Pacific Institute for Climate Solutions

BRITISH COLUMBIA

Integrated flood management planning:

a guide for communities in B.C.

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Territory Acknowledgement

The Living with Water project respectfully acknowledges that the learning, collaboration, and development of this report have taken place on the unceded traditional territories of the Coast Salish Peoples, including the xʷməθkʷəy̓əm (Musqueam), Skwxwú7mesh Úxwumixw (Squamish), Səl̓ílwətaɬ (Tsleil-Waututh), sc̓əwaθən məsteyəxʷ (Tsawwassen), and SEMYOME (Semiahmoo) Nations.

The coastal region that grounds this work has long been a place of knowledge, governance, and stewardship. For millennia, Coast Salish Peoples have maintained deep relationships with the lands and waters of these territories, passing on culture, laws, and ecological knowledge through generations. We recognize that floodplains and shorelines are not only physical environments but living systems shaped by these enduring relationships.

Throughout this project, we are learning from and attempting to work in reciprocal relationship with the Nations whose territories we engage. We acknowledge the historical and ongoing legacies of colonialism and affirm that effective and just flood management must be rooted in respect for Indigenous rights, Title, and governance, as outlined in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and the Declaration on the Rights of Indigenous Peoples Act (DRIPA).

We are committed to approaches that honour Indigenous Knowledges alongside western science and support self-determined climate adaptation strategies. This report reflects an effort to advance more just, place-based, and collaborative approaches to integrated flood management—grounded in the leadership, teachings, and continued stewardship of Indigenous Peoples across the region.

Defined terms

This section provides brief definitions of key terms used throughout the guide. Definitions reflect their usage in the context of Integrated Flood Management Planning (IFMP) in British Columbia and are intended to support a shared understanding for readers.

Adaptive management: A continuous cycle of planning, monitoring, learning, and adjusting in response to changing conditions. Adaptive management helps ensure flood strategies remain relevant and effective over time.

Co-benefits: Additional positive outcomes that result from flood risk reduction actions—such as improved biodiversity, food security, cultural resilience, and recreational access—beyond their primary purpose of reducing flood impacts.

Critical infrastructure: Systems and assets essential to the health, safety, and functioning of communities—including transportation, utilities, hospitals and community health services, water systems, food systems, and emergency services. Flood planning should assess and protect these systems.

Equity: Recognizing that not all communities face the same risks or have the same resources to respond. Equity in flood planning means addressing disproportionate impacts and ensuring inclusive participation, with particular attention to marginalized and historically underserved groups.

Integrated Flood Management (IFM): A holistic, proactive, and collaborative approach to managing flood risk across connected water systems—such as watersheds, sub-watersheds, and coastal reaches. IFM integrates structural and non-structural measures, connects with land use, ecosystem, and infrastructure planning, and emphasizes coordination across jurisdictions, knowledge systems, and timeframes to support long-term community and ecological resilience.

Nature-based Solutions (NbS): Flood management strategies that work with or restore natural systems—such as wetlands, riparian buffers, and floodplain reconnection—to reduce risk while delivering co-benefits like habitat, water quality, and cultural revitalization.

Non-structural measures: Policy, planning, and behavioral strategies that reduce exposure or vulnerability without relying on physical infrastructure. Examples include land use regulation, zoning changes, early warning systems, community education, and insurance programs.

Resilience: The capacity of communities and ecosystems to withstand, adapt to, and recover from flood events and future changes. Resilience includes both the ability to resist damage and the ability to transform in response to evolving conditions.

Risk: The combination of the likelihood and the consequence of a specified hazard being realized; refers to the vulnerability, proximity, or exposure to hazards, which affects the probability of adverse impacts.

Sendai Framework for Disaster Risk Reduction: A global framework adopted by B.C. that promotes an "all-of-society" approach to managing disaster risk, emphasizing prevention, inclusivity, and cross-jurisdictional coordination.

Structural measures: Engineered interventions that reduce flood risk through physical infrastructure, such as dikes, floodwalls, pump stations, culverts, and stormwater systems. These measures often protect built areas from immediate flood impacts.

UNDRIP (United Nations Declaration on the Rights of Indigenous Peoples): An international human rights instrument affirming Indigenous Peoples' rights to self-determination, traditional lands, governance systems, and free, prior, and informed consent. In B.C., these rights are legally recognized under the Declaration on the Rights of Indigenous Peoples Act (DRIPA).

Watershed: An area of land where all water drains into a common waterbody, such as a river, lake, or ocean. Planning at the watershed scale helps account for hydrological and ecological connections across upstream and downstream areas. Smaller-scale planning units (e.g., sub-watersheds or coastal reaches) may also be appropriate depending on context.

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Introduction

This guidance document was developed to offer communities a basic understanding of Integrated Flood Management Plans (IFMPs) from preparation to implementation. We hope this document serves as a useful resource to inform discussions and exploration of IFMPs in the context of B.C. communities. The authors look forward to future guidance and supportive policy and programs from the Province of British Columbia.

B.C. Context for IFMPs

In March 2024, the Province released the B.C. Flood Strategy (the Flood Strategy), which includes Action 2.4: "Promote integrated flood management planning." The Flood Strategy describes IFMPs as plans that outline a preferred combination of measures for managing flood risk, including both structural and non-structural approaches. These plans address public safety, but also take into account community wellbeing, ecosystem health, equity, economic stability, and reconciliation with First Nations.

A key focus of the Flood Strategy as a whole is the Province's commitments under the Declaration on the Rights of Indigenous Peoples Act (the Declaration Act), particularly Articles 19 (free, prior, and informed consent), 27 (fair, independent, impartial, and transparent processes), and 29 (conservation and protection of the environment). The Strategy recognizes that flood management and land-use decisions in B.C. have disproportionately and negatively impacted First Nations communities. Prior to colonization, First Nations practiced governance and land management based on their own laws and knowledge systems, enabling them to

live well in floodplains and coastal regions. The Declaration Act mandates that First Nations' inherent authority is recognized in planning and decision-making in their territories, and that their Rights and Title, priorities, and worldviews are respected and upheld in flood management actions.

> *"Flood risk is not simply a technical problem to be solved but a collective concern shaped by history, place, governance, and lived experience."*

What is Integrated Flood Management?

Integrated Flood Management (IFM) is a holistic, proactive, and collaborative approach to managing flood risk. Unlike isolated, site-specific flood control measures, IFM addresses flood management across broader geographic areas—such as river deltas, watersheds, and coastal regions—respecting water connections and the transboundary nature of water systems. It involves coordination across jurisdictions and sectors, and connects with other local, provincial, federal, and First Nations plans, policies, and priorities that complement or affect flood management.

IFM considers past events and future projections, such as climate change and population growth, along with upstream and downstream impacts to develop adaptive strategies.

IFMPs bring together conventional flood control measures (for example, dikes), nature-based solutions, land-use planning, and public education to enhance resilience and mitigate and adapt to the impacts of flood events.

Communities worldwide have adopted Integrated Flood Management and its emphasis on human-land-water relationships within floodplains and watersheds. In B.C. IFM offers an opportunity to align flood management efforts with broader land use, ecosystem restoration, and infrastructure planning policies of local and First Nations governments. It also fosters collaboration and can support relationship-building to identify and implement actions with multiple benefits for communities—actions that, together, contribute to long-term flood resilience.

The development of IFMPs is a process that integrates floodplain mapping, flood hazard and risk assessments, climate change projections, and consideration of risk reduction options. Supported by community engagement, IFMP processes explore proactive flood risk reduction and resilience options, seeking the best fit for communities and their needs and priorities.

Alignment with Broader Initiatives

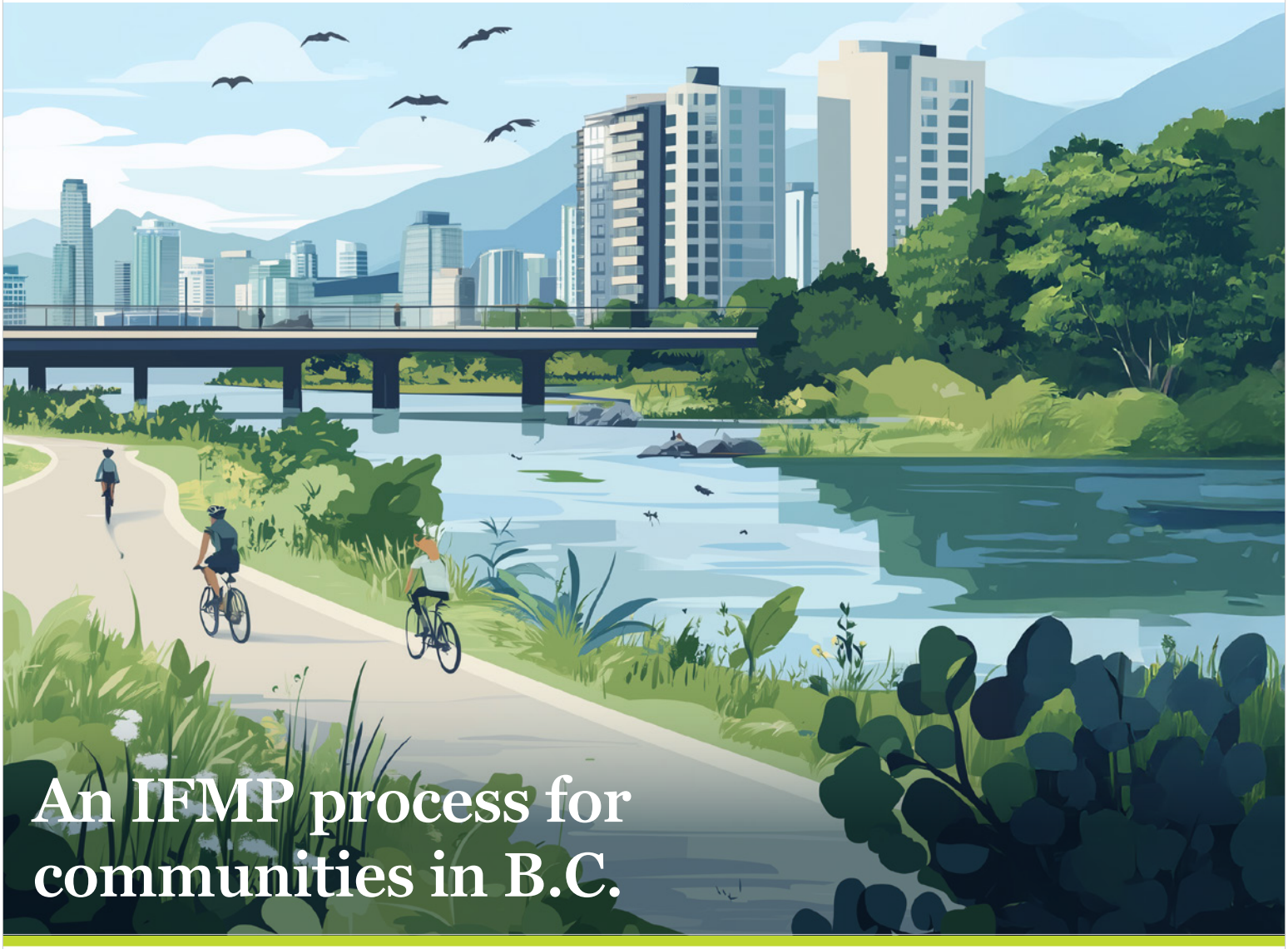
In addition to the Declaration Act, and the B.C. Flood Strategy, the B.C. context for IFMPs is shaped and informed by several key law and policy instruments related to emergency management and climate adaptation:

1. **The UN Sendai Framework for Disaster Risk Reduction (Sendai Framework)**, adopted by B.C. in 2018, emphasizes an all-of-society approach to understanding, managing, and reducing disaster risk.
2. **The B.C.** ***Emergency and Disaster Management Act*** **(EDMA)**, mandates a coordinated, multi-actor response to risk across all four phases of emergency management: preparedness, mitigation, response and recovery.
3. **The B.C. Flood Strategy** aims to ensure that communities are informed, collaborative, and resilient in adapting to climate change, fostering safe, resilient ecosystems and infrastructure.

