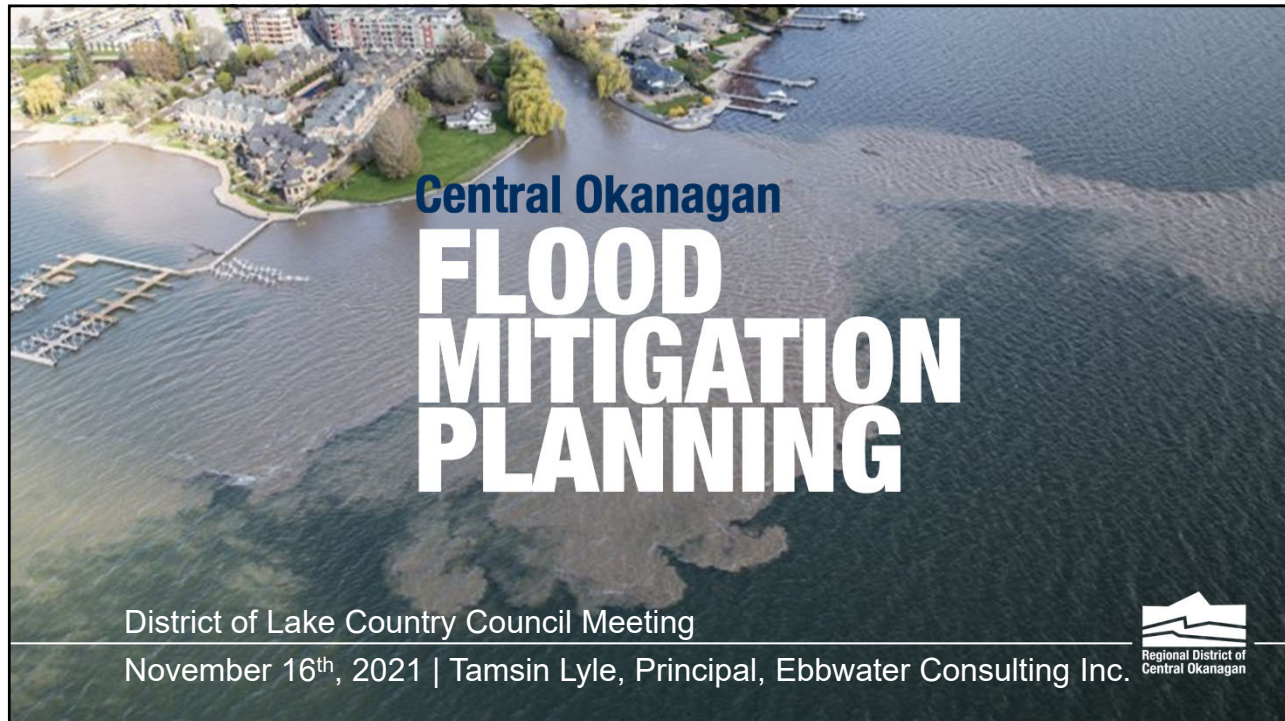




1

Today's Presentation

- Project background
- Quick reminders on what flood means in the Okanagan
- Overview of deliverables (Resource Guide and Technical Report)
- Key recommendations

2

Project Initiation

- \$150,000 UBCM grant funding awarded.
- Project initiated in January 2021, building on earlier work completed by RDCO, Okanagan Nation Alliance, and member municipalities.

