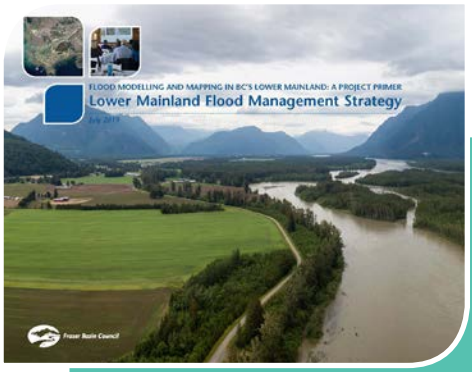
Future flood scenarios that account for the effects of climate change were modelled. As projected in Phase 1 of the LMFMS, climate change is expected to lead to larger and more frequent floods on the lower Fraser River in the coming decades. The change in the river flood hazard comes from the combination of sea level rise and changing snowmelt and precipitation patterns in the Fraser Basin. In the Phase 2 modelling and mapping work, climate change (to 2050 and 2100) was taken into account in multiple flood scenarios, using updated climate science that was unavailable in Phase 1.

While based on the best available data, the flood scenarios chosen for modelling are hypothetical and are NOT predictions of when or how future Lower Mainland floods may occur; nor are they a statement about the probability or location of specific dike failures. Flood managers can use the scenarios to examine the areas that would be flooded under given conditions and where flooding may be most severe.

For each scenario, the flood modelling work has produced data, flood maps and animation sequences that show:

- **Extent of flooding**
- **Depth of flooding**
- **Velocity of flood waters**
- **Timing of the flooding.**

Combined with data on damages and loss of buildings and infrastructure, the flood modelling data provides a good foundation for a detailed flood risk assessment, which can help decision makers set priorities for flood risk reduction: see Risk Assessment, p. 5



Ready to Learn More?

Highlights of this project are set out in the summary **Flood Modelling & Mapping in BC's Lower Mainland: A Project Primer**. *The primer is being distributed to LMFMS partners in July 2019 and will be available online at floodstrategy.ca.*

FBC will make a presentation on the work to partner entities in the LMFMS at the Lower Mainland Flood Forum in October: see page 6.

Charlene Menezes of the Fraser Basin Council offers an overview of the Lower Fraser River flood modelling project at a workshop for critical infrastructure agencies in late 2018

Disclaimer on Flood Scenarios

The flood scenarios and maps developed for the Lower Fraser River flood modelling and mapping project are for information only. They are intended for flood mitigation planning and may help inform emergency planning. The scenarios are NOT predictions of when a Fraser River flood might occur or where a flood would overtop dikes or breach dikes. They are not for use in designating floodplains, establishing Flood Construction Levels or designing dikes or other structures.

FBC client engineer on the modelling project, Tamsin Lyle of Ebbwater Consulting, provides a flood modelling briefing for the Joint Program Committee (JPC) for Integrated Flood Hazard Management. JPC members work for federal, provincial, local and First Nations governments and other entities with flood responsibilities. They meet at least three times a year and many serve on advisory committees for the Flood Strategy.

Five of the flood scenarios focused on the impact of specific types of flood mitigation in given locations, and four of those scenarios were modelled. Insufficient data was available to model upstream storage; therefore, assumptions were made based on professional judgment. The intent was to study the hydraulic effects (e.g., water depth, extent, velocity) of a few potential flood risk reduction options:

- **Raising dikes in their current location to meet the current Provincial standard**
- **Setting back dikes from their current location to leave more room for the river**
- **Raising land above projected flood levels prior to development**
- **Removing sediment from the river channel to create capacity for flood conveyance**
- **Storing water upstream in existing reservoirs to reduce peak freshet flows.**

For commentary on each, see *Flood Modelling and Mapping in BC's Lower Mainland: A Primer*.

For all flood risk reduction options – whether focused on land use planning or flood works – effectiveness in reducing flood risk is important, including a consideration of social, economic and environmental factors. Regulatory issues must also be considered.

Value of the Flood Modelling & Mapping

The Results Show

- **Areas of the Lower Mainland that would flood under a given flood scenario**
- **Severity of the flooding (depth and velocity of floodwaters)**
- **Timeline of key impacts in a given flood scenario**
- **Potential benefits & limitations of flood mitigation options, including flood levels and velocities in the river channel and on the floodplain, and also impacts on neighbouring areas across the river channel and downstream**

The Results Support

- **Flood risk assessment (see p. 5)**
- **Regional priority-setting for flood risk reduction**
- **Evaluation of flood risk reduction options**
- **Emergency preparedness and response planning.**

The Flood Model Can Be Customized for Communities

In addition to sharing modelling results, FBC intends to make the flood model tool accessible to LMFMS partner organizations, subject to funding, data-sharing arrangements and other applicable procedures and protocols.