B.C. Flood Strategy Principles

The eight guiding principles of the B.C. Flood Strategy are all important to consider in the development and implementation of IFMPs:

1. **Holistic:** A holistic approach to flood management is interdisciplinary, balanced, Indigenous-centred, and is integrative across a network of relations within watersheds, ecosystems, land, and society.
2. **Proactive:** Provincial government, First Nations, local governments, organizations, and individuals must work together and take action to build greater flood resilience.
3. **Place-based:** Decisions to avoid and reduce flood risks need to use the best available data, and Indigenous Knowledge and science considering watershed-based approaches, including understanding upstream and downstream connections. No single solution can address every flood risk, requiring the need for flexible and diverse solutions.
4. **Accountable:** Organizations and individuals must take responsibility for their decisions and actions to build greater flood resilience over time. Accountability in this context means inclusivity, equitable decision-making, and alignment with the UN Declaration, with a focus on a communal approach that goes beyond historical decision-making authorities.
5. **Collaborative:** Effective collaboration among diverse stakeholders is required to reduce flood risks. This includes all levels of governments, First Nations, industries, businesses, communities, landowners, and the public.
6. **Transparent:** Flood resilience decisions and flood risk data must be open and accessible to all, enabling comprehensive, accurate, clear information on flood risks, including uncertainties.
7. **Fair:** To be effective, programs aimed at reducing flood risk must be equitable and accessible to all, with specific attention paid to the vulnerability of Indigenous Peoples in B.C. A GBA+ lens must be applied to address factors such as race, culture, gender, sex, age, income, and ability, while upholding human rights.
8. **Risk-informed:** Flood resilience decisions and investments are informed by known levels of risk through community and provincial level vulnerability and risk assessments that are based on climate change, equity, resilience, and cumulative effects.



An IFMP process for communities in B.C.

This guidance document outlines a five-step process for developing an IFMP based on a comprehensive review of research and practice, including IFMPs recently implemented in similar geographic and jurisdictional contexts. The five-step process is designed to tackle the challenges of flood risk management in a way that respects cultural, environmental, and community values, and enables collaboration and coordination between First Nations and local governments.

The five steps/iterations we have identified include:

1. Setting the Scope and Building Relationships
2. Understanding Risks
3. Selecting and Evaluating Risk Reduction Options
4. Assembling the IFMP
5. Implementing and Adapting the IFMP

Each of these steps is important for an IFMP. The diagram on the next page illustrates this process as a cycle, emphasizing that flood risk management is not a one-time effort but an ongoing commitment. The circular design highlights that each step may inform and loop back to previous steps, responding to new information, challenges and opportunities. For example, as risk reduction options are evaluated (Step 3), communities may decide to revisit the initial scope (Step 1) or decide that further investigation of risk is needed (Step 2), based on new data or shifting community priorities.

IFMPs are more likely to support community resilience and create multiple benefits if they are grounded in collaboration, inclusivity, and respect for diverse knowledge systems, particularly from First Nations and local communities. For example incorporating Indigenous Knowledge about local waterways can improve understanding of natural flood patterns and inform strategies that align with ecological cycles, benefiting both flood resilience and environmental stewardship.

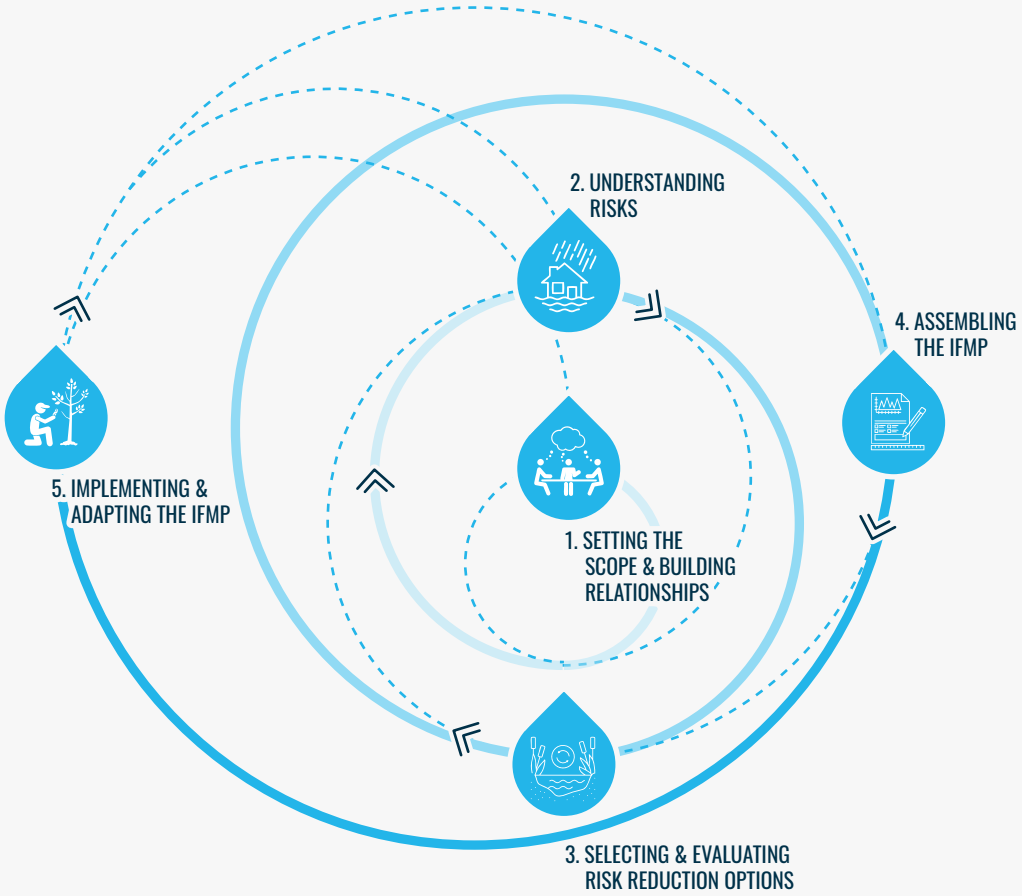
It's understood that implementation (Step 5), will also be adapted over time based on evolving information and practices, community needs and priorities, and other factors.

It's assumed that the IFMP, once developed, will be a living process, enabling communities to adapt their strategies as conditions, knowledge and relationships evolve.

For each step this document includes an overview of the purpose, expected outcomes, practical guidance on key elements, and selected tools and resources.

This guidance is intended to help local governments and First Nations understand what is needed to develop an IFMP, and why and how it can be useful for their communities. Apart from managing flood risks, this can include coordination and alignment with other planning and management related to land and water. As well, the guidance may assist communities in identifying aspects of IFM planning that they can handle themselves, and where additional expert advice and technical support might be needed.

FIGURE 1: INTEGRATED FLOOD MANAGEMENT PLANNING PROCESS



An IFMP process for communities in B.C.

Step 1: Setting the scope & building relationships

The first step in developing an IFMP is to define the geographic scope and identify the relationships needed to support coordinated planning and decision-making across that area. It is assumed that local governments and First Nations will lead this work within their respective jurisdictions, recognizing that there may be overlapping responsibilities.

Relationships between these governments continue to evolve, and further provincial guidance is anticipated as part of implementing the *Declaration on the Rights of Indigenous Peoples Act*. At present, local governments should be guided by the provincial commitments to UNDRIP, as outlined in the BC Flood Strategy, and work proactively to ensure that IFMP scoping, development, decision-making processes, and funding arrangements are acceptable to the First Nations whose territories and communities are involved. Grounding the process in respectful relationships and clear, formalized agreements creates space for outcomes that are mutually beneficial and adaptable to future needs.

There are many catalysts that may drive the need for an IFMP, such as recent flood events, population growth, unmanaged flood risks, climate change impacts, infrastructure projects, community plan updates, habitat restoration objectives or broader watershed initiatives. Reconciliation efforts and protocols developed in other contexts can also provide a strong foundation for collaboration. Building trust and collaborative practices early on strengthens the IFMP process and creates momentum for coordinated flood management.

Along with building relationships, Step 1 includes developing a guiding vision for the IFMP and identifying the main flood management challenges to be tackled.

Early planning should also identify the broader system of support for the IFMP, including key stakeholders, funding sources, and links to ongoing land and water initiatives. Connecting the IFMP with these existing efforts ensures that

planning efforts are aligned, resources are used effectively, and community engagement is integrated from the outset

Outcomes

- **Scope of management for the IFMP defined:**
  The geographical extent and known flood hazards and risks have been determined using geospatial data informed by hydrology (e.g., watershed, floodplain, coastal shoreline), existing relationships, relevant initiatives, and community capacity. The time frame has been set to address both short- and long-term objectives and to incorporate climate change considerations.

- **Guiding vision and rationale for working together established:**
  A shared vision has been developed that articulates high-level goals and identifies specific challenges to be addressed—such as public safety, access to services, ecological protection, cultural values, and food security. This vision has provided guidance on collaboration, priorities, roles and responsibilities, and has helped identify relevant programs and initiatives.

- **Leadership and management arrangements developed**
  A leadership and management structure has been created among local governments and/or First Nation authorities. This has been formalized through a terms of reference, memorandum of understanding, or protocol agreement that clarifies expectations, responsibilities, and decision-making processes for the IFMP.

- **Support system for the IFMP process built:**
  Key stakeholders, agency representatives, and community supports have been engaged early in the process. Financial, technical, and human resources have been identified and secured through partnerships to enable coordinated and sustained flood management efforts.

Practical guidance

- **Defining the geographic scope in detail:**
  When developing an IFMP, the geographic scope should align with natural water systems such as a watershed, river basin, or coastal reach. Planning at this scale supports a more holistic and effective approach, combining structural and non-structural strategies to manage flood risks across interconnected areas. If the scope is too localized, this can constrain risk management options or unintentionally increase vulnerabilities for neighboring or downstream communities. In British Columbia, developing a watershed-wide IFMP can be challenging because many watersheds include forest lands managed under the provincial forest tenure system; however, it is often still possible—and preferable—to define a scope that brings together floodplain or coastal communities facing shared flood risks and willing to collaborate on solutions. Importantly, recent changes under the *Emergency and Disaster Management Act* (EDMA) require local governments to consult and collaborate with First Nations when developing risk assessments, providing a critical foundation for building more inclusive and coordinated flood management efforts. Beyond natural boundaries, the scope should also be shaped by existing relationships, partnerships, initiatives, and community capacity, supported by geospatial analysis. By integrating these social and ecological dimensions from the outset, an IFMP can be grounded in local strengths, better reflect community priorities, and deliver more durable, regionally aligned outcomes.

- **First Nations and local governments working together:**
  Once a logical geographic scope for the IFMP has been identified, representatives from local governments and First Nations within that region can begin exploring opportunities to work together. This may start informally—either through technical discussions among staff or through existing leadership forums and intergovernmental relationships. As collaboration takes shape, partners should develop a leadership and management arrangement that outlines the IFMP's scope, high-level vision, and goals, as well as guiding principles for working together. This arrangement must respect First Nations' title, rights, and inherent authority, and should clarify mutual expectations, roles, and decision-making processes to guide the development of the IFMP.

A useful example is the Memorandum of Understanding for the Lower Cowichan/Koksilah River Integrated Flood Management initiative, which offers a model for how shared governance can support flood planning across jurisdictions.

- **Consider the multiple benefits of developing an IFMP:** Developing an IFMP helps communities shift from reacting to flood events toward proactively reducing risk and building long-term resilience. Through the collaborative process of planning, communities develop a shared understanding of flood risks—including those heightened by climate change—which supports more informed decision-making and preparedness. By taking a holistic view of land and water systems, IFMPs can identify nature-based strategies, such as reconnecting waterways, restoring riparian or coastal areas, and upgrading infrastructure to be more fish- and flood-friendly—actions that benefit both ecosystem health and community wellbeing. Because IFMPs consider interconnected risks across a region, they help avoid unintended consequences between upstream and downstream areas and create space for coordinated, larger-scale interventions. This regional lens also ensures that economic, social, and ecological dimensions of flood risk are considered together, leading to solutions that are more appropriate and equitable for the places and communities involved. Importantly, IFMPs provide a structured way to map out near- and long-term actions, helping guide investment in the right priorities at the right time—avoiding both costly over-investment in short-sighted measures and underinvestment in areas requiring urgent attention or future adaptation.