3

Project Objectives

1

Reduce Flood Risk

2

Improve Emergency
Flood Response

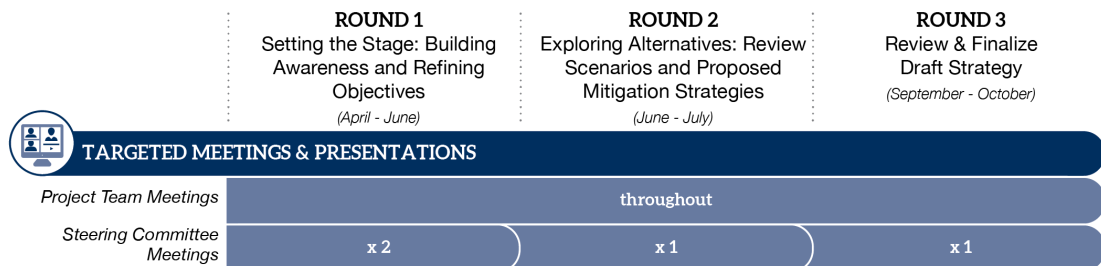
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Increase Resiliency
to Climate Change

4

Steering Committee

- 3 meetings
- 20 members
- 12 organizations (local governments, First Nations, OBWB, Okanagan Collaborative Conservation Program and UBCO)



5

Engagement



Outreach

Local & social media
Websites & newsletters (RDCO, Kelowna)
Posters, sandwich boards, digital billboard
120+ stakeholders invited



Community Members:

2 events + 1 survey
52 participants / responses

Stakeholders:

Session #1: 34 participants
Session #2: 37 participants

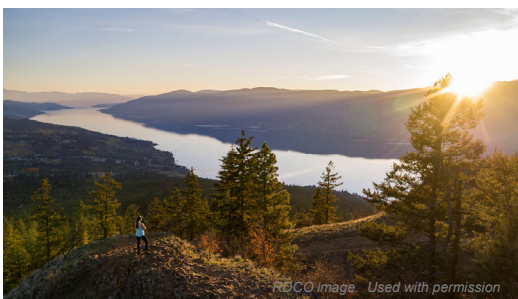


6

Let's talk water..

7

Let's Start with Water



“When we take care of the land and water, the land and water take care of us” ---

---- siwtkw Water Declaration

Reasons to Respect Water	Consideration
Water is powerful	It will always find a way around obstructions and is destructive. It is a source of power in many dimensions.
Water is life	It is part of, and sustains, humans and all life; it feeds and regenerates ecosystems in water and on land.
Water is connection	It connects living and non-living things, in the past, present and future. Water is our relation

8

1903



Bernard Avenue at
Abbott Street

City of Kelowna Archives

2017



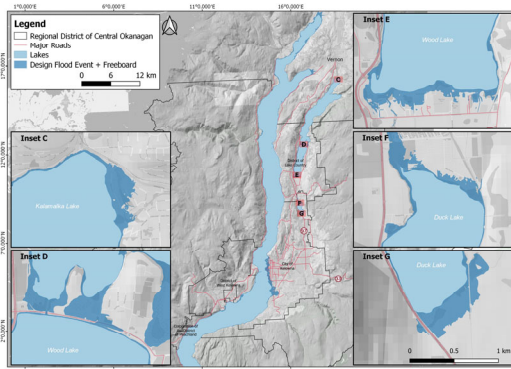
Off Sutherland Avenue

RDCO image. Used with permission

9

Not all flood hazards are created equal

Key message and best practice response



- Lake (Coastal)
- Creek and River
- Pluvial
- Secondary Hazards
 - Erosion
 - Avulsion



Key message #1: Flood hazards are nuanced. Mitigation actions need to be too.

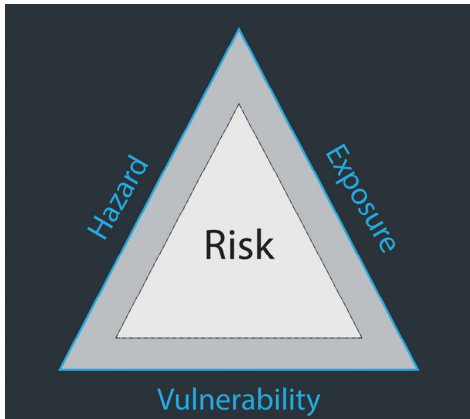


Action #1: Consider the nuance and range of events.

10

Damages and consequences are what matter

Key message and best practice response



Key message #2: It's RISK that matters. Risk is messy and complex.



