LOWER MAINLAND FLOOD MANAGEMENT STRATEGY PHASE 2

Flood Strategy Briefing

Bulletin 2: May 2018

About the Flood Strategy Briefing

This is the second 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.

See Briefing 1 (September 2017) for an overview on funding, structure and project leadership.

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

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WHAT IS THE FLOOD STRATEGY?

The Lower Mainland Flood Management Strategy (LMFMS) is aimed at reducing flood risk and improving the flood resilience of communities along the lower Fraser River and south coast — from Hope to Richmond and from Squamish to White Rock.

Participants in the LMFMS have responsibilities or interests related to flood management and include the Government of Canada, the Province of British Columbia, Lower Mainland local governments, First Nations, and non-governmental and private sector entities in the region.

The LMFMS is an opportunity for decison-makers to work collaboratively on flood management. Participants share information, fill knowledge gaps, enhance communications, build consensus, identify regional priorities and interdependencies, identify and advance projects of regional benefit, and explore costsharing solutions.

The collaborative approach is important. A regional consensus on a flood strategy is key to finding shared solutions and a compelling case for action at all levels.

Phase 1 of the LMFMS was completed in May 2016. Phase 2 is now underway.

What We Know from Phase 1

Phase 1 of the LMFMS offers a critical lesson: We have to get ready for flood — and the sooner the better.

Phase 1 tells us that the Lower Mainland faces an increasing likelihood of a large-scale coastal or Fraser River flood over the next 100 years. The key drivers are sea level rise and other projected impacts of climate change. The region's diking system is inadequate, and in a major flood event, most dikes would be at risk of being breached and/or overtopped.

If a major Fraser River or coastal flood were to occur between now and 2100, it would trigger losses estimated at \$20 to \$30 billion, which would make it the largest disaster in Canadian history.

Find Phase 1 results at floodstrategy.ca

The aim of Phase 2 is to build a comprehensive, integrated flood management strategy to reduce flood risks in the region. Phase 2 will include an assessment of a range of mitigation options — flood infrastructure and other works, land use strategies and floodproofing requirements.



THE FLOOD STRATEGY IN THREE PHASES

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
- State of flood mitigation works, policies and practices.

Details are at floodstrategy.ca.



Phase 2 (2017-2020) Building a Region-Wide Strategy

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

- Improved understanding of the flood hazard
- · Assessment of priorities and options for flood mitigation, decision-making and cost-sharing
- Input on options from partners and participants in the LMFMS
- Participation of First Nations
- · Analysis of environmental impacts and regulatory requirements of flood mitigation
- · Stakeholder and public engagement on key issues.

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Phase 3 (2020-) Taking Action

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

DIRECTION

The LMFMS is a collaborative partnership of 50+ governmental and non-governmental entities having responsibilities or interests in flood management.

A **Leadership Committee** offers guidance on the initiative. Members of the Leadership Committee are from the Government of Canada, Province of BC, Lower Mainland local governments, First Nations and regional entities.

Expert staff from participants in the LMFMS serve on the Joint Program Committee for Integrated Flood Hazard Management and several Advisory Committees.

The Fraser Basin Council manages the LMFMS initiative.

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RESEARCH & ANALYSIS

Central to the strategy is an assessment of flood management choices for the Lower Mainland.

The work includes analysis of:

- Regional priorities
- Flood mitigation options
- Funding and decision-making options.

A new Lower Fraser Floodplain Model is being developed that will support analysis of Fraser River flood scenarios and mitigation options.

See page 6

LOWER MAINLAND FLOOD MANAGEMENT STRATEGY

Phase 2 Overview

STRATEGY DELIVERABLES

Flood Strategy Interim and Final Reports

The Lower Mainland Flood Management Strategy will be reflected in interim (2018) and final (2019-2020) reports.

The reports will reflect research and analysis on regional priorities, flood mitigation options, and funding and decision-making models for flood management in the Lower Mainland – together with recommendations for action.

New Tools & Resources

Phase 2 will deliver new tools and resources:

- Lower Fraser Floodplain Model
- Online Atlas on Flood and the Environment
- Review of Seismic Vulnerability of Dikes
- Backgrounders/discussion papers on key topics

See page 12 for Timeline and Strategy Deliverables

ENGAGEMENT

Engagement of LMFMS partners and other entities active in flood management is critical to success. Opportunities include:

- Participation on advisory committees
- A survey on regional priorities
- Presentations, discussion and input on the strategy
- Flood Strategy Briefing bulletins
- Lower Mainland Flood Forums at which drafts of the Flood Strategy reports will be discussed: see *Strategy Deliverables.*

First Nations participate on the Leadership Committee and advisory committees and have been invited to propose other forms of engagement as well.