- **Identify funding and resource support:** Securing adequate funding is essential to support the full scope of an IFMP—from staffing and community engagement to technical assessments, engineering input, environmental consulting, and legal advice. Provincial and federal grants related to flood resilience, disaster risk reduction, and ecological restoration are key funding sources, and additional support may come from NGOs, research programs, and private sector contributions. To maximize impact and avoid duplication, the IFMP process should connect with ongoing land and water initiatives within the region. These could include habitat restoration, emergency preparedness planning, infrastructure

Being proactive instead of reactive

With a better understanding of flood risks, including climate change impacts, communities can make a shift from recovering in a reactive way to flood events. Instead, they can proactively plan and implement strategies that increase resilience and reduce the harm of future events. The collaborative process that it takes to develop an IFMP can build a foundation of shared understanding in communities, helping everyone to be informed and prepared.

Benefits for ecosystem health and community wellbeing: Looking at the land and water holistically helps identify nature-based approaches to managing flood risk, like re-connecting waterways and restoring riparian and coastal areas that support salmon and other species while acting as a buffer during flood events. Modernizing existing infrastructure to be fish-friendly can also have flood protection benefits.

Flood risk management tailored to communities and their regions: The scale of an IFMP means that the needs and vulnerabilities of neighbouring communities can be considered together, to avoid unintentional consequences (e.g. upstream and downstream), and also to identify opportunities for both synergies and larger-scale measures—it opens up a broader range of choices. As well, looking at the economic, social, and ecological dimensions of flood risk and flood risk management all together helps ensure that the actions that are identified in the IFMP are good choices for the place and the communities where it will be implemented.

Right-sized, well-timed investments: An IFMP also lays out the full suite of flood risk reduction and resilience building actions that are needed, and is a basis for identifying short, medium and long term funding needs, land use considerations and longer term questions that are not urgent but need further investigation and deliberation. It can help avoid underinvestment where needed and overinvestment in actions that lock communities into strategies that may not be effective over the long term, or that may prevent adaptation in an uncertain future.

upgrades, or development planning—all of which can align with flood and drought resilience objectives. Linking the IFMP with these efforts helps build momentum, share knowledge, and ensure resources are used effectively across projects and jurisdictions.

- **Identify stakeholders part of the support system:** At the outset of the IFMP process, it's important to identify the key actors who will be involved across various phases of the plan's development. Since the safety and resilience of communities is central to flood risk management, early involvement from those responsible for delivering essential services is critical. This includes staff from municipalities, regional districts, and First Nations governments, as well as operators of critical infrastructure such as the Ministry of Transportation and Infrastructure (MOTI), BC Hydro, Fortis, telecommunications providers, railways, port authorities, and diking authorities. These actors may contribute in advisory or technical capacities. Others to involve may include infrastructure funding agencies (e.g. Indigenous Services Canada), emergency responders, health authorities, and farm associations.

  As the IFMP also aims to advance broader community goals—such as public health, equity, ecosystem restoration, and economic stability—additional stakeholders should be invited to participate. Early outreach can help identify these groups, and special attention should be given to engaging vulnerable or at-risk community members who may be disproportionately affected by flood risks or mitigation strategies.

- **Prepare for community engagement throughout IFMP development:** Planning for engagement with communities is a further important aspect of developing the IFMP. First Nations governments will likely engage directly with their community members according to their own customs and practices, and it's important that the development of the IFMP and the timing of each of the subsequent phases accommodates the level of engagement that is determined to be necessary. For municipalities and regional districts, community engagement needs and capacity should also be evaluated so that there is adequate community participation in subsequent phases. A community engagement plan can be developed for the IFMP and Steps 2 - 5.

  It can also be helpful to make connections with universities and colleges that can support IFMP development with research and technical work, and potentially with engagement processes.

> *"By integrating social and ecological dimensions from the outset, an IFMP can be grounded in local strengths and deliver more durable, regionally aligned outcomes."*

Tools & resources

This is a starting point, not a comprehensive list.

- B.C. Flood Strategy
  Strategic vision for flood management to increase flood resilience for all British Columbians.
- Emergency and Disaster Management Act (EDMA)
- ClimateReadyBC
  Disaster and climate risk reduction tool for community use.
- Local Government and First Nations Relations
  B.C. Government guidance on intergovernmental collaboration and relationship-building.
- Memorandum of Understanding Lower Cowichan/Koksilah River Integrated Flood Management
- Stronger Together: A Toolkit for First Nations-Municipal Community Economic Development Partnerships
- Canadian Institute of Planners Policy on Planning Practice and Reconciliation
- The United Nations Declaration on the Rights of Indigenous Peoples: A Guide for Municipalities
- B.C. Community Engagement Guidelines
  Guidelines for engaging stakeholders effectively in public consultations and decision-making processes.

» B.C. Climate Action Toolkit
Has information about integrating flood management with broader climate adaptation strategies.

» B.C. Data Catalogue
B.C. Data Catalogue for accessing regional geospatial data, including floodplain maps and hydrological information.

» Flood Hazard Area Land Use Management Guidelines
B.C. Government guidelines for land-use planning in flood hazard areas.

» Multi-Jurisdictional Flood Management Guidelines
Provincial Flood Emergency Plan by Emergency Management B.C.

An IFMP process for communities in B.C.

Step 2: Understanding risks

Flood risk is the probability that a given flood event will have a negative effect on people, homes, businesses, critical infrastructure, ecosystem health, food security, cultural sites and other things that matter for communities. One part of understanding flood risk is about water: where will the water go, how deep will it be, how fast will it happen and how long will it last. Another part of understanding risk is related to the consequences: what will get wet or be otherwise affected, and how much does it matter.

A flood risk assessment combines understanding about flood hazard and the consequences so that communities can make informed decisions about managing and reducing flood risk. The assessment usually involves working with external consultants who have specific expertise related to assessing flood hazards, and in assisting communities to identify and evaluate consequences. The outputs of a flood risk assessment are typically flood maps and reports that describe the flood risk profile for locations, systems and services in the community. In most cases there are federal and provincial maps and data to help inform this work. As noted in the BC Flood Strategy, Indigenous Knowledge is also extremely valuable for understanding and managing flood risk, and if possible should be included in flood risk assessment.

Step 2 is also about identifying what we don't yet know. Data gaps—whether technical, social, or historical—can weaken the foundation for good planning. Taking stock of these gaps early allows communities to seek out new data, draw on lived experience, and strengthen assessments through participatory processes, partnerships, or targeted studies. Grounding this work in both formal data and community knowledge helps capture the full complexity of flood risks and enables more nuanced and just responses. An inclusive approach will include implications for vulnerable community members, culturally significant landscapes, and the ability

of First Nations to exercise their inherent authority, title and rights in their territories.

Looking ahead is essential. Flood risk is not static—it is shaped by climate change, changing land uses, and shifting social conditions. Incorporating climate projections early in the planning process helps communities understand how future rainfall, sea level rise, and storm patterns could affect risk. In addition, assessing risks associated with other hazards such as drought, wildfire, or landslides will enable more coordinated and resilient strategies.

> *"Equity is a central theme in the IFMP, not only in terms of outcomes, but in how decisions are made and whose voices are heard."*

Both the BC Flood Strategy and the Sendai Framework on Disaster Risk Reduction describe the importance of understanding risk in order for communities to escape repeated cycles of floods, response, and recovery. With a flood risk assessment in hand, communities can proactively and strategically reduce risk in ways that reflect community values and priorities. They can also avoid decisionmaking that adds new risks, and better allocate scarce resources. In short, understanding flood risk can help communities make better decisions, for both the short and long term, and control the things that can be controlled. A flood risk assessment is an important foundation for building an integrated flood management plan.

Outcomes

- **Flood hazards for the IFMP area assessed:** Flood hazards have been identified and hazard scenarios developed, including those that account for climate change, based on the management objectives established in Step 1. This has included reviewing existing data, identifying gaps, and incorporating knowledge of past flood events shared by Indigenous rights-holders and community members.

- **Flood risk analysis completed:** A structured analysis has been carried out to systematically assess the social, economic, environmental, and cultural consequences of flood hazards. This analysis has been grounded in community and stakeholder engagement across the IFMP area, integrating local priorities and values with flood hazard data to understand exposure and potential consequences. Where local governments and First Nations have collaborated, the process has upheld distinct First Nations priorities and may have included engagement and deliberation led by First Nations within their communities.

- **Flood hazard and risk mapping produced:** Flood hazard and risk assessments have resulted in maps illustrating the extent and impact of modelled flood events across different locations. These maps have supported understanding of community risk tolerance, informed the identification of risk reduction options, and provided a foundation for communicating flood risks to stakeholders and the public.

Practical guidance

- **Understand risk, risk reduction, and resilience:** Flood risk is shaped by the combination of hazard, exposure, and vulnerability. Effective risk reduction targets one or more of these elements by reducing the hazard itself, limiting the exposure of people and infrastructure or reducing the vulnerability of those exposed. Understanding risk allows communities to access the full toolbox of risk reduction options, as discussed in Step 3. Building resilience means not only resisting flood impacts but also enhancing the capacity of communities and ecosystems to respond, recover, adapt and transform over time. Flood risks are dynamic—shaped by changing land uses, climate variability, and social conditions— and understanding risk will be an ongoing process that enables communities to manage future uncertainties.

- **Assess risk proactively and comprehensively:** The framework for risk analysis should include maintaining critical infrastructure systems and essential services (transportation, energy, water, waste, health and community wellbeing, food security, ecosystem health, culturally significant areas, emergency response, etc.), as well as impacts on neighbourhoods and businesses. Where known,

longer-term priorities and factors (e.g. planning for growing populations, habitat restoration objectives, new economic development) are also important to consider. If possible, a multi-hazard approach that also looks at landslides, droughts, wildfires and other risks will support planning for community resilience.

- **Incorporate climate change projections:**
  Integrating climate change projections into the risk assessment ensures long-term resilience. Existing models can be used to assess future changes in rainfall patterns, storm intensity, sea level rise and storm surge, all of which may exacerbate flood risks. Because climate change projections introduce further uncertainties into flood risk management, building flexibility and adaptability into strategies will help communities better respond to evolving conditions.

> *"Capacity is not just about technical expertise—it includes governance coordination, community readiness, and sufficient funding."*

- **Take advantage of existing resources and community input:**
  Begin by gathering all relevant data sources, including past flood records, hydrological models, floodplain maps, and climate projections. In addition to formal geospatial data, draw from local and Indigenous Knowledge, which can provide critical insights into seasonal water flows, historical flood patterns, and the impacts of flooding on cultural practices, food security, and salmon health. Participatory mapping and storytelling approaches may work well with communities. Provincial resources, such as the forthcoming provincial and federal flood risk mapping program (anticipated in 2025) and existing best practices on flood mapping and LiDAR specifications, can also help strengthen the data foundation. Combining scientific data with lived experience ensures a well-rounded risk assessment that reflects both the physical and social landscape.

- **Identify and address data gaps:**
  Data gaps—such as outdated floodplain maps, missing assessments of social vulnerabilities, or insufficient information on environmental risks—can make a flood risk assessment less accurate and less useful for planning and decisionmaking. It will be helpful to identify gaps early, assess their importance, and decide how they should be addressed. Further technical studies, partnerships with academic institutions, or community-driven approaches may be appropriate. Community members may be able to offer insights on undocumented flood-prone areas, informal drainage systems, or historical flood events. Community engagement can explore different risk tolerances across groups and highlight where certain populations, ecosystems, or services are especially vulnerableAs the Province develops the Disaster and Climate Risk and Resilience Assessment (DCRRA), including regional versions, communities may have additional guidance to support more integrated and coordinated risk assessment.

Tools & resources

This is a starting point, not a comprehensive list.

- UNDRR - Technical Guidance for Comprehensive Risk Assessment and Planning in the Context of Climate Change
  Guidance on comprehensive risk assessment and climate change adaptation planning.

- Flood Hazard Area Land Use Management Guidelines
  B.C. Government's guidelines for framing land-use planning in flood hazard areas.

- Professional Practice Guidelines – Legislated Flood Assessments in a Changing Climate in B.C.
  Professional practice guidelines to support high-quality, climate-informed flood assessments.

- The First Nations Principles of OCAP
  Website with information and training on OCAP.

- Guidance for Selection of Qualified Professionals and Preparation of Flood Hazard Assessment Reports
  Guidance document for selecting qualified professionals and preparing flood hazard assessments in B.C.