Action #2: Use risk as the basis for analysis. Acknowledge the messiness and uncertainty.

11

Flood mitigation actions have consequences

Key message and best practice response



Key message #3: Externalities matter, especially when they exist 365 days a year.



Action #3: Strive for solutions that minimize externalities and have co-benefits.

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Taking action on flood mitigation



- This is a messy problem
- Solutions are not homogeneous:
 - Hazard type, severity, frequency
 - Existing land use (and all the things that go along with this)
 - Jurisdiction
 - Potential for risk reduction
 - Negative and positive externalities

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Non-structural is not the norm...

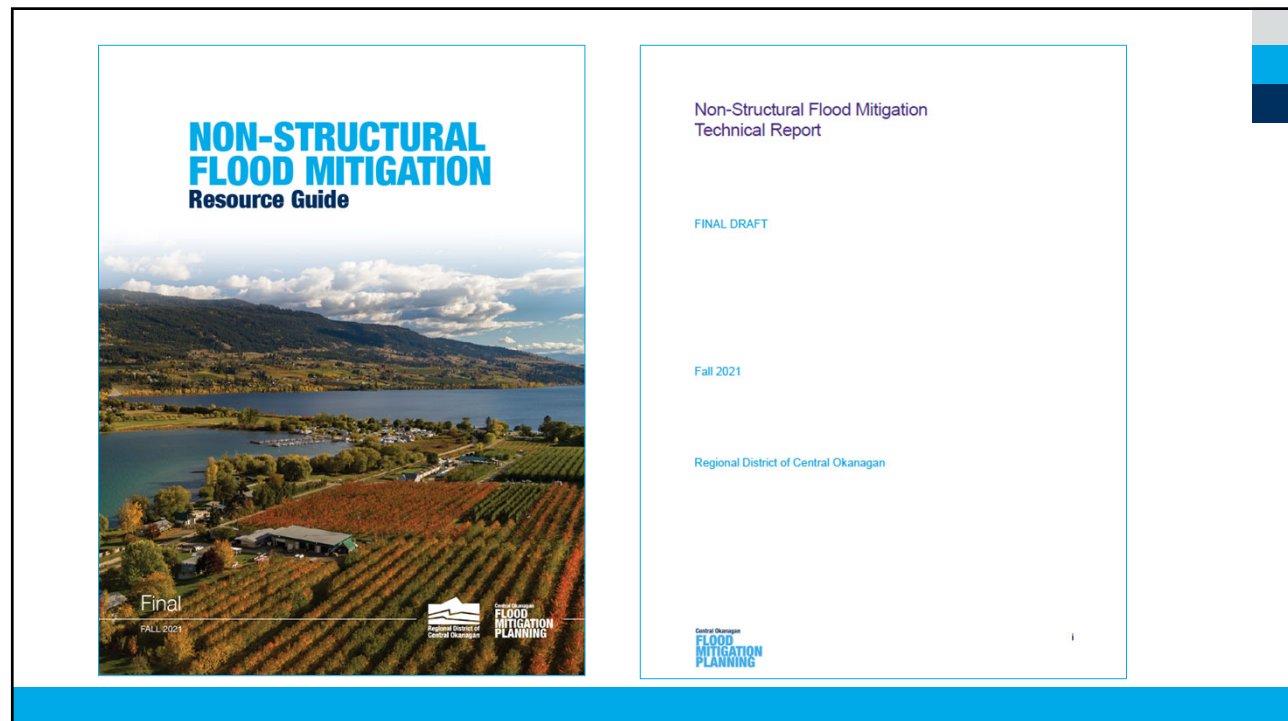


Non-structural flood mitigation
- the broad group of actions that can be taken to reduce flood risk and increase resilience that are not large engineering works

