

THE BUSINESS IMPERATIVE OF CLIMATE CHANGE ADAPTATION FOR MUNICIPALITIES



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