- Flood Mapping in B.C.
  Best practices for developing flood maps in B.C. using consistent methods and high-quality data.

- Specifications for LiDAR for B.C.
  Technical specifications to guide high-quality LiDAR data collection for flood mapping.

- ClimateReadyBC Hazard Maps and Resources
  Online platform offering hazard maps, risk data, and adaptation resources to support flood and climate resilience.

- Disaster and Climate Risk and Resilience Assessment (DCRRA) (Upcoming)
  New provincial guidance under development to help communities undertake integrated disaster and climate risk assessments, supporting IFMPs and broader adaptation planning.

- River Forecast Centre
  B.C. River Forecast Centre provides real-time hydrological data and modeling for flood risk assessment.

- First Nations Climate Initiative
  Resources for integrating Indigenous Knowledge into climate-related risk assessments, including flood risk.

- Participatory Planning Resources (B.C. and Indigenous Knowledge Integration)
  First Nations Climate Initiative offers resources on integrating Indigenous Knowledge and community engagement in climate adaptation and flood planning.

- Emergency Management Strategy for Canada
  Public Safety Canada's comprehensive strategy for emergency management, including flood risk.

- Social Vulnerability Index
  A tool for assessing social vulnerability and integrating socioeconomic factors into the risk analysis framework.

- Social Vulnerability Index Report
  The Partners for Action (P4A) report on social vulnerability and resilience in Canada.

- Climate Projections for the Capital Region 2024
  ClimateBC provides projections for future climate scenarios impacting flood risk in B.C.

- National Strategy for Critical Infrastructure
  Infrastructure Canada resources for planning around the impact of floods on critical infrastructure and essential services.

- B.C. Land Use Planning Resources
  Land Use Planning B.C. for understanding land use regulations and policies in B.C.

- Salmon Health Monitoring Tools
  Resources from Fisheries and Oceans Canada (DFO) Pacific Region for monitoring salmon populations and assessing the impact of flooding on habitats.

- Pacific Salmon Foundation - Salmon Explorer
  Interactive tool illustrating threats to salmon within specific watersheds across B.C.

- Pacific Salmon Foundation - State of Salmon Report
  Provides an overview of salmon population health and key pressures, supporting integrated watershed and flood risk planning.

- Flood mapping types and process

- Federal Flood Mapping Guidelines

- Deltares - Adaptation Pathways Decision Support Tool
  This tool uses structured decision-making to develop flexible flood management plans, exploring short-term and long-term strategies under different climate scenarios.

An IFMP process for communities in B.C.

Step 3: Selecting and evaluating risk reduction and resilience options

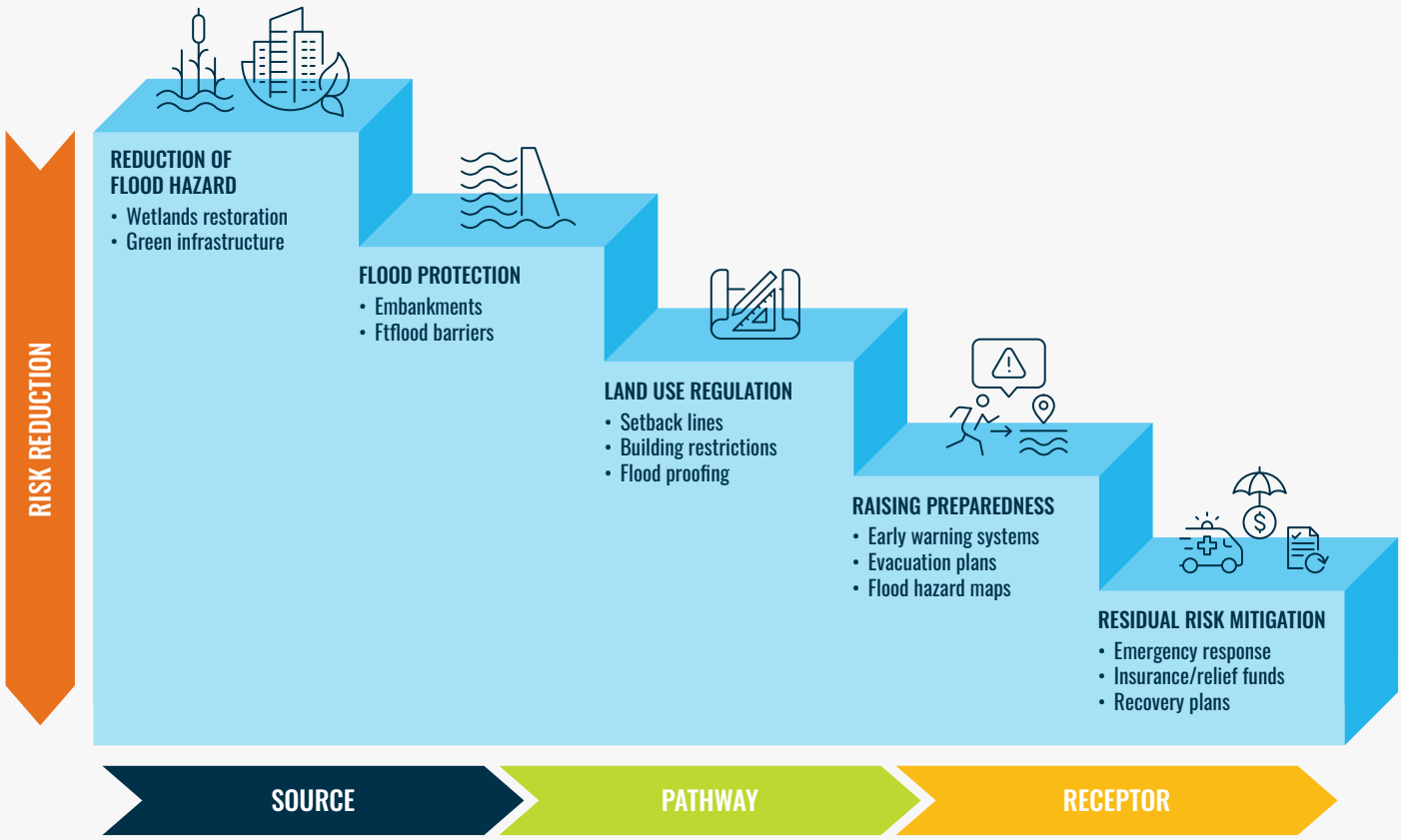
Step 3 is about using the understanding of flood risk from Step 2 as the basis to explore and select risk reduction options to reduce vulnerabilities and build long-term community resilience. Integrated flood management involves using the full toolbox of flood risk reduction measures to tailor a set of actions that works best to achieve the objectives of the communities within the IFMP area. Emphasizing flexibility and diversity of risk reduction measures allows communities to address different types and scales of risk across landscapes and timeframes.

A structured, transparent decision-making process guides the evaluation and prioritization of options, ensuring that choices are grounded in local values, technical feasibility, and social and ecological goals. Participatory approaches—including multi-criteria evaluation, community engagement, and scenario-based planning—help communities explore trade-offs, understand uncertainties, and build consensus around preferred strategies. Scenario planning also supports the identification of early no-regret actions and the development of adaptive pathways, sequencing investments over time to remain resilient under a range of future conditions.

> *"The shared vision is to move beyond short-term fixes and toward long-term, integrated flood solutions that support thriving communities and ecosystems."*

Throughout this step, communities are encouraged to prioritize nature-based solutions, integrate Indigenous stewardship frameworks, and consider how individual strategies can support broader planning objectives such as climate adaptation, biodiversity protection, food security, and cultural revitalization. The result of Step 3 is a carefully

FIGURE 2: INTEGRATED FLOOD RISK MANAGEMENT



prioritized, adaptable set of risk reduction strategies that positions communities for effective, staged action in a changing environment.

Outcomes

» **Portfolio of flood risk reduction strategies identified:** An effective and context-appropriate set of risk reduction measures has been identified, drawing on frameworks such as Protect, Accommodate, Retreat, and Avoid (PARA) and tailored to local flood risks, cultural values, ecological priorities, and long-term sustainability goals.

» **Structured and inclusive evaluation process completed:** Options have been assessed through a transparent, participatory decision-making process that integrated technical analysis, Indigenous Knowledge, community engagement, and scenario-based planning to ensure inclusive, adaptive, and future-oriented prioritization.

» **Adaptive pathways and sequenced actions developed:** Selected strategies have been organized into adaptive pathways that identify early no-regret actions and establish flexible sequences for longer-term investments—allowing communities to adapt based on monitoring results, risk thresholds, and changing conditions.

» **Alignment with broader community goals achieved:** Flood risk reduction strategies have been intentionally aligned with broader municipal, regional, Indigenous, and ecological planning initiatives, maximizing co-benefits across environmental health, social wellbeing, food security, and climate resilience.

Practical guidance

» **Develop and evaluate a comprehensive range of options:** A robust flood management strategy begins by assembling a full suite of risk reduction and resilience options spanning the disaster management cycle: preparedness, mitigation, response, and recovery. Preparedness strategies may include enhancing early warning systems, evacuation route planning, and public education programs, while mitigation actions encompass both structural measures—such as upgrading dikes, culverts, and seawalls—and non-structural measures like updated zoning, conservation easements, and nature-based solutions.

A useful framework for organizing these strategies:

- Protect strategies resist floodwaters with structures like dikes or living shorelines.
- Accommodate strategies adjust infrastructure or land use to tolerate controlled flooding.
- Retreat strategies involve relocating structures and communities from high-risk areas.
- Avoid strategies prevent future exposure by directing development away from vulnerable areas.

By planning across the PARA framework, communities can create a flexible portfolio of actions that respond adaptively to the diversity of flood risks they face. Surrey's Coastal Flood Adaptation Strategy (CFAS) is an example of this integrated approach, applying a PARA lens to tailor a mix of interventions to the needs of different neighborhoods and environments.

> *"Guiding principles reflect a commitment to collaboration, transparency, and Indigenous rights, shaping how decisions are made and implemented."*

» **Adopt structured decision-making and impact scenario planning:**
Selecting and prioritizing flood risk management options requires a structured and transparent process that engages diverse perspectives and systematically weighs trade-offs. Structured Decision-Making (SDM) frameworks guide communities through articulating objectives, evaluating options against shared criteria, and documenting trade-offs in a way that builds trust and supports informed choices. Complementing SDM, impact scenario planning allows communities to explore how different strategies perform under varying future conditions, such as shifts in climate, land use, or socio-economic contexts. This combination of approaches supports more robust, flexible planning that remains resilient under uncertainty. The Sea2City Design Challenge in Vancouver applied SDM and scenario planning together, demonstrating how collaborative exploration of near-term timeframes and longer term futures can lead to adaptation pathways grounded in both community values and technical feasibility.

» **Apply a values-based approach to prioritizing actions:**
A values-based approach to prioritization ensures that flood risk management strategies reflect what matters most to the community—not only technical performance or financial costs, but cultural, ecological, and social wellbeing. After developing a range of options, communities should evaluate strategies based on locally defined values such as protecting cultural heritage, sustaining Indigenous food systems, enhancing biodiversity, promoting social equity, and supporting economic resilience. Frameworks like WAMPUM (Witness, Acknowledge, Mend, Protect, Unite, Move) provide useful models for embedding relational and rights-based considerations into evaluation criteria. Prioritizing options through a values-based lens ensures that flood management strategies contribute not only to physical protection but also to broader goals of community health, environmental stewardship, and reconciliation.

» **Flexibility through no-regret actions and adaptive pathways:**
Adaptive pathways planning encourages communities to identify a range of options that can evolve in response to changing conditions, triggered by future environmental, social, or economic shifts. A key principle within this approach is prioritizing early no-regret actions—measures that provide immediate benefits and maintain their value across a variety of future scenarios. These early actions can lay the foundation for more transformative investments that are implemented if and when specific risk thresholds

are crossed. Evaluating options through the lens of adaptive pathways helps communities build flexible, staged strategies that are responsive rather than rigid. Financial considerations remain important, particularly ensuring that funding mechanisms—such as resilience bonds, reserve funds, or phased investment plans—can support incremental action rather than locking communities into static, long-term commitments. By focusing on no-regret options and adaptive sequencing, IFMPs can prioritize strategies that are not only achievable today, but resilient and adaptable in the face of future uncertainties.