14

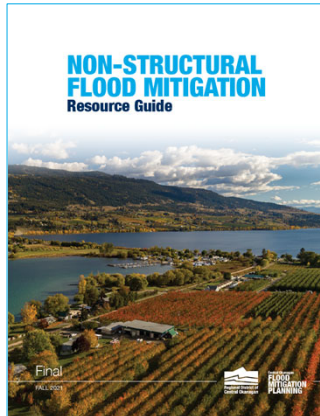
Project Deliverables

15



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The What



- A “Toolbox” of non-structural mitigation options
- Targeted at First Nation and Local Government

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Options Overview

While flood risk is complex, the good news is that there is a very wide range of possible non-structural flood mitigation options that can be applied to your particular context. The remaining section of the Resource Guide presents detailed information on forty different non-structural flood mitigation options, to help you discern which combination or “mix” of options will allow you to best reduce flood risk, build resilience and meet the particularities of your context. These options can be considered as part of a “toolbox” of possibilities that can be drawn on in different ways over time, to best meet your particular needs, concerns and opportunities.

We have used the terms “Approach”, “Strategy” and “Option” to organize and group ideas together in a way that makes it easier to see how they differ one from another, and so that it is easy to consider alternatives. In this Guide, these are defined as:

- **Approach** – an overarching category of non-structural flood mitigation strategies, based on whether it acts to reduce hazard, exposure or vulnerability, or increase resilience. There are six overarching Approaches in this Guide, summarized in the tables directly below. Each Approach is assigned a colour, to help with navigating through the Option profiles that follow.
- **Strategy** – a category of Options with a shared intention or objective. Within each Approach, there are multiple strategies. For example, under the Approach “Emergency Response,” there are three strategies: “Monitoring and Warning,” “Flood Response Planning” and “Neighbourhood Resilience Building.”
- **Option** – specific actions that can be taken to fulfil the intention of a given Strategy. For example, within “Flood Response Planning,” specific Options include “Flood Response Plan,” “Flood Response Plan Maintenance,” “Flood Response Training” and “Flood Response Resources.”

LAND STEWARDSHIP Maintaining and restoring natural assets and systems (e.g., watersheds, wetlands, riparian areas, natural waterways) to help reduce flooding.		
STRATEGY	MEASURES	OPTIONS
Maintain natural assets	It is well documented that natural systems are extremely effective at managing the natural hydrologic cycle. Protecting and maintaining existing natural assets (e.g., natural wetlands and riparian areas) and restoring degraded natural assets (e.g., riparian areas) can help reduce flood risk by absorbing and slowing floodwaters, and by providing natural barriers to floodwaters.	1. Protection of Upper Watersheds 2. Protection of Lower Watersheds 3. Protection of Riparian Areas and Wetlands 4. Constructed Wetlands 5. Dike Setbacks or Relocations: Dewatering of Creeks
Restore natural assets	Recognizing that many natural systems, which would naturally have reduced flood risk, have been damaged by human activity, it is known that in some cases restoring ecological function will reduce risk over time.	

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LAND USE MANAGEMENT Encouraging or requiring types of land use in flood hazard areas that will prevent or reduce potential damage.		
STRATEGY	MEASURES	OPTIONS
Assess	The broad intent of assessing risk is to have no exposure to flood hazard. This is ideally managed by avoiding development in flood areas in the first place.	6. Land Use Controls to Limit All Development 7. Land Use Controls to Limit High Consequence Development 8. Acquisition – Undeveloped Land 9. Acquisition – Post-Disaster Buyouts 10. Acquisition – Developed Land (Pre-Disaster) 11. Life Rights Agreements (Acquisition Over Time) 12. Relocation – Property 13. Relocation – Infrastructure 14. Transfer of Development Potential 15. Housing Setbacks 16. Density, Relocation 17. Rights to Flood
Redistribute	Another way of approaching exposure reduction is to optimize the redistribution of valued assets (land use) for example, moving highly vulnerable elements from flood hazard areas, or reducing density in higher hazard areas (e.g., wetlands), and increasing density in flood-fragile or outside the flood hazard areas altogether.	
BUILDING MANAGEMENT Regulations and strategies that make structures and belongings less susceptible to flood damage.		
STRATEGY	MEASURES	OPTIONS
Building Controls for New Builds	With flood hazard areas on the rise, and increasing development pressures, it is not always possible to avoid new development in flood hazard areas. Changing the built form so that damaged to structures are limited, or more easily replaceable is an effective means of reducing risk. This can be relatively easily achieved for new construction.	18. Elevate Structures (New Builds) 19. Elevate High Consequence Structures (New Builds) 20. Dry Floodproofing (New Builds) 21. Dry Floodproofing (Existing Builds) 22. Wet Floodproofing (New Builds) 23. Wet Floodproofing (Existing Builds) 24. Dry Floodproofing (Permanent) 25. Dry Floodproofing (Temporary) 26. Dry Floodproofing (Building and New Builds)
Rebuilding of Existing Buildings	With flood hazard areas on the rise, and increasing development pressures, it is not always possible to avoid new development in flood hazard areas. Changing the built form so that damaged to structures are limited, or more easily replaceable is an effective means of reducing risk. Rebuilding of structures to limit or reduce damage is possible.	