The public will be invited to engage on an interim report via:

- Community information and input sessions
- An online platform.

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DIRECTION

The Leadership Committee is composed of representatives of partner organizations: two Federal government, two Provincial government, four Local government, four First Nations* and one non-governmental.

The Committee's inaugural meeting is on May 25, 2018, which will include a briefing, progress report and discussion of key elements of the work.

The Committee will provide guidance and advice on:

- Vision and Goals
- Workplan
- Research & Analysis Projects
- Development of the Strategy
- Engagement.

The Joint Program Committee for Integrated Flood Hazard Management and advisory committees provide guidance and advice on all aspects of the Strategy.

* Members and interim members are confirmed, with provisions for emergent approaches to representation

PHASE 2 STRUCTURE



PROGRAM MANAGEMENT

Fraser Basin Council



RESEARCH & ANALYSIS

Lower Fraser Floodplain Model

In Progress | Test Runs: 2018 | Completion: 2019

The Lower Mainland Flood Management Strategy is developing a new Lower Fraser Floodplain Model. Following an RFP process, Northwest Hydraulic Consultants was retained for the work in late 2017.

The Lower Fraser Floodplain Model will be based on a new digital elevation model that encompasses both the river channel and the floodplain: see **Digital Elevation Model** on page 7.

The Floodplain Model will be used to better understand how water moves down the river and across the floodplain under various flow scenarios. It will also be used to analyze the effects of dike breaches; to create flood hazard maps that show the extent, depth and velocity of floodwaters; and to evaluate the effectiveness of proposed flood mitigation options.

Initial runs of the new model are expected in the summer of 2018.

How will the Floodplain Model Be Used?

- Run Fraser River flood scenarios
- Analyze dike breach effects
- Create flood hazard maps (showing extent, depth and velocity of flood waters)
- Assess management options:
 - Flood mitigation work
- Land zoning and use
- Inform decisions
- Raise public awareness





2017 bathymetric survey of the Lower Fraser

Digital Elevation Model of the Lower Fraser River Completed: March, 2018

In 2017, Northwest Hydraulic Consultants was retained to:

- conduct a bathymetric survey to collect data along the lower Fraser River from Hope to the river's mouth at the Strait of Georgia, and
- combine the newly-collected data with existing bathymetric and topographic data to develop a digital elevation model.

The bathymetric survey measured the underwater depths of the river. It was conducted by boat using single (sonar) beam hydrographic equipment and software. The final elevation data from the survey was combined with data collected by Public Works & Government Services Canada in 2015, LiDAR topographic data commissioned by the Province of BC and other data.

A digital elevation model (DEM) has been derived using these datasets. The DEM provides a critical input for the development of the new Lower Fraser Floodplain Model.

Assessment of Flood Management Options

In Progress | Flood Strategy Interim Report (Draft): Late Fall 2018

Regional Flood Mitigation Priorities

Lower Mainland local governments and other flood authorities were surveyed in the fall of 2017 about their short- and long-term priorities for flood mitigation, and what factors should be weighed when setting regional priorities.

Survey respondents identified factors of importance when setting flood mitigation priorities for the region. These include public safety and a number of other factors (in no specific order):

- Public safety
- · Critical infrastructure and essential services
- Economic values
- Social and cultural values
- Environmental values
- Agriculture / food security.

Additional technical analysis, consultation and dialogue will be facilitated to further refine priorities for the Lower Mainland Flood Management Strategy.



Flood Mitigation Options

In consultation with the Joint Program Committee for Integrated Flood Hazard Management, FBC has identified a range of approaches to flood mitigation to consider in the context of a regional strategy.

A backgrounder on flood mitigation options – including potential benefits and challenges of both structural and non-structural approaches – is in preparation. It includes approaches taken in BC and other jurisdictions and is intended as a general introduction for officials and staff of organizations participating in the LMFMS.

An initial assessment of mitigation options as these relate to the Lower Mainland will be presented in a Flood Strategy Interim Report (Draft) late in 2018 and include consideration of:

- Hard- and soft- engineered flood mitigation works (e.g., dike upgrades, dike realignment, breakwaters, sediment management and water retention)
- Adjustments to land use policies
- Floodproofing requirements for new and existing development in floodplain.

