The Corporation of the City of Courtenay

Staff Report

To: Council **File No.:** 5335-20

From: Director of Infrastructure and Environmental Engineering **Date:** October 9, 2024

Subject: **Flood Management Plan**

PURPOSE: To seek council support for the adoption and implementation of the Flood Management Plan.

BACKGROUND:

The Flood Management Plan is a master plan to reduce flood risk in the City of Courtenay. It is aligned with community values, senior government regulations, and international best practice. It is informed by the community experience of past flood events, and it builds on the work of our regional partners.

Water knows no boundaries, and with this in mind, previous flood hazard modelling and mapping was completed at a regional scale, for the entire Comox Valley Regional District (CVRD). In the Flood Management Plan, the development of risk reduction and resilience strategies was focused on the City of Courtenay municipal boundary, and opportunities to work with regional partners were identified. These regional partners include the K'ómoks First Nation, the CVRD, the Town of Comox, and the Ministry of transportation and Infrastructure.

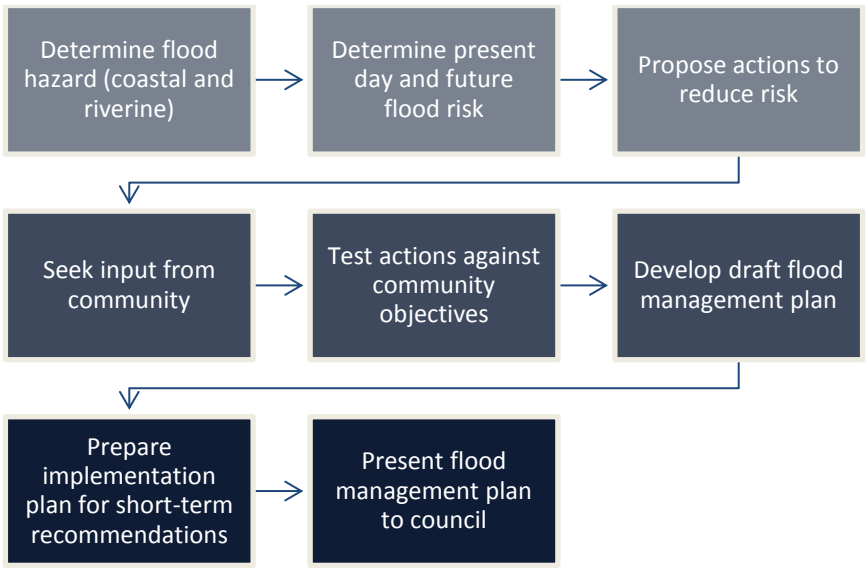
Many rivers and creeks flow through Courtenay, the major ones being the Puntledge and Tsolum Rivers which join together to form the Courtenay River that flows into the estuary and Salish Sea. This geography makes the community susceptible to three different kinds of flood hazards:

1. *Coastal Flooding.* This flooding occurs along the exposed shoreline of the estuary and ocean due to higher than typical water levels in the ocean. This increase in water levels is from a combination of sea level rise and storm surge.
2. *Riverine Flooding.* This flooding occurs when extreme rain causes water in a river to overflow its banks.
3. *Pluvial Flooding.* This flooding occurs when extreme rain cannot be accommodated by drainage systems. This kind of flooding can happen anywhere, even in places without a river or coast nearby.

The Flood Management Plan presents solutions to address the risk of *coastal* and *riverine* flooding. *Pluvial* flooding is managed by the municipal stormwater system, and solutions to address this risk are covered in the Integrated Rainwater Management Plan. The combination of these master plans manages flooding within the City of Courtenay.

DISCUSSION:

The development of this project has followed the general process of: understand the risk, decide what to do, and plan action. More specific steps are presented in the figure below, and a detailed technical description can be found in Appendix B of the Flood Management Report, provided in Attachment 5.



Understand the Risk

To understand the flood hazard, a full spectrum of possible flood events was considered, including small and frequent events; and large and rare events. Multiple combinations of sea level rise and rainfall events were considered, and 20 scenarios were assessed as part of the regional Coastal Flood mapping project led by the CVRD in 2021. In the development of the Flood Management Plan, flood hazard maps were produced to visualize three scenarios that represent the range of possibilities, as described below:

- Present day, likely flood event. No sea level rise, rainfall event with 5% chance of happening in any given year. This scenario represents flooding events that are likely to occur, and have already occurred within the City of Courtenay.
- Mid-term future, less likely flood event. Sea level rise up to 1 m, rainfall event with a 0.5% of happening in any given year, with 15% increase in riverine flows. This scenario represents flooding expected in the year 2100.
- Far future, rare flood event. Sea level rise up to 2m, rainfall event with a 0.2% of happening in any given year, with 30% in riverine flows. This scenario represents the “worst case” flood hazard for the City of Courtenay.

A hazard map was produced for each scenario to indicate the extent of flood water, and the anticipated depth. The hazard maps formed the basis for a more detailed analysis that considered what is the path of flood water, and what is likely to be impacted by a flood event.