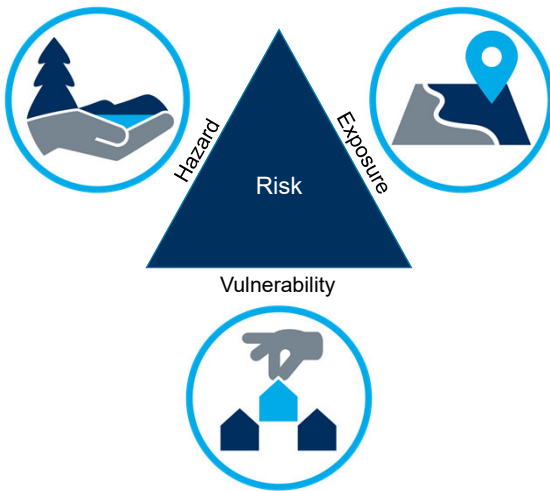
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26 Options to support risk reduction:

- Land Stewardship
- Land Use Management
- Building Controls

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Risk Reduction Options



- **Land stewardship** – maintaining and restoring natural assets and systems
- **Land use management** – strategies and regulations to reduce exposure
- **Building management** – strategies and regulations that can reduce sensitivity of structures to flood damage

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14 Options to support increased resilience:

- Education and Awareness
- Emergency Response
- Insurance and Disaster Financial Assistance

EDUCATION AND AWARENESS Strategies to educate the public, practitioners, and other stakeholders.		
STRATEGY	NATIONALE	OPTION
Acknowledge and Disclose	A precursor to developing land use controls in flood hazard areas is the recognition, acknowledgement and public disclosure of the existence, extents, etc. of the hazard. Disclosure can also support uptake of other risk reduction or resilience measures (e.g., floodproofing, insurance).	27. Covenant on Title
Public Education	Programs to educate the public about flood hazard, vulnerability, and risk as well as the provision of resources that can aid the public in making good decisions about flood-risk reduction.	28. Public and Accessible Flood Mapping 29. Public Education (Multi-media) 30. Serious Gaming 31. Public Art
Media Education	Programs to educate the media, in advance of a flood event to support them to provide correct and useful information.	32. Media Education
EMERGENCY RESPONSE Strategies that are in place to ensure efficient and effective response when floodwaters are on the ground.		
STRATEGY	NATIONALE	OPTION
Monitoring and Warning	Timely response requires that monitoring systems and warning systems are in place so that actions within flood response plans can be triggered.	33. Warning System
Flood Response Planning	Effective response requires that plans and resources are in place in advance of an event occurring.	34. Flood Response Plan 35. Flood Response Plan Maintenance 36. Flood Response Training 37. Flood Response Resources
Neighbourhood Resilience Building	During and after disaster, communities will generally recover more quickly if systems are in place to build communities that care about each other.	38. Neighbourhood Resilience Building
INSURANCE AND DISASTER FINANCIAL ASSISTANCE Financial strategies to manage residual risk.		
STRATEGY	NATIONALE	OPTION
Insurance	There will always be some residual risk, even when risk reduction measures are in place.	39. Insurance (Private) 40. Insurance (Public)

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Resilience and Supporting Activities



- **Emergency Response** – early warning systems, temporary barriers and response activities.
- **Insurance and disaster financial assistance** – financial mechanisms to manage residual risk and support recovery.
- **Education and awareness** – learning resources to support ‘all-of-society’ resilience.