In assessing mitigation options, FBC and its advisory committees will look at a range of considerations. In no specific order, these include:

- Effectiveness
- Technical feasibility
- Costs and benefits
- First Nations interests
- · Environmental impacts
- Public and stakeholder interests
- Suitability of options for diverse local and subregional circumstances.

Funding and Decision-Making Models

An initial inventory and analysis is in progress to document past, present and emerging approaches on funding and decision-making related to flood risk. Examples from BC and other jurisdictions are being reviewed. Near-term funding opportunities are being explored, as well as the potential to establish a new funding program for longer-term strategy implementation. The business case for proactive investment and regional cost-sharing is also being developed.

The results of this work will be presented in a discussion paper and in the Flood Strategy Interim Report (Draft) for initial consideration by participants in the LMFMS.

Online Atlas on Flood and the Environment In Progress | Completion: Late Fall 2018

An online map atlas and document library are being developed to identify environmental values and features along the lower Fraser River and coastal foreshore areas – in the context of flood hazards and flood management.

The atlas will help identify potential environmental benefits and adverse impacts of flood mitigation works or policies. It will help decision-makers flag issues likely to require review in regulatory processes and identify potential candidate sites for habitat protection, conservation, restoration or compensation.

The atlas will be hosted on the Community Mapping Network. Thanks to several governmental and nongovernmental agencies that have made data available, information will include:

- Estimated depth and extent of Fraser River and coastal flood scenarios
- Location and alignment of flood mitigation works
- · Communities and land use
- · Watercourses and wetlands
- · Sensitive ecosystems
- Fish habitat.

RELATED FLOOD PROJECTS

Seismic Guidelines for Dikes

In Progress | Scoping Study: June 2018 | Completion: 2020-21

The Province introduced seismic guidelines for new and existing high-consequence dikes in 2011 (updated in 2014). The aim was to better protect the diking system from earthquake damage. Local authorities and design professionals in the Lower Mainland have found the standards are technically challenging to implement in many locations and/or cost-prohibitive.

The Province of BC has provided funding to:

- fill information gaps about the seismic vulnerability of flood protection dikes through geotechnical investigations and engineering analysis
- · review the seismic guidelines and implementation challenges and propose changes/updates
- work with local governments and design professionals to develop a program that balances:
 - a level of seismic resilience that is financially achievable, and
 - continued improvement of flood infrastructure for current and future conditions
- develop professional practice guidelines for effective and consistent application of seismic risk assessment and design.

This initiative is expected to improve understanding of seismic vulnerabilities and to develop and implement a well-defined and regionally accepted program to improve the seismic resilience of Lower Mainland dikes.

Assessment of Orphan Dikes

In Progress | Completion: 2019-20

The Fraser Basin Council has retained a consultant to review risk assessment methodologies and recommend a methodology that would be suitable to assess orphan dikes in BC – that is, dikes with no local authority for operations and maintenance.

Province-wide, there are 101 orphan dikes and erosion protection works, totalling more than 85 km in length. These works were either constructed or funded by the Province over the past 50 years to respond to emergency flooding situations or were built by others and abandoned. These works generally lack adequate planning and engineering design due to the emergency conditions under which most were constructed. They are not typically maintained or inspected by a diking authority.

A second phase of work will involve assessment of the orphan dikes using the recommended methodology, including field assessments. The project will evaluate the condition of the orphan dikes, the associated risks of failure and what is needed to bring each up to provincial standards and into a state of readiness to establish a local authority. While only a small number of orphan dikes are in the Lower Mainland, the project will help identify any significant risks associated with them.

The project is funded by the Province of BC with the aim of helping local governments, the public, and the Province to quantify and understand the risks that these structures pose to BC communities. The project will also assist interested local governments that wish to mitigate these risks by assuming the role of diking authority, if warranted.

BC Storm Surge Forecast Model

The BC Storm Surge Forecast model provides important 5-day forecasts of coastal flood conditions in the Georgia Strait.

Coastal partners in the LMFMS and the Province of BC have cost-shared the operation of the BC Storm Surge Forecast Model over the 2016-17 and 2017-18 storm seasons (October through March). Funds for continued operation and enhancement of the forecast model have been secured for the 2018-19 and 2019-20 storm seasons.



ENGAGEMENT

Over the past six months, the LMFMS team has connected with over 300 people from more than 100 organizations. The presentations and events listed are in addition to meetings of the Leadership Committee, Joint Program Committee on Integrated Flood Hazard Management and advisory committees.