LMFMS partners will be able to run additional scenarios of interest to them using the flood model, with help from modelling experts in qualified firms.

Lower Mainland Flood Risk Assessment

In Progress | Completion: March 2020

What losses would result from a wide-scale flood in the Lower Mainland – and how can we identify the areas of highest risk within the region? A rigorous, standardized and up-to-date flood risk assessment will help to address these questions.

Phase 1 of the LMFMS included a high-level, region-wide baseline vulnerability assessment to estimate flood-related losses connected to buildings, infrastructure, agricultural production and shipping. It was estimated that the region overall could faces losses of $20-30 billion from a major coastal or Fraser River flood.

By using updated flood modelling results (p. 3) and the latest datasets specific to the region (on population, buildings and infrastructure), it is now possible to conduct a flood risk assessment that identifies direct and indirect impacts of flood with greater consistency and accuracy. A flood risk assessment will make it easier for decision makers to determine high-, medium- and low-risk areas so that they can be considered later in the strategy for various flood risk reduction options.

Watch for updates.

Lower Mainland Flood & Environmental Atlas

Completed: May 2019

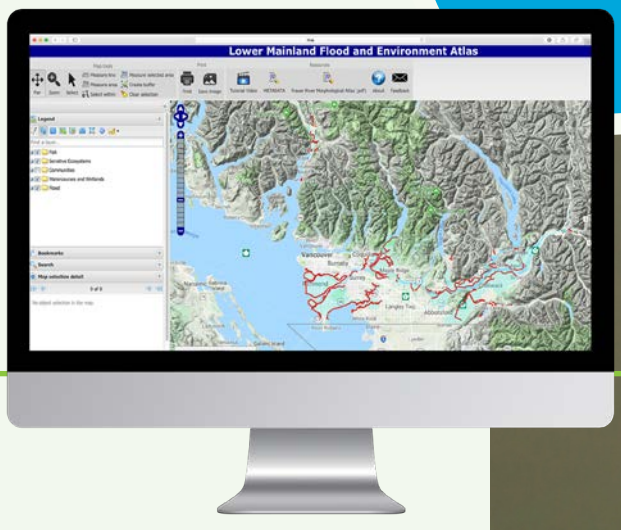
Are you looking for new planning tools for flood management?

A new Lower Mainland Flood & Environment Atlas has been developed for the Lower Mainland Flood Management Strategy. The atlas is now available on the Community Mapping Network website.

In the Atlas you can view estimated flood extents in both Fraser River and coastal floodplains (present day and 2100), combined with the best available data on environmental values and features along the Fraser (Hope to Richmond) and coastal foreshore (White Rock to Squamish).

The atlas can help communities engaged in flood management planning to identify the potential impacts of land use planning and flood infrastructure and related works on environmental values such as species and habitats of concern. Depending on available data, the atlas can help decision makers flag issues likely to require review in regulatory processes and identify potential candidate sites for habitat protection, conservation, restoration or compensation.

Take a tour at
www.cmnbc.ca



ENGAGEMENT

Lower Mainland Flood Forum

Upcoming: October 8-9, 2019

Partners and participants in the Flood Strategy initiative are invited to be represented at the Lower Mainland Flood Forum

The Fraser Basin Council is hosting a Lower Mainland Flood Forum October 8 (full day) and 9 (half day) in Vancouver to bring together funding partners and other participants in the Lower Mainland Flood Management Strategy initiative.

The Forum will advance the strategy by updating participants and seeking input on key issues:

- **regional priorities for flood risk reduction**
- **flood risk reduction options, including land use choices, flood infrastructure and related works**
- **approaches to funding and decision-making.**

The forum is by invitation to one or more invitees (elected officials or senior executives) from each funding partner or participant organization via personal email in mid-July. An invitee can delegate a spot to another person within the same organization. Registration is requested as soon as possible and no later than September 16, and space is limited. This Flood Strategy Briefing and the Flood Modelling & Mapping Primer will accompany invitations as background information.

We expect to welcome 150 representatives to the Forum from the Government of Canada, the Province of British Columbia, local, regional and First Nations governments across the Lower Mainland, as well as infrastructure entities and other organizations with interests in flood risk reduction. There will be opportunity for additional input by partners on the key issues following the Forum.

Flood Education Website

In Progress | Completion: March 2020

A first-stop flood education website is in development to support better awareness of flood hazards and the opportunities for flood risk reduction in the Lower Mainland.

The site will support the Lower Mainland Flood Management Strategy through information, story maps and a series of short videos. The site will also profile best-in-class flood information resources and case examples relevant to BC.

While the initial focus of the site will be on the Lower Mainland, the site may also be expanded in future to profile other flood initiatives in British Columbia.

The site is scheduled to launch in March 2020.