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Strategy and strategy rationale (why would we do this?)

First steps: considerations for planning

Regulatory actions to consider

Guidance documents to develop or draw on

Funding options

Maintaining effectiveness over time

Approach title and icon

Option number and title

How effective is this option at reducing risk?

What kind of negative externalities or positive co-benefits does this option bring?

What obstacles are there to implementation (including cost)?

Key opportunities and challenges

Works well at regional level

This option requires this to work well...

This option combines well with...

Case studies and examples

What type of flood will this option be effective for?

What severity of flood will this option be effective for?

Where can this be used, given present day land use?

Land Use Management – Avoid

6. Land Use Controls to Limit All Development

Avoiding or limiting all new development in flood hazard areas.

HOW TO IMPLEMENT

This option is primarily within the authority of local governments.

PROCESSED COMPONENTS

Plan

- Identify and map flood hazard areas within Regional Growth Strategy or Official Community Plan.
- Develop flood hazard maps that are not already available. Consider developing advanced mapping and effective and long-term to distinguish areas of highest hazard from areas where significant development may be appropriate.
- Review flood hazard areas and flood hazard management strategies.
- Review flood hazard areas and flood hazard management strategies.

Regulate

- Develop local development bylaws or policies that restrict development in flood hazard areas.
- Review flood hazard areas and flood hazard management strategies.
- Review flood hazard areas and flood hazard management strategies.

Guidance

- Develop guidance for development, making public, etc. to ensure that development in flood hazard areas is limited to appropriate uses.
- Review flood hazard areas and flood hazard management strategies.
- Review flood hazard areas and flood hazard management strategies.

Fund

- Identify funding through normal operating budgets.
- Review flood hazard areas and flood hazard management strategies.
- Review flood hazard areas and flood hazard management strategies.

Monitor/Evaluate

- Ensure that land is protected in accordance with the purpose of flood hazard management strategies.
- Review flood hazard areas and flood hazard management strategies.
- Review flood hazard areas and flood hazard management strategies.

REFERENCES

- Public and accessible flood mapping
- Other options in Land Use Management
- All options in Land Use Management
- All options in Education and Awareness
- All options in Insurance

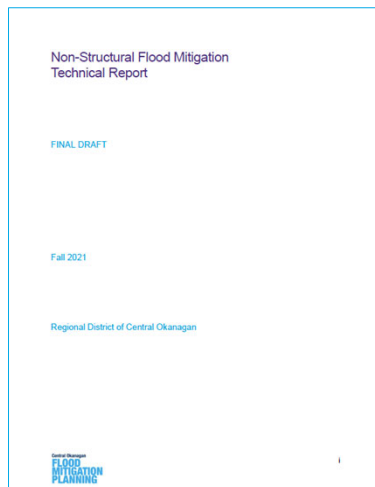
COMPLEMENTARY ACTIONS

- Other options in Land Use Management
- All options in Land Use Management
- All options in Education and Awareness
- All options in Insurance

One historic example is the high level of flood hazard areas that are developed are mapped and regulated through the regulatory control of conservation authorities in Ontario. Making sure that the same level of regulation is not possible within the current BC governance regime.