Presentations, Meetings & Events

Recently Completed (September 2017 – May 2018)

September

- Meeting and webinar on "Room for the River" approaches to flood mitigation in Alberta and the Netherlands (Sept 5, 2017)
- Greater Vancouver Gateway Council meeting and presentation (Sept 26, 2017)
- Union of British Columbia Municipalities (UNBC) workshop on flood mitigation for local governments (Sept 28, 2017)

October

- Workshop on community resilience in collaboration with Dutch Trade Mission (Oct 5, 2017)
- Sq'ewá:lxw First Nation meeting and presentation (Oct 17, 2017)

November

- Vancouver Chapter of Lambda Alpha International (Nov 15, 2017)
- Environmental Managers Association of BC (Nov 16, 2017)
- Metro Vancouver's Regional Planning Advisory Committee (Nov 17, 2017)

January

 Greater Vancouver Board of Trade Transportation and Infrastructure Committee (Jan 19, 2018)

February

 British Consulate's forum: "Resilient Cities: An Integrated Economic Approach to Natural Hazard Risk Mitigation" (Feb 1-2, 2018)

The LMFMS team has connected with over 300 people from more than 100 organizations.

March

- District of Maple Ridge Council workshop presentation (Mar 6, 2018)
- Climate adaptation presentation with FLNRORD in Surrey
 (Mar 8, 2018)
- Meeting on flood mitigation with Dutch delegation and Lower Mainland professionals (Mar 13, 2018)
- Kwantlen First Nation community session on flood mitigation (Mar 14, 2018)
- Federal Flood Mapping Working Group workshop (Mar 20-21, 2018)
- Living with the Harrison Salmon Stronghold Our Shared Waterway workshop in Lhawathet Lalem (Sts'ailes Healing House) (Mar 28, 2018)

April

- Salish Sea Conference in Seattle panel on coastal flood modelling and mitigation planning (Apr 4-6, 2018)
- Understanding Risk Symposium in Victoria (Apr 16-17, 2018)
- Institute for Catastrophic Loss Reduction nation-wide webinar on Flood Mitigation Planning (Apr 20, 2018)
- Lower Mainland Local Government Association Flood Control and River Management Committee (Apr 25, 2018)
- Agricultural Land Commission presentation on the Regional Flood Strategy and agricultural vulnerability (Apr 27, 2018)



Upcoming

- Addressing Climate Risks for Coastal Transportation Forum (May 16-17, 2018)
- Canadian Water Resources Association National Conference in Victoria (May 28 – June 1, 2018)
- Fraser River Discovery Centre Dialogue: Flood Management (Public Event: May 31, 2018)



Flood Strategy Briefing Bulletins

- · Briefing 1 (Sept 2017)
- · Briefing 2 (May 2018)

Find them at floodstrategy.ca



2018

Connect with us online and subscribe to the *Flood Strategy Briefing* bulletin: **floodstrategy.ca**

Connect With Us

The Lower Mainland Flood Management Strategy is 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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TIMELINE AND STRATEGY DELIVERABLES

Spring - Summer

- Joint Program Committee, advisory committees and Leadership Committee meet
- Environmental Advisory Committee leads workshop and field tour
- Initial Assessment on Regional Priorities and Flood Mitigation Options is completed
- Initial Assessment on Funding and Decision-Making Models Scoping Project is completed

Fall - Winter

- Joint Program Committee, advisory committees and Leadership Committee meet
- Online Atlas on Flood and the Environment is completed
- Flood Strategy Interim Report (Draft) is completed*
- Lower Mainland Flood Forum: Strategy participants meet to review the Flood Strategy Interim Report (Draft)
- Technical analysis continues
- Flood Strategy Interim Report is completed*
- · Strategy participants briefed, media briefed

2019

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Spring - Summer

- Public engaged, with opportunity for input on Flood Strategy Interim Report
- Technical analysis from Lower Fraser Floodplain Model is completed*
- Joint Program Committee, advisory committees & Leadership Committee meet to advance the Final Report (Draft)

Fall - Winter Joint Program

- Joint Program Committee, advisory committees & Leadership Committee meet to advance the Final Report (Draft)
- Flood Strategy Final Report (Draft), incorporating technical results, is completed*
- Flood Forum 2019: Strategy participants meet to review Flood Strategy Final Report (Draft)
- Flood Strategy Final Report is completed*
- Strategy participants briefed, media briefed
- * Key Strategy Deliverables