An in-depth analysis was completed for the present day, likely flood event; and the mid-term future, less likely flood event. Impacts to people, the economy, the environment, culture and critical infrastructure were identified and mapped for each scenario, and two map sets were produced. All hazard maps and consequence maps are presented in Appendix C of the Flood Management Report, provided in Attachment 6.

These consequence map sets represent the flood risk faced by the City of Courtenay in the present day, and in the future. To build resilience to flood events, we must act to reduce this risk.

Decide What to Do

Actions to reduce flood risk may be grouped into general strategies, as outlined below.

- *Protect:* these strategies aim to keep water away from developed areas using permanent structures or temporary barriers. Protect strategies are ineffective against extreme flood events, because structures can be overtopped, or fail. Furthermore, protect strategies may transfer risk and magnify the impacts of a flood.
- *Accommodate:* aims to accommodate the presence and movement of water. It is best applied in low and medium risk areas. Accommodate strategies may not be sufficient for extreme events.
- *Managed Retreat:* reduces exposure by moving existing infrastructure out of flood hazard areas. Retreat strategies are most appropriate for areas with an existing high risk.
- *Avoid:* prevents additional risk by limiting development with a floodplain. This strategy is particularly important in medium to high hazard areas. In lower risk areas, accommodate and resilience building strategies may be sufficient.
- *Resilience Building:* this strategy focuses on setting communities up to prepare, manage and bounce back from flood events. It can be applied in areas of low risk and high risk, and should always complement other strategies.

Flood risk reduction options specific to the City of Courtenay were identified by dividing the City into six local areas based on hydraulic properties and land use. A comprehensive list of all possible risk reduction options for each area was prepared and systemically screened in steps. The first step screened out options that were outside the authority of the City of Courtenay, did not comply with provincial or federal regulations, or were not effective. The second step identified the strengths and weaknesses of the remaining options, and evaluated the impact of the option during a flood and all year round. The third step identified options that were aligned with community values. Community values that guided the recommendations include: biodiversity, recreation and natural assets, community & culture, social equity, economic success, low carbon and public safety.

Public and partner engagement throughout the project was key. Two public surveys were conducted, along with a public information session, and public communications including: project updates on the City website, social media, and informational mail-outs for residents in the floodplain. A workshop with City staff and Community partners was held for in-depth discussion of the options. Further technical review was held with City staff, and Provincial regulatory authorities.

Through this rigorous decision-making process, the trade-offs associated with each option were considered, and a suite of recommended actions were identified to reduce the flood risk faced by the City of Courtenay.

Action Plan

A set of 86 recommended actions are proposed for implementation. These actions are designed to work together to reduce the risk associated with flood events. The objective is to reduce the risk until the impact of a flood is small, even if the water level may be high. The table below summarizes the total number of recommended actions associated with each flood risk reduction strategy.

Strategy	Number of Recommendations
Protect	26
Accommodate	39
Retreat	3
Avoid	3
Resilience Building	15
Total	*86*

An overview map of the recommended actions is presented in Attachment 2. This map provides an overview of city-wide recommendations that are proposed for implementation across the municipality, and local area recommendations that are proposed for more focused implementation. A detailed description of each recommended action is provided in Chapter 7 of the Flood Management Plan, found in Attachment 3.

An implementation plan was developed to organize the recommendations into a timeline and estimate the budget required to support implementation. An overview of the proposed timeline is summarized in the table below.

Timeline		Number of Recommendations
Annual	Occur every year	8
Immediate Actions	Within 2 years	35
Short term	Within 5 years	37
Medium term	Within 10 years	2
Long Term	Within 20 years	3
Very long term	20 years +	1
Total		*86*

Most of the recommendations are proposed for implementation within the next 5 years. An immediate timeline was assigned to actions that address areas of high risk. This relatively quick implementation timeline increases the likelihood that the City will be better prepared for future flood events.

The implementation of a specific recommendation may involve the development of a new project; a revision of existing practices; or the continuation of initiatives that are already underway. Following adoption of the Flood Management Plan, staff will work to incorporate these actions into workplans, and include budget needed for implementation in the 5 year financial plan, for council consideration.

POLICY ANALYSIS:

The development of the Flood Management Plan is informed by:

- The *Community Charter* which outlines the scope of authority of the City of Courtenay.
- The *Dike Maintenance Act* which outlines responsibilities of the City as a diking authority
- The *Emergency and Disaster Management Act* which governs how to manage an emergency in BC
- From Flood Risk to Resilience: a BC flood strategy to 2035, the latest provincial flood strategy.

In addition to provincial regulations and guidance documents, the development of this plan was informed by engineering professional practice guidelines, international best practices, and previous work completed within the region. The recommendations are aligned with the Official Community Plan, and community values.