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The Why and How



- **Background context:**
 - Flood in the Okanagan, inclusive of climate change trends
 - Best practice management
 - Governance context for flood management in BC
- **Project methods and results:**
 - Guiding principles
 - Engagement
 - Criteria development
 - Filling of toolbox
 - Policy scan

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District of Lake Country – Policy Review

Opportunities:

- Many policy tools in place that are precursors to non-structural mitigation
- Good base policies and minimum standards within zoning and building bylaws

Challenges:

- Regulations refer to outdated flood levels in Okanagan Lake (approx. 1m different)
- Vulnerability reduction tools limited to boiler plate options within Provincial guidelines

Potential Next Steps:

- Update zoning bylaw with new FCL
- Consider developing/enhancing a flood hazard DPA or flood bylaw that focuses on exposure reduction (land use) and vulnerability reduction (building controls), which will support vulnerability reduction over time

Regulation	Section	Details/Description
OCP, Bylaw 2220 (District of Lake Country, 2018)	Objective 3.1.16	Minimize risk to citizens and development from natural hazards: b. Provide clear development guidelines for safe and environmentally sensitive development c. Seek to identify potential floodplain areas within the District.
	Objective 3.14.1	Reduce potential to development of damage from flooding: a. Conduct floodplain mapping. b. Prepare floodplain management plan. c. Avoid new development in areas within and close to the floodplain.
	Section 9.2	"stormwater management plans must accommodate the 10-year flood event onsite and provide positive relief for a 100-year flood event."
	Natural Environment DPA and Guidelines	This DPA is intended to support ecological function and values of natural areas. An explicitly noted co-benefit is a reduction in flood hazard.
Stormwater management Bylaw		Bylaw to support servicing of new developments to ensure that stormwater is managed appropriately, and largely onsite.
Building Regulation Bylaw 1070	Section 10.3	"for a parcel of land on which a building or structure is proposed if the building official believes the parcel is or is likely to be subject to flooding, mud flows, debris flows, debris torrents, erosion, land slip, rock falls, subsidence, or avalanche, and the requirements for a professional design is in addition to a requirement under Part 3, Division 8 of the Community Charter (i) for a report certified by a professional engineer with experience in geotechnical engineering that the parcel may be used safely for the use intended, and (ii) that the plans submitted with the application comply with the relevant provisions of the Building Code and applicable bylaws of the District.
	Section 11.4	Requires that for complex buildings that the underslab of the structure meet provincial flood mapping requirements (noting that there are none within Lake Country) or District land use regulations (see Zoning Bylaw).
Zoning Bylaw 561 [2007, amendments to 2021]	Section 7.16.1	Limits development within a buffer zone from a still water body (7.5m) or a moving watercourse (15 m). It also provides elevations below which construction should not occur in relation to Okanagan (343.66 m, no datum detail) and Kalamalka and Wood Lakes (393.2 m, no datum detail).
Development Applications Bylaw 1133	Section 6.2 (p)	Opens the door to requiring reporting prepared by a qualified professional related to flooding.

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Strategic Actions for the Region

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Formally Establish a Collaborative Working Group (*Lake Country to consider membership*)

Establish a Memorandum of Understanding to work collaboratively as a region; initiate this as the Regional District.

- Develop Terms of Reference.
- Continue to build capacity for Government to Government relationships.
- Build on existing work and relationships.
- Consider a multi-hazard perspective.

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Create Policy Consistency

Policy scan highlighted diversity in region, and engagement highlighted this as a challenge to implementation.

- Share resources to develop pilot policy language for RGS, OCP, and bylaws.
- Encourage adoption of these policies across the region (through MOU) to avoid “tragedy of the commons”.

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Thank You!

For more information go to:
www.rdco.com/flood

Or contact Brittany Lange:
brittany.lange@rdco.com

Acknowledgements

Project Funder

Union of BC Municipalities Community Preparedness Fund

Project Partners and Steering Committee

Regional District of Central Okanagan, Syilx Nations (Okanagan Nation Alliance, Okanagan Indian Band and Westbank First Nation), City of Kelowna, City of West Kelowna, District of Peachland, District of Lake Country, Okanagan Collaborative Conservation Program, Okanagan Basin Water Board, UBC Okanagan

Consultant Team

Ebbwater Consulting Inc., SHIFT Collaborative, EcoPlan International

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