- **Integrate nature-based solutions and indigenous stewardship approaches:**
  Nature-based solutions (NbS) should be prioritized as core elements of flood risk management wherever feasible. Measures such as wetland restoration, riparian reforestation, floodplain reconnection, and living shoreline construction offer flexible, adaptive approaches to managing flood risks while enhancing ecosystem functions and supporting cultural revitalization. Indigenous stewardship approaches, emphasizing reciprocal relationships with land and water, provide important guidance for designing and governing NbS initiatives. Embedding Indigenous Knowledge systems alongside technical expertise leads to more holistic, regenerative flood resilience strategies. In Campbell River's Sea Level Rise Action Plan, for example, nature-based approaches such as beach nourishment and habitat enhancement were integrated with traditional infrastructure improvements, recognizing the ecological and cultural values of the coastal landscape.

- **Align risk reduction options with broader community goals:**
  When evaluating and prioritizing flood risk management options, it is important to consider how individual strategies align with broader municipal, regional, and Indigenous community planning goals. Strategies that contribute to multiple objectives—such as flood resilience, biodiversity enhancement, food security, climate mitigation, and cultural revitalization—may offer higher overall value and stronger community support. Prioritizing options that leverage synergies across sectors can also increase funding eligibility, regulatory readiness, and implementation momentum. Embedding these considerations into the evaluation process helps ensure that selected strategies deliver not only flood protection but also broader community benefits, maximizing the impact of resilience investments and strengthening public trust in adaptation decisions.

Tools & resources

This is a starting point, not a comprehensive list.

- Local Government Planning and Land Use Guidelines
  UBCM (Union of British Columbia Municipalities) offers resources for local governments in B.C. to plan for land use, zoning, and flood hazard management.

- Flood Risk Mitigation Tools
  Natural Resources Canada provides climate risk assessment tools, including floodplain maps, climate projections, and adaptation strategies for flood risk management.

- FloodWise In B.C.'s Lower Mainland
  Provides flood-related data, tools, and resources for flood management.

- Flood and Coastal Erosion Risk Management (FCERM) Appraisal Guidance
  UK-based resource providing structured guidance on appraising flood risk management strategies, including economic, social, and environmental criteria.

- Natural Infrastructure Framework: Key concepts, definitions and terms
  Tools and frameworks from the Canadian Council of Ministers of the Environment (CCME) that focus on adaptive management in flood and watershed resilience projects.

- Adaptation Planning for Coastal Communities
  NOAA provides resources and tools for adaptation planning, particularly for coastal regions.

- Georgetown Climate Center - Managed Retreat Toolkit
  Georgetown Climate Center offers a toolkit on managed retreat as a strategy for flood-prone areas.

- Stewardship Baseline Objectives Tool
  B.C. Government's tool for resource stewardship and planning.

- Multi-Criteria Decision Analysis (MCDA) - Flood Adaptation Tool
  MCDA helps decision-makers rank flood management strategies based on various criteria like cost, environmental impact, and social benefits.

- Green Infrastructure Planning Toolkit
  Green Infrastructure Ontario Coalition provides resources for incorporating green infrastructure, such as rain gardens, permeable pavement, and bioswales, into flood management strategies.

- Natural Flood Management Solutions
  NRC Solutions provides a comprehensive toolkit for implementing nature-based solutions in flood risk management.

- UN Environment Programme (UNEP) - Ecosystem-Based Adaptation
  UNEP's resources on ecosystem-based approaches to climate adaptation.

- Nature-Based Solutions (NBS) Decision Support Framework
  This decision-support tool helps integrate nature-based solutions into flood risk management by assessing multiple benefits of different options.

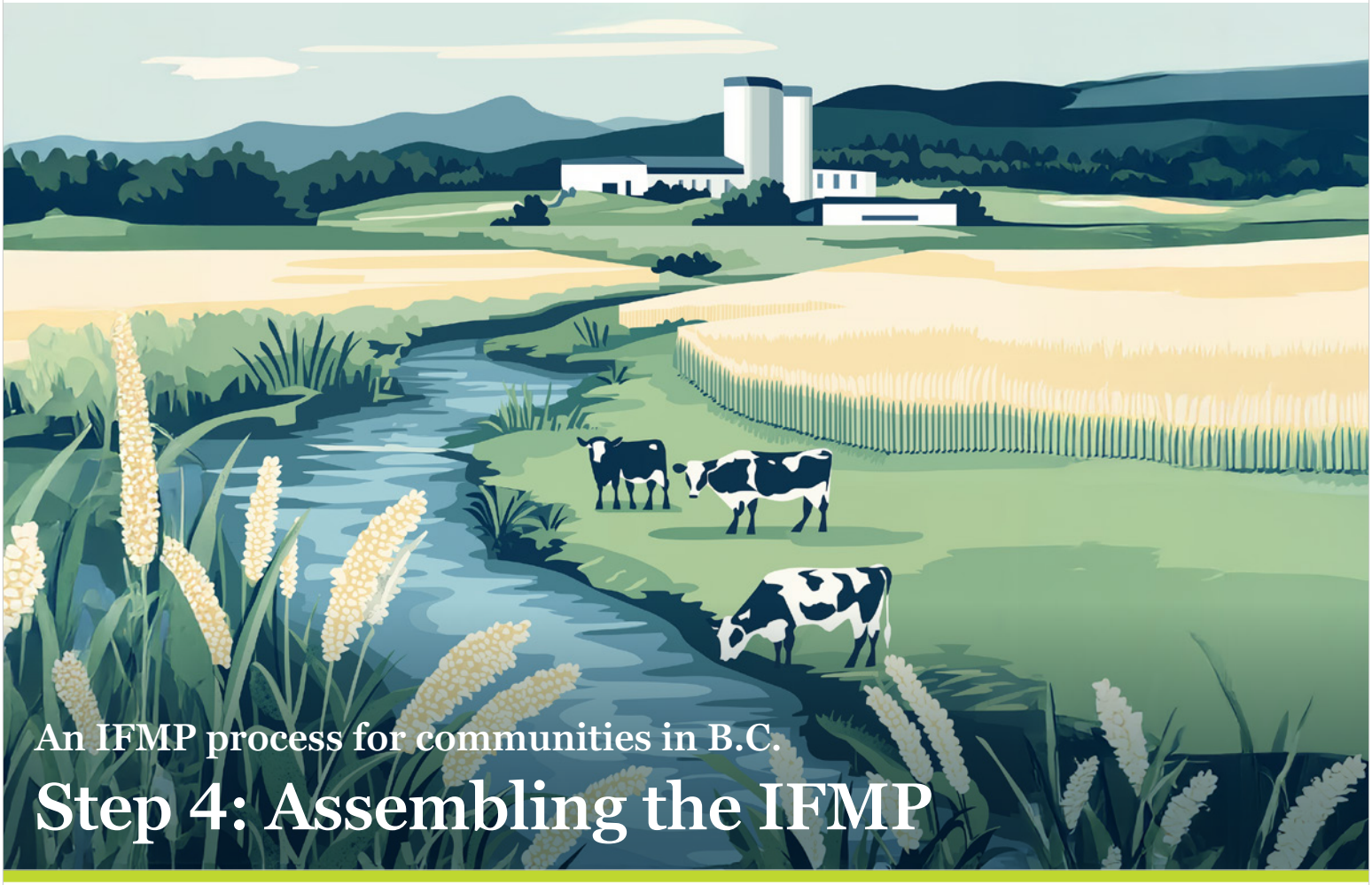
- Coastal Adaptation – Values-based Planning Primer
  A primer developed by the City of Vancouver, outlining a values-based approach to coastal adaptation.

- Surrey Coastal Flood Adaptation Strategy (CFAS)
  Comprehensive community-led coastal flood adaptation strategy applying a PARA framework lens to resilience planning.

- Okanagan Flood Resource Guide (RDCO)
  Practical resource guide developed by the Regional District of Central Okanagan for integrated flood management planning, including technical assessments and community engagement strategies.

- Squamish Integrated Flood Hazard Management Plan (IFHMP)
  A community-driven flood management plan integrating hazard assessment, risk reduction strategies, climate change adaptation, and land use planning for long-term resilience. See also case study in Appendix.

- Campbell River Climate Adaptation Plan
  A city-led action plan integrating nature-based and structural measures for sea level rise and coastal flood adaptation.



An IFMP process for communities in B.C.

Step 4: Assembling the IFMP

Step 4 brings together all of the preceding work into a single, actionable Integrated Flood Management Plan. This phase synthesizes technical findings, engagement outcomes, and prioritized strategies into a cohesive and practical document that reflects the shared vision of the planning process. More than a final report, the IFMP should serve as a living strategy, grounded in Indigenous and local knowledge, backed by rigorous assessment, and ready for implementation across multiple timeframes.

The structure of the IFMP typically includes sections on background and context, flood risk assessment, engagement, management options, recommended actions, and implementation. Wherever possible, the plan should clearly communicate the expected outcomes of proposed actions, both in qualitative terms (e.g., ecosystem benefits, cultural protection) and quantitative terms (e.g., avoided flood damages, cost-benefit ratios). Articulating these benefits helps strengthen funding proposals and align the IFMP with senior government priorities.

Finalizing the IFMP also involves outlining the path to implementation. This includes developing a detailed workplan with assigned roles and timelines, confirming regulatory compliance and necessary approvals, and identifying diverse funding sources to support staged investment. Regulatory coordination with federal and provincial agencies—such as Fisheries and Oceans Canada, Environment and Climate Change Canada, and Indigenous Services Canada—should be formalized as part of the plan, including identifying any necessary permits or agreements. A robust monitoring and evaluation framework should also be established to ensure accountability and support adaptive updates over time.

Ultimately, this step transforms risk understanding and planning into a shared commitment to act. By assembling a clear, coordinated, and community-supported IFMP, local governments and Indigenous Nations can build lasting flood resilience that protects people, land, water, and infrastructure across generations.

Outcomes

- **Comprehensive and implementable plan assembled:** The IFMP has been completed as a clear, structured document that integrates technical analysis, community input, and selected strategies—providing a practical roadmap for coordinated and adaptive flood risk management.

- **Risk reduction benefits and prioritized actions clearly defined:** Recommended actions have been linked to measurable outcomes, including anticipated flood risk reduction, social and ecological co-benefits, and community priorities. This supports effective decision-making, funding applications, and public accountability.

- **Implementation and approval pathway established:** A detailed workplan has been outlined with assigned roles, timelines, and sequencing of actions. A regulatory and governance pathway has been developed to guide legal compliance and formal approval processes across jurisdictions.

Practical guidance

- **Assemble core sections of the IFMP:** A well-structured Integrated Flood Management Plan (IFMP) should be more than a technical report; it should serve as an actionable blueprint for long-term flood resilience. Typical IFMPs include an executive summary, followed by background and context describing the floodplain, historical flood events, and jurisdictional responsibilities. Additional sections cover community and Indigenous engagement, the flood risk assessment, evaluation of risk reduction strategies, and recommended actions linked to timelines, responsibilities, and resource needs. An implementation roadmap should clearly articulate governance structures and a monitoring and evaluation framework to ensure the plan remains adaptive over time. The District of Squamish's IFHMP exemplifies this approach, creating a user-focused document that bridges technical detail with practical implementation.

- **Define implementation roles and a detailed workplan:** A detailed workplan bridges the gap between planning and action. It should outline the key actions needed to reduce flood risk, categorize them by priority, and specify responsible agencies, timelines, and sequencing of activities. Clear role assignment—for example, distinguishing municipal, Indigenous, and provincial responsibilities—is essential for accountability. Workplans should also identify required resources, dependencies between actions, and contingency strategies to manage risks during implementation. The Campbell River's Sea Level Rise Action Plan illustrates this phased approach, organizing actions into near-, medium-, and long-term horizons to maintain momentum and flexibility.

- **Coordinate with indigenous, provincial, and federal agencies:** Rather than treating regulatory processes as afterthoughts, communities should proactively establish an IFMP approval pathway early in the planning phase. This includes understanding jurisdictional requirements, submitting formal notifications to regulatory bodies, and ensuring the IFMP aligns with existing laws and policy frameworks. Approvals may be required under legislation such as the *Water Sustainability Act*, the *Fisheries Act*, the *Canadian Environmental Assessment Act*, and the *Species at Risk Act*. Early working sessions with agencies like Fisheries and Oceans Canada, Environment and Climate Change Canada, and Indigenous Services Canada can help identify compliance requirements and uphold commitments to Indigenous rights and environmental protection. The Sea2City Design Challenge demonstrated how collaborative governance frameworks can clarify roles across multiple levels of government.

- **Articulate risk reduction outcomes and return on investment:** Senior government funders increasingly expect flood management proposals to demonstrate effectiveness, efficiency, and community benefit. The IFMP should, where feasible, quantify expected outcomes—such as reductions in flood damages, avoided economic losses, or strengthened cultural resilience—and link these benefits to the costs of proposed actions. For instance, Surrey's CFAS used detailed benefit-cost analysis to secure federal funding for

priority actions under the *Disaster Mitigation and Adaptation Fund (DMAF)*. Demonstrating clear returns on investment, including through co-benefits like habitat restoration or food security, strengthens funding proposals and fosters broader community and political support.

» **Secure and diversify funding streams:** Effective implementation requires a diversified funding strategy. Communities should position themselves to access programs such as the *Disaster Mitigation and Adaptation Fund (DMAF)*, the *Community Emergency Preparedness Fund (CEPF)*, and the *Investing in Canada Infrastructure Program (ICIP)*, among others. A strong IFMP, with clearly prioritized actions and benefit-cost justifications, improves competitiveness for these funds. Local financing mechanisms—such as development cost charges, stormwater utility fees, or resilience bonds—can also create stable funding streams for ongoing investments. The Okanagan Flood Resource Guide and the Squamish IFHMP both demonstrate effective models for blending senior government grants with local revenue strategies.

Tools & resources

This is a starting point, not a comprehensive list.

» Community Emergency Preparedness Fund (CEPF)
Provides grants for local governments and Indigenous communities to enhance flood risk mitigation.

» B.C. Disaster Financial Assistance Program
Offers financial aid for disaster response and recovery, including flood events.

» Investing in Canada Infrastructure Program (ICIP)
Supports large-scale infrastructure projects focused on green infrastructure and climate resilience.

» Climate Action and Awareness Fund (CAAF)
Provides grants for municipalities, Indigenous groups, and non-profits for climate adaptation projects.

» Fisheries and Oceans Canada (DFO)
Ensures compliance with the Fisheries Act for projects affecting waterways and fish habitats.

» Environment and Climate Change Canada (ECCC)
Provides oversight on environmental impact assessments and ensures alignment with conservation goals.

» National Disaster Mitigation Program (NDMP)
Provides funding for projects that reduce natural disaster impacts, including flood risk assessments and infrastructure.

» Disaster Mitigation and Adaptation Fund (DMAF)
Supports large-scale infrastructure projects aimed at improving resilience to natural hazards like floods.

» Adaptation, Resilience, and Disaster Mitigation (ARDM) Stream – ICIP
A funding stream for projects that reduce climate-related risks, including coastal and flood adaptation.

» Canada Nature Fund: Target 1 Challenge
Supports projects that conserve ecosystems and mitigate risks like coastal and flood impacts.

» Emergency Management B.C. (EMBC) Flood Management Programs
Offers programs supporting flood risk reduction, planning, and mitigation.

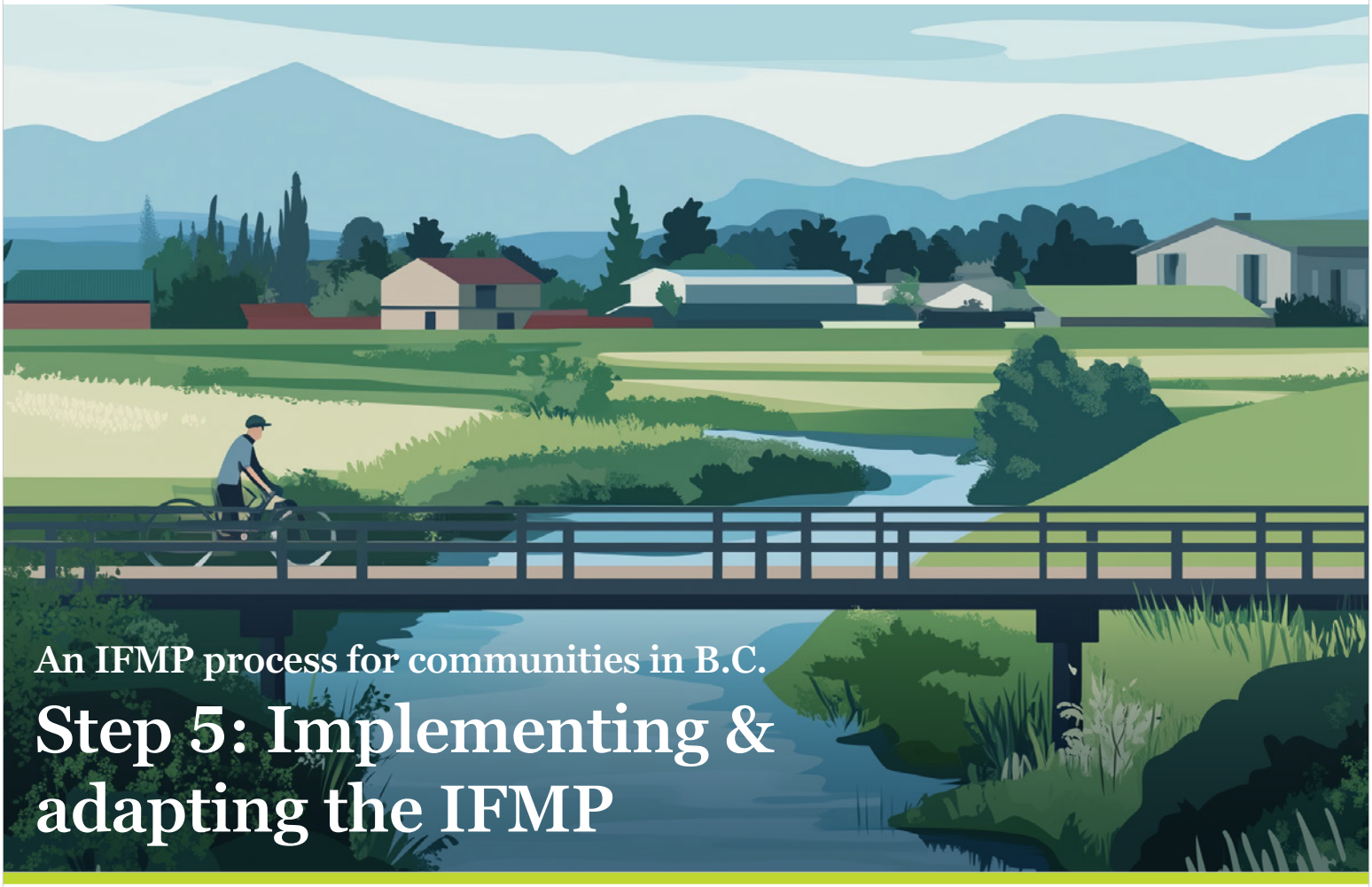
» Union of British Columbia Municipalities (UBCM) Funding Programs
Provides funding streams for local governments, including flood mitigation and climate adaptation projects.

» First Nations Adapt Program
Offers funding to First Nations to assess and respond to climate change impacts, including floodplain mapping and coastal erosion.

» Green Municipal Fund (GMF)
Provides funding for municipal environmental initiatives, including flood prevention and climate adaptation.

» CleanBC
Supports initiatives addressing climate adaptation, including flood risk reduction and community resilience projects.

» BC Disaster Resilience and Innovation Funding
Provides funding to First Nations and local governments in B.C. to enhance their capacity to withstand and adapt to natural and climate-driven hazards.



An IFMP process for communities in B.C.

Step 5: Implementing & adapting the IFMP

This final step in the Integrated Flood Management Planning (IFMP) process focuses on implementation over time—ensuring that strategies identified in earlier phases are carried out effectively, monitored for impact, and adapted as conditions evolve. Rather than viewing the IFMP as a static deliverable, this phase positions it as a living document—one that supports learning, accountability, and long-term resilience.

Successful implementation requires systems that track not only whether actions are completed, but whether they are having the intended effect: reducing flood risk, supporting ecological and cultural priorities, and aligning with community-defined values. Adaptive implementation allows communities to revisit assumptions, respond to new climate projections, flood events, or governance shifts, and refine their actions accordingly. This flexibility is particularly important given the uncertainties surrounding future conditions, including climate impacts, land use changes, and infrastructure development.

Robust monitoring and evaluation (M&E) frameworks are essential to this process. These frameworks track progress through clear, meaningful indicators linked to both implementation milestones and broader outcomes—such as flood exposure, biodiversity, or community wellbeing. Importantly, monitoring and learning efforts are most effective when they are collaborative and inclusive. Co-developing indicators with First Nations, stewardship groups, and local residents ensures that tracking reflects the lived realities of flood risk and remains grounded in local and cultural knowledge.

This step also involves committing to regular plan updates and building connections with other communities and regional partners. Review cycles provide structured opportunities to incorporate new knowledge, realign priorities, and adjust to changing conditions. Participating in inter-community learning networks strengthens this work by sharing lessons, tools, and

innovations across regions. Together, these efforts ensure that the IFMP continues to guide action, support meaningful outcomes, and evolve with the needs and aspirations of the communities it serves.

Outcomes

- **Adaptive implementation pathways established:** An implementation pathway has been developed that enables actions to be sequenced or adjusted in response to evolving risks, new knowledge, or changing community priorities—ensuring the IFMP remains responsive over time.
- **Inclusive monitoring and evaluation system developed:** A results-based monitoring system has been established to track both progress and outcomes, using indicators co-developed with First Nations and community partners to reflect shared values related to flood resilience, ecological health, and social wellbeing.
- **Nature-based solutions tracked and evaluated:** The performance of nature-based and ecological strategies—such as wetland restoration and riparian enhancement—has been monitored using indicators that capture both flood risk reduction and broader environmental co-benefits.
- **Ongoing review and shared learning mechanisms implemented:** Processes for regular IFMP review and updates have been put in place, supported by participation in regional and inter-community learning networks that foster shared insight, innovation, and continuous improvement.

Practical guidance

- **Embrace an adaptive implementation approach:** Flood risks are shaped by many shifting factors—including climate change, economic activities, and regional development. Adaptive implementation provides a structured but flexible framework for managing these uncertainties. Rather than treating the IFMP as a fixed product, this approach views it as a living strategy that evolves through cycles of action, reflection, and adjustment. As new risks emerge or conditions change, planned actions can be revisited, re-sequenced, or expanded. Adaptive implementation also supports phased or conditional investments, allowing communities to act on no-regret measures now, while preparing for more transformative options in the future.
- **Build a results-based monitoring and evaluation framework:** Monitoring and evaluation (M&E) frameworks are essential to assess whether the IFMP is achieving its intended goals. A results-based approach tracks both implementation progress—such as completed actions, policy changes, or partnerships—and outcome indicators like flood risk reduction, enhanced ecosystem services, or community awareness. Establishing clear indicators and baseline data early on ensures meaningful comparisons over time. Metrics might include avoided infrastructure damage, number of people or assets removed from high-risk zones, or the amount of restored floodplain. Including rights- and stakeholders in selecting these indicators helps ensure they reflect community priorities and lived realities, not just technical performance.
- **Monitor nature-based solutions:** Nature-based strategies like restored wetlands, riparian buffers, and floodplain reconnection provide multiple co-benefits—from flood attenuation and groundwater recharge to habitat enhancement and cultural revitalization. Evaluating their performance requires a combination of hydrological indicators (e.g., flow velocity reduction, water retention, sediment capture) and ecological metrics (e.g., vegetation establishment, habitat complexity, biodiversity gains). While some benefits—such as salmon population recovery—may take years to observe, early indicators like channel connectivity or water temperature regulation can offer valuable feedback for adaptive refinement. Integrating Indigenous and community knowledge into this monitoring process ensures local relevance and can surface insights not captured by technical tools alone. Seasonal observations, oral histories, and participatory mapping efforts strengthen this understanding and ground assessments in lived experience.

- **Use real-time data and shared monitoring systems:** Advanced monitoring technologies, such as remote sensing, telemetry, and drone-based surveys, offer communities timely and detailed insights into changing flood conditions, infrastructure performance, and land-use patterns. When integrated into dashboards or alert systems, these tools can support early warning systems and proactive decision-making, while also contributing to long-term planning and model calibration. Equally important are collaborative monitoring structures that bring together technical staff, Indigenous Guardians, stewardship groups, and local residents. Through standing advisory committees, review workshops, or open feedback channels, these groups can validate findings, flag emerging concerns, and co-develop updates to the IFMP. Combining high-resolution data with inclusive governance strengthens both the responsiveness and legitimacy of flood management strategies.

- **Revisit and refresh the plan at regular intervals:** To remain useful, the IFMP must evolve alongside new information, changing risks, and shifting community goals. Communities should establish a regular schedule for reviewing and updating the plan—often annually for implementation tracking, and every three to five years for more substantive reassessment. Plan updates should incorporate recent flood events, new scientific insights, community feedback, and changes in governance or land use. This ongoing process keeps the plan grounded in reality, responsive to needs, and aligned with broader planning frameworks. Embedding this cycle into local governance structures ensures continuity and institutional support over time.

- **Strengthen knowledge-sharing networks:** Flood management is inherently a shared challenge. Participating in knowledge-sharing networks enables communities to learn from peers, avoid common pitfalls, and stay up to date on emerging tools and practices. Regional or sectoral forums—such as those hosted by the Lower Fraser Floodplain Coalition—provide platforms for collaborative problem-solving and innovation. These partnerships also open opportunities for joint funding proposals, shared services, and policy alignment across jurisdictions. Embedding lessons from other communities into local adaptation efforts can increase the speed and effectiveness of implementation while fostering a culture of continuous learning.

Results-based monitoring and evaluation system

The United Nations have outlined "Ten Steps to a Results-Based Monitoring and Evaluation System", which can be considered when implementing and adapting the IFMP:

Step 1. Conducting a readiness assessment:
Assess the current capacity and willingness of the organization to implement a results-based monitoring and evaluation (M&E) system. This includes understanding the political and organizational environment, the legal and regulatory framework, and the existing M&E practices.

Step 2. Agreeing on outcomes to monitor and evaluate:
Engage rights- and stakeholders to identify and agree on the outcomes that the M&E system will focus on. Define these outcomes and ensure they align with the IFMP's strategic objectives.

Step 3. Selecting key performance indicators to monitor outcomes:
Choose specific, measurable indicators to track progress towards the agreed outcomes. These indicators should be meaningful and provide a clear picture of performance over time.

Step 4. Setting baselines and gathering data on indicators:
Establish baseline data for each indicator to create a point of reference against which future performance can be measured. This involves collecting initial data to capture existing conditions.

Step 5. Planning for improvement:
Determine targets for each indicator that represent the desired level of achievement. Targets should be specific, achievable, and time-bound, providing clear benchmarks for success.

Step 6. Monitoring for results:
Implement a process for systematically collecting and analyzing data on the selected indicators. Regular monitoring helps to track progress, identify trends, and highlight any deviations from expected outcomes.

Step 7. Using evaluation to support a results-based management system:
Conduct evaluations to assess the effectiveness, efficiency, and impact of programs. Evaluations provide critical insights into what works, what doesn't, and why, helping to inform decisions and improve performance.

Step 8. Reporting findings:
Prepare and disseminate reports that communicate the findings from monitoring and evaluation activities. These reports should be clear and accessible, providing transparency and accountability.

Step 9. Using findings:
Use the findings from monitoring and evaluation to make informed decisions, improve program performance, and achieve better outcomes. This involves applying lessons learned and making necessary adjustments.

Step 10. Sustaining the M&E system within the organization:
Ensure the sustainability of the M&E system by embedding it into the organization's culture and practices. This requires ongoing support, capacity building, and a commitment to continuous improvement.

Tools & resources

This is a starting point, not a comprehensive list.

- United Nations' "Ten Steps to a Results-Based Monitoring and Evaluation System"
  A framework for establishing a robust M&E system for tracking and assessing the success of IFMP implementation.

- Climate Adaptation and Resilience Monitoring
  Resources from Climate Resilience Toolkit Canada for monitoring and adapting to changing climate conditions, including flood risks.

- Community-Based Monitoring Tools
  The Canadian Environmental Network provides tools and resources for developing and implementing local flood monitoring systems.

- Indigenous Climate Monitoring Tools
  First Nations Climate Change Monitoring offers resources for integrating Indigenous Knowledge into monitoring and evaluating flood risk and climate adaptation strategies.

- Adaptive Watershed Management
  A technical report from the Southern California Coastal Water Research Project (SCCWRP) offering comprehensive insights into adaptive management strategies for watershed-based approaches.

- Watershed Monitoring and Adaptive Management
  The Pacific Institute offers resources on the integration of adaptive management techniques into watershed monitoring and water management projects.

- Adaptive Strategies for Integrated Water Management A scholarly article discussing integrated water management strategies in response to climate change and ecosystem dynamics.

- Adaptive Flood Management Guide
  This guide from Ebbwater Consulting provides insights into adaptive flood management strategies tailored for evolving flood risks.

- Community Resilience Self-Assessment Toolkit
  A toolkit developed by Evergreen for assessing community resilience, which includes components relevant to flood management and adaptation.

Moving forward

This guide outlines a five-step process for developing Integrated Flood Management Plans (IFMPs) that support communities in collaboratively managing flood risks. The approach is grounded in respect for cultural, ecological, and community values, and emphasizes the importance of strong relationships between First Nations, local governments, provincial agencies, and other partners. Because flood risks often span multiple jurisdictions within a watershed, building trust and clarity around roles and responsibilities is essential to support coordinated and inclusive planning.

The five steps outlined in this guide begin with setting the geographic scope and establishing collaborative relationships (Step 1), followed by building a shared understanding of risks informed by both technical and local knowledge (Step 2). Communities then identify and evaluate a broad range of structural and non-structural risk reduction and resilience options (Step 3), assemble these into a cohesive, implementable plan (Step 4), and ensure that the IFMP remains responsive through adaptive implementation, monitoring, and learning (Step 5). Each step supports communities in taking action that is transparent, place-based, and responsive to future uncertainty.

This process is designed to align with broader provincial and national initiatives, including the B.C. Flood Strategy, the Emergency and Disaster Management Act, the Sendai Framework for Disaster Risk Reduction, and the Declaration on the Rights of Indigenous Peoples Act. These frameworks call for collaborative and coordinated approaches to risk

reduction that uphold Indigenous rights and knowledge systems, promote ecosystem health, and strengthen community resilience.

While this guide primarily refers to planning at the watershed scale, some IFMPs may focus on smaller areas within a watershed, such as a sub-watershed or coastal reach. The appropriate scale will depend on local conditions, governance arrangements, and shared priorities. Regardless of scope, planning should reflect the interconnected nature of water systems and support coordination across boundaries.

Taken together, the steps in this guide offer a practical and flexible foundation for communities to work together toward long-term flood resilience. By investing in relationships, integrating diverse forms of knowledge, and advancing adaptive and inclusive strategies, communities across B.C. can reduce flood risks and support the well-being of both people and ecosystems over time.

Appendix: Case study analysis

This appendix presents two case studies on Integrated Flood Management Plans (IFMPs), showcasing practical experiences and outcomes from these projects. Each case study details the key insights gained, the organizational structure behind the projects, strategies for engaging First Nations and community stakeholders, and the major outcomes achieved. These examples provide valuable perspectives and lessons learned to guide future flood management initiatives.

Case study title	**District of Squamish Integrated Flood Hazard Management Plan (IFHMP)**
Timeline	IFHMP reports developed between 2014 and 2017, continued adaptation and implementation of the recommendations.
Location	Squamish, B.C.
Executive summary	The District of Squamish is a community of around 25,000 people situated on the traditional territory of the Sḵwx̱wú7mesh Úxwumixw (Squamish Nation). Five major rivers and various smaller creeks flow through the community. Some of these rivers enter Howe Sound, a fjord of the Pacific Ocean. As such, the District of Squamish, as well as several Sḵwx̱wú7mesh Úxwumixw reserves, are exposed to riverine flooding, debris flows, and coastal flooding. The community also experiences groundwater flooding. Between 2014 and 2017, the District of Squamish developed an Integrated Flood Hazard Management Plan (IFHMP) focusing on its riverine and coastal flood hazards. The District of Squamish was motivated to begin this project due to several reasons: the flood management plan released in 1994 was old and needed updating to account for climate change; the Province released sea level rise guidance in 2011; and, a development boom in the community's downtown core along with coast revealed the need for stronger planning. The project brought together various consultants, governing authorities—including the Sḵwx̱wú7mesh Úxwumixw—as well as other governmental, non-governmental, and community stakeholders. It was funded through a Community Works Fund administered by the Union of B.C. Municipalities and cost roughly $450,000. The project consisted of four phases and resulted in four corresponding reports that: 1. Overviewed existing information on the community's flood hazards and flood risk reduction strategies 2. Developed a coastal flood risk mitigation strategy based on a review of coastal hazards 3. Developed a riverine flood risk mitigation strategy based on flood maps and a hazard and consequence assessment 4. Synthesized this information into a final report.

Executive summary cont.	Collectively, these IFHMP reports recommended over 100 specific structural and non-structural flood risk mitigation tools that address dike upgrades, land use planning, building regulations, river management, emergency response, and public education among other factors. These tools were informed by the PARA framework and attempt to protect the community from flood hazards, accommodate flood hazards by adapting land use and building design, retreat select development out of the floodplain, and avoid new development in high-risk locations. These tools and actions were classified as either short-term, medium-term, longer-term, or opportunistic priorities. The short-term and medium-term priorities are intended to be implemented before the next IFHMP update, which the District aims to occur every 10 years.
Key learnings	» The collaborative and multidisciplinary nature of the project team enabled a holistic approach to flood management that accounted for different environmental, social, economic, and political concerns. The team included multiple departments from the District of Squamish who brought the institutional knowledge needed for the IFHMP to connect with other community plans and concerns. » The establishment of a Technical Working Group and use of several community engagement methods allowed the IFHMP to incorporate concerns and values of several rights holders, stakeholders, and the public. » The plan assessed multiple types of flood hazards, including riverine and coastal flooding, and looked at multiple flood hazard sources including five major rivers and Howe Sound. While groundwater flooding was outside the scope of the project, it was considered in some parts of the project. » Although the IFHMP project was expensive—costing roughly $450,000 over three years—it has since helped the District secure $10 million in grant money. As such, the project was a great return on investment. » The project team originally budgeted less money and time for the project, but soon realized the project required more public engagement as well as rework to incorporate the lessons from this engagement. This shows how IFHMP projects must be adaptive and reiterative. » The IFHMP engaged with the community's history of flooding and flood management (see timeline of flood events). This historical information was used to understand Squamish's flood risk today as well as to reflect upon the flaws of past flood management approaches.
Project organizational structure	District of Squamish staff in the engineering and planning departments led the project alongside a multi-disciplinary consulting team specializing in engineering, planning, as well as geotechnical and environmental science. Kerr Wood Leidal Associates Ltd. worked with District staff to lead the project with the support of Arlington Group Planning + Architecture Inc., SNC-Lavalin Inc., Thurber Engineering Ltd., and Cascade Environmental Resource Group. The project team also gathered insights and input from other rights holders and stakeholders including: » District of Squamish staff from other departments (e.g., Public Works) as well as Mayor and Council » Sḵwx̱wú7mesh Úxwumixw Council and staff » A Technical Working Group consisting of several governmental, non-governmental, and community groups with interests in flood management » Residents and landowners in Squamish

Working with First Nations	During the IFHMP project, the District of Squamish and Sḵwx̱wú7mesh Úxwumixw collaborated in several different ways. Initial meetings with Sḵwx̱wú7mesh Úxwumixw Council and staff helped District of Squamish staff learn about the history of flooding and erosion faced by the Sḵwx̱wú7mesh Úxwumixw, as well as their concerns with flood control infrastructure that had eroded reserve land. This history provided the context and foundation necessary for the two governments to build a working relationship for the IFHMP project to progress. Collaboration continued through staff-to-staff communication as well as several workshops, presentations, and meetings between District staff and Sḵwx̱wú7mesh Úxwumixw Council and staff. The relationship between the District of Squamish and Sḵwx̱wú7mesh Úxwumixw during the IFHMP was best characterized as close engagement. The District shared data and the results of the technical studies and mapping with the Sḵwx̱wú7mesh Úxwumixw, helping the Sḵwx̱wú7mesh Úxwumixw develop their own flood mitigation plans and projects for their territory. The Sḵwx̱wú7mesh Úxwumixw provided feedback and technical input on the IFHMP project. Official comments from the Sḵwx̱wú7mesh Úxwumixw on the IFHMP Final Report were included in an appendix. The IFHMP helped strengthen the relationship between the District of Squamish and the Sḵwx̱wú7mesh Úxwumixw. Following work on the IFHMP, the two governments have become partners on specific projects. For instance, through the Eagle Viewing Area / Siyich'em Reserve Dike Master Plan, the District of Squamish and Sḵwx̱wú7mesh Úxwumixw are working together to build a dike to protect District and Nation land.
Working with community stakeholders	During the IFHMP process, the project team engaged community groups and members in various ways by: » Establishing a Technical Working Group (TWG) to bring together representatives from the District of Squamish, Sḵwx̱wú7mesh Úxwumixw, as well as other governmental and non-governmental bodies with interests in flood management (e.g., BC Hydro, BC Ministry of Forests, Lands, and Natural Resource Operations (MFLNRO), BC Ministry of Community, Sport and Cultural Development, BC Ministry of Transportation and Infrastructure, Emergency Management BC, Fisheries and Oceans Canada, CN Rail, Fortis BC, Vancouver Coastal Health, as well as local residents, business, and environmental groups). Four formal meetings and informal communications involving TWG members provided input during key stages of the IFHMP process. » Holding four meetings with different stakeholders in the community including highly affected landowners, environmental groups, as well as other community groups and members. » Organizing three open houses that involved sharing information on the community's flood risks, potential flood risk mitigation options, and IFHMP project progress through storyboards and dialogue. » Conducting four public surveys online and in person at the Open House events to gather public input on the community's flood risks, flood risk mitigation options and designs, flood risk mitigation policy tools, funding approaches, and other information relevant to the IFHMP project. » Adding an IFHMP project webpage to the District of Squamish's website to provide updates and documents, as well as solicit feedback.

Key outputs

The IFHMP reports recommended over 100 structural and non-structural tools to mitigate flood risk in the community. These are listed in Table 7-1 of the Coastal Flood Risk Mitigation Options Report and Tables 8-1 to 8-7 of the River Flood Risk Mitigation Options Report. Since the IFHMP reports were released in 2017, the District of Squamish has implemented several of the recommended actions and conducted follow-up work including:

- Enhancing dikes and other flood control infrastructures throughout the community
- Enforcing flood construction Levels on new development
- Updating the hazards lands section in the Official Community Plan
- Developing a Floodplain Management Bylaw
- Creating a Development Permit Area to restrict development in certain high flood risk areas
- Conducting a Quantitative Risk Assessment on one river floodplain
- Relocating the community's primary fire hall and emergency operations center out of the floodplain

While the IFHMP process involved a lot of time and resources, the outputs of the project are still relevant today. The District of Squamish intends to update the plan in 2027, focusing on reviewing what is working and what is not as well as incorporating new climate data and guidance if there is any.

Key diagrams

Timeline of recorded floods in Squamish, B.C.

2010s

2000s

October 2003
- *Squamish River*
- *Cheakmus River*

Largest flood on record (369 mm in 4 days) caused District evacuations and damaged the B.C. rail line Dikes were almost overtopped

1990s

August 1991
- *Squamish River*
- *Cheakmus River*
- *Cheekeye River*

15 houses on Cheakamus I.R. No 11 were flooded and the access road to Paradise Valley was washed out

1980s

October 1984
- *Cheekeye River*
- *Cheakamus River*
- *Stawamus River*

Log bridge across the Cheakamus River destroyed and damaged homes

October 1981
- *Squamish River*

177mm of rain in 48 hours

1970s

December 1980
- *Squamish River*
- *Cheakamus River*
- *Mamquam River*
- *Stawamus River*

Logjams on 3 rivers led to damages to 200 homes and clsure of Highway 99

November 1968
- *Mamquam River*

Flooding damaged a trailer park, highways and railway

1960s

December 1967
- *Howe Sound*

Sea dike was overtopped and Downtown Squamish flooded

1950s

October 1958
- *Squamish River*

Four feet of water over the main road in Brackendale

October 1940
- *Squamish River*

Evacuations from Brackendale to Downtown

1940s

August 1958
- *Cheekeye River*

Major debris flow following a sudden rainstorm

December 1932
- *Howe Sound*

Overtopping of the sea dike in Downtown

1930s

October 1955
- *Mamquam River*

Mamquam Bridge washed out for 1 0th time in 28 years

October 1921
- *Mamquam River*
- *Squamish River*

Flood covered valley floor

1920s

December 1951
- *Howe Sound*

Sea dike was breached in two places

October 1950
- *Squamish River*

Damage to roads and rail bridges

1910s

September 1906
- *Squamish River*

"Many settlers were completely wiped out" (Myrtle Herndl)

1900s

1890s
- *Squamish River*

First River Dike proposed

Images courtesy of the Squamish Public Library istory Archives
Kerr Wood Leidal. Timeline of Recorded Floods in Squamish, B.C. IFHMP Final Report.

Key diagrams

Kerr Wood Leidal. Objectives of Squamish's IFHMP Project. IFHMP Final Report.

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*Additional insights inquired through semi-structured interviews with key personnel

Case study title	**Comox Valley Regional District Coastal Flood Adaptation Strategy**
Timeline	Multi-year and multi-phased project that started in 2018 and is still ongoing as of October 2024
Location	Comox Valley Regional District, B.C.
Executive summary	The Comox Valley Regional District (CVRD), located on Vancouver Island on the territory of the K'ómoks First Nation, has a population of roughly 72,000 people. As a regional district, the CVRD consists of three member municipalities—the City of Courtenay, Town of Comox, Village of Cumberland—as well as three electoral areas. Due to its geographic spread, the CVRD also contains several river and coastal flood hazards. In 2018, the CVRD began developing a Coastal Flood Adaptation Strategy (CFAS) in order to understand and mitigate flood risk in the region. Updates to the Province of British Columbia's Flood Hazard Area Land Use Management Guidelines in 2018 also motivated the CFAS project to understand how climate change and sea level rise would impact flooding. The project has progressed in phases. Between 2019 and 2021, the CVRD worked with engineering consultants Kerr Wood Leidal on Phase 1 of the CFAS to map the region's coastal flood hazards. In Phase 2, which ended in 2022, the CVRD hired Ebbwater Consulting and SHIFT Collaborative to conduct a flood-risk assessment as well as engage with community stakeholders to establish a set of values to guide flood mitigation efforts. This phase also involved developing and testing a decision-making framework for the CVRD and its partners to use in the future to select, prioritize, and implement flood mitigation measures in different floodplains. In Phase 3 of the CFAS, which is ongoing as of October 2024, the CVRD is working with its member municipalities, K'ómoks First Nation, and the Ministry of Transportation and Infrastructure to mitigate flooding along Comox Road. Various phases of the CFAS were funded by the Union of British Columbia Municipalities' Climate Emergency Preparedness Fund, Emergency Management BC, and the National Disaster Mitigation Program.
Key learnings	» As a regional district, the CVRD faces unique challenges and opportunities in managing flood risk throughout the valley. This case study speaks to the role that regional districts can play in bringing local municipalities and First Nations together to manage flooding in a more holistic and integrated way. Although the regional collaborative framework is currently being developed as part of Phase 3 of the CFAS (as of October 2024), it provides a model for how neighboring jurisdictions can come together to develop shared values, goals, plans, and projects that mitigate flood risk. » As a pre-existing multi-jurisdictional service, Comox Valley Emergency Management Service (CVEM) has played a key role in bringing together jurisdictions to collaborate on flood management. Regions and communities throughout B.C. may be able to turn to similar entities and build upon pre-existing relationships in order to develop integrated flood management plans and projects. » The multi-phase nature of CVRD's CFAS shows how partnership and collaborative structures, public engagement strategies, and key outputs can differ from phase to phase. This points to how IFMPs can be flexible and adaptive based on the needs of the communities involved. Flood management may even involve jumping between developing maps and plans that encompass whole regions (Phase 1 and 2) to implementing flood resilience strategies and projects focused on specific areas (Phase 2 and 3).

Project organizational structure	Because the CVRD is a regional district, it has limited to carry out flood mitigation projects within municipal and First Nation boundaries. As a result, the CVRD plays a key role in bringing together different jurisdictions and encouraging collaboration to mitigate flood risk in the region. The CVRD has also assumed its regional partner role by sharing maps, data, and findings with governments within and even outside of its jurisdiction. Due to the CFAS's multi-phased approach, the CVRD has worked with various consultants, member municipalities, rights holders, and stakeholders depending on the aims and geographic scope of the phase. As part of Phase 3, the CVRD is bringing together several jurisdictions to mitigate flooding on Comox Road. The road is a key transport corridor that spans several jurisdictions: it connects Courtenay and Comox, traverses through a K'ómoks First Nation reserve, lies partially within the CVRD's jurisdiction, and is managed by the Ministry of Transportation and Infrastructure. In order to bring these various jurisdictions together, the CVRD has relied on pre-existing relationships established through the Comox Valley Emergency Management Service (CVEM). CVEM is a multi-jurisdictional service administered by the CVRD in partnership with K'ómoks First Nation and the CVRD's three member municipalities. Throughout the Spring of 2024, the CVRD held several in-person and virtual workshops and meetings to bring together representatives from these different jurisdictions to discuss shared goals and unpack the technical details of the project. Due to the complexity and multi-jurisdictional nature of the Comox Valley Flood Mitigation project, Phase 3 is also being used as an opportunity to develop a regional collaborative framework that lays out how these different jurisdictions can continue to work together to improve flood resilience in the region. As such, the CVRD is hoping that this phase will strengthen partnerships that can help future flood mitigation planning efforts and projects.
Working with First Nations	In 2010, the CVRD and its member municipalities signed a protocol agreement with the K'ómoks First Nation that established a shared understanding of key interests. Since this agreement, the CVRD and K'ómoks First Nation have maintained a government-to-government relationship. In various phases of the CFAS, the CVRD have shared their data and findings with the K'ómoks First Nation. As Comox Road crosses through K'ómoks First Nation land, the CVRD are focusing on strengthening their relationship with the K'ómoks First Nation in Phase 3 of the CFAS by utilizing pre-existing relationships between CVEM staff and K'ómoks First Nation staff. By leaning on these pre-existing connections, CVRD staff were welcomed onto K'ómoks First Nation IR#1 that surrounds a part of Comox Road. K'ómoks First Nation representatives offered a tour of their land, talked about their cultural heritage and shared personal experiences of flooding on the reserve. This experience helped the CVRD team understand how the K'ómoks First Nation would like to be involved in the Comox Road Flood Mitigation project. The two jurisdictions identified shared goals for understanding and mitigating flood risk along Comox Road. This experience also supported the aims of developing a regional collaborative framework between the CVRD, its member municipalities, and the K'ómoks First Nation that inspires collaboration on future flood mitigation planning efforts and projects. Engagement with the public has varied with each phase of the CFAS.

Working with Community Stakeholders	Engagement with the public has varied based on the phase of the CFAS. » As Phase 1 involved producing flood maps and was more of a technical exercise, the CVRD focused its efforts on communicating the maps and findings of the project with the public. » Phase 2, on the other hand, involved three rounds of engagement sessions with community stakeholders and partners to understand important values related to flood hazards and mitigation in the region. These qualitative findings informed the flood risk assessment conducted in this phase. » In Phase 3, the CVRD is focusing its efforts on developing a regional collaborative framework to strengthen relationships between the various jurisdictions in the region. Due to this focus, along with the technical nature of the Comox Road Flood Mitigation project, the intention is for public engagement to occur through education as the project progresses.
Key outputs	The different phases of the CFAS have produced different outcomes. » Phase 1 updated the CVRD's flood maps. » Phase 2 produced a flood risk assessment, with maps, of the whole CVRD and of four specific locations. It also developed a decision-making framework for the CVRD and its partners to use in the future to select, prioritize, and implement flood mitigation measures in specific floodplains. » Phase 3 will eventually result in the selection and implementation of flood mitigation measures to manage flooding along Comox Road. It is also being used as an opportunity to develop a formal regional collaborative framework between jurisdictions that will guide future flood management efforts.
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