Workshops, Presentations & Dialogues

Ongoing

The Fraser Basin Council works with the Leadership Committee, and meets regularly with the Joint Program Committee for Integrated Flood Hazard Management and project advisory committees. In the past year, in collaboration with partners, we have led or participated in over 30 different engagement and dialogue sessions with people who have responsibilities for or interests in flood risk reduction.

- **Workshops or meetings with local governments and First Nations**, including: City of Delta, Indigenous Emergency Planning Secretariat, Kwantlen First Nation, City of Maple Ridge, Metro Vancouver, Musqueam First Nation, North Shore Sea Level Rise partners (City of West Vancouver and City and District of North Vancouver), City of Pitt Meadows, City of Port Coquitlam, City of Surrey, City of Vancouver, Upper Fraser Valley Community-to-Community Forum and Metro Vancouver Mayors' Committee
- **Specialty workshops and field tours, including:**
  - *Fraser River Flooding, Flood Management and the Environment Workshop*
  - *Coastal Flooding & Ecosystem Resilience under 21st Century Sea Level Rise Workshop*
  - *Flood Hazards and Infrastructure Risk in the Lower Mainland Workshop*
  - *Workshop on flood mitigation with Dutch delegation and Lower Mainland flood management professionals*
  - *Urban Development Institute, Planning Institute of BC, and Fraser Basin Council seminar: Planning and Building for Regional Flood Resilience*
  - *BC Land Summit session: Changing Climate, Changing Coast: Building Resilience & Reducing Disaster Risk in BC*
  - *Resilient Waters workshop on flood management and the environment*
- **Multiple other flood presentations and discussions at key events for LMFMS partner and participant organizations and for other stakeholders.**

Flood managers and community group representatives discuss environmental and infrastructure issues in coastal flood management during a 2019 meeting and field tour in Richmond and Delta

30
Outreach Sessions
2018/19

RELATED PROJECTS

Assessment of Orphan Dikes

In Progress | Completion: March 2020

Province-wide, there are approximately 100 orphan flood and erosion protection works that were constructed during emergency conditions. They lacked adequate engineering design, and since construction, have not typically been maintained. FBC has retained a consulting team to evaluate the condition of the orphan structures, the associated risks of failure and high-level conceptual design, as well as the costing associated with upgrading to provincial standards. The field assessments of all the structures were completed in late 2018, and work on the risk assessment continues. While only a small number of orphan works are in the Lower Mainland, the project will help identify any significant risks associated with them. This project is funded by the Province of BC with the aim of helping local governments, the public and the Province understand the risks that these structures pose to BC communities.

Seismic Guidelines for Dikes

In Progress | Completion: March 2021

Since the Province introduced seismic guidelines for new and existing high-consequence dikes in 2011, local authorities and design professionals in the Lower Mainland have found the standards technically challenging to implement and/or cost-prohibitive in many locations. The Province of BC has funded a project to fill in knowledge gaps on the seismic vulnerability of diking and to engage with local governments on how to improve the seismic resilience of Lower Mainland dikes. FBC has retained a consultant to fill information gaps about the seismic vulnerability of dikes through geotechnical investigations and engineering analysis. The field investigations will begin in summer 2019 and the engineering analysis will be completed in early 2020.

Subscribe to the *Flood Strategy Briefing* bulletin: **floodstrategy.ca**

Connect With Us

The Lower Mainland Flood Management Strategy is facilitated and managed by the Fraser Basin Council on behalf of the funding partners and participants in the Strategy development. We invite your questions and feedback.

Lower Mainland Flood Management Strategy

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Fraser Basin Council

PHASE 2 TIMELINE

2019

Flood Management Tools & Analysis

- Lower Fraser 2D Flood Modelling and Mapping (complete)
- Online Atlas on Flood and the Environment (complete)

Engagement

- Leadership Committee, JPC and advisory group work (ongoing)
- Presentations for partners and others (ongoing)
- Lower Mainland Flood Forum (October 2019)
- Partner engagement and feedback on progress to date and key issues (Fall 2019)

2020

Flood Management Tools & Analysis

- Flood Risk Assessment (Spring 2020)

Engagement

- Leadership Committee, JPC and advisory group work (ongoing)
- Presentations for partners and others (ongoing)
- Public education website and videos (March 2020)
- Partner/public input on draft strategy (June 2020)

Reports

- Draft Strategy (June 2020)
- Final Strategy (September 2020)

Funding Acknowledgements

Thanks to the Government of Canada, Province of British Columbia and LMFMS partners for their financial and in-kind contributions to Phase 2. We acknowledge the National Disaster Mitigation Program for funding the Lower Fraser 2D Flood Model, the flood website and flood risk assessment projects, and the Real Estate Association of BC for funding the Lower Mainland flood and environment atlas and other environmental work.