FINANCIAL IMPLICATIONS:

The cost associated with each recommended action have been estimated, and are presented in Chapter 8 of the Flood Management Plan, provided in Attachment 3. Following adoption of the Flood Management Plan, the finer details of the implementation plan will be developed and these estimates will be revisited. Once estimates have been reviewed and confirmed by staff, they will be incorporated in the 5-year financial plan, for council consideration.

These projects are intended to reduce the economic impacts of flood events, and protect the financial health of the community. For example, it is estimated that a present-day flood event would result in a financial loss of $42 million, and a future flood event could result in a financial loss of $140 million. By implementing the Flood Management Plan, these financial losses can be minimized. Furthermore, the Flood Management Plan demonstrates a proactive approach to the Municipal Insurance Association of BC, which increases the likelihood that the City of Courtenay will be able to maintain insurance for critical infrastructure in a changing climate.

ADMINISTRATIVE IMPLICATIONS:

The Flood Management Plan was developed by Infrastructure and Environmental Engineering in collaboration with Ebbwater Consulting. It is expected that implementation of the plan will require collaboration from across the organization.

- Infrastructure and Environmental Engineering may offer technical support for implementation, advance capital projects, and manage dike infrastructure.
- Development Services may lead the revision of bylaws, including the zoning bylaw and the Floodplain Management Bylaw.
- Operations may lead the deployment of the tiger dam and other temporary flood barriers
- Communications may assist with the development of public education campaigns
- The Fire Department may lead regional emergency management initiatives
- Recreation and Parks may develop plans for programming and infrastructure impacted by flood.

Once the Flood Management Plan is adopted, the details of implementation projects will be further developed, and each department will determine how to incorporate the actions into their workplans.

STRATEGIC PRIORITIES REFERENCE:

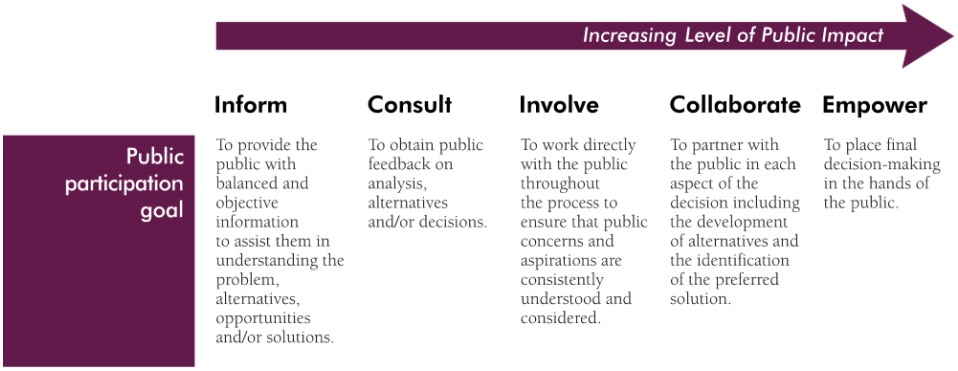
This initiative addresses the following strategic priorities:

- Public Safety - Build capacity for emergency planning and local response
- Organizational Well-Being and Sustainability - Ensure capacity to accommodate big change resulting from direct and indirect impacts to our community
- Municipal Infrastructure - Continued regional collaboration: Regional Growth Strategy, Liquid Waste Management Plan, South Sewer Conveyance, organics/solid waste, air quality, and regional parks
- Buildings and Landscape - Update Zoning Bylaw - review maximum building heights
- Buildings and Landscape - Review and update land use regulations and bylaws for consistency with OCP
- Natural Environment - Develop and implement a strategy for parkland acquisition
- Parks and Recreation - Complete recreation facilities need assessments and capital improvements: Florence Filberg Centre, Courtenay & District Memorial Outdoor Pool, Lewis Centre

PUBLIC ENGAGEMENT:

Staff *Involved* the public in the development of the Flood Management Plan (FMP) based on the IAP2 Spectrum of Public Participation. This included a public communications campaign to invite residents and property owners within the floodplain, and the general public to provide feedback on proposed recommendations. Staff collaborated with neighbouring local governments, K'ómoks First Nation (staff), emergency management groups, local environmental groups, engineering firms, and the Ministry of Transportation and Infrastructure in creating the recommendations.

Following adoption of the FMP, staff would *Inform* the public by developing communications campaigns to raise awareness of flood risks within the City. Projects related to the implementation of the Flood Management Plan would involve additional public engagement that is specific to the project.



OPTIONS:

1. THAT Council adopt the Flood Management Plan; and,

   THAT Council direct staff to implement the 86 recommended actions, and include budget for related projects in the 5 year financial plan.

2. THAT Council provide alternative direction to staff.

ATTACHMENTS:

1. Presentation – Flood Management Plan
2. Recommendations Overview Map
3. Flood Management Plan Report
4. Appendix A – Historic Flood Events
5. Appendix B – Methodology Details
6. Appendix C – Hazard and Consequence Map Atlas
7. Appendix D – Public Communciations Materials
8. Appendix E – Public Survey Results
9. Appendix F – Dike Master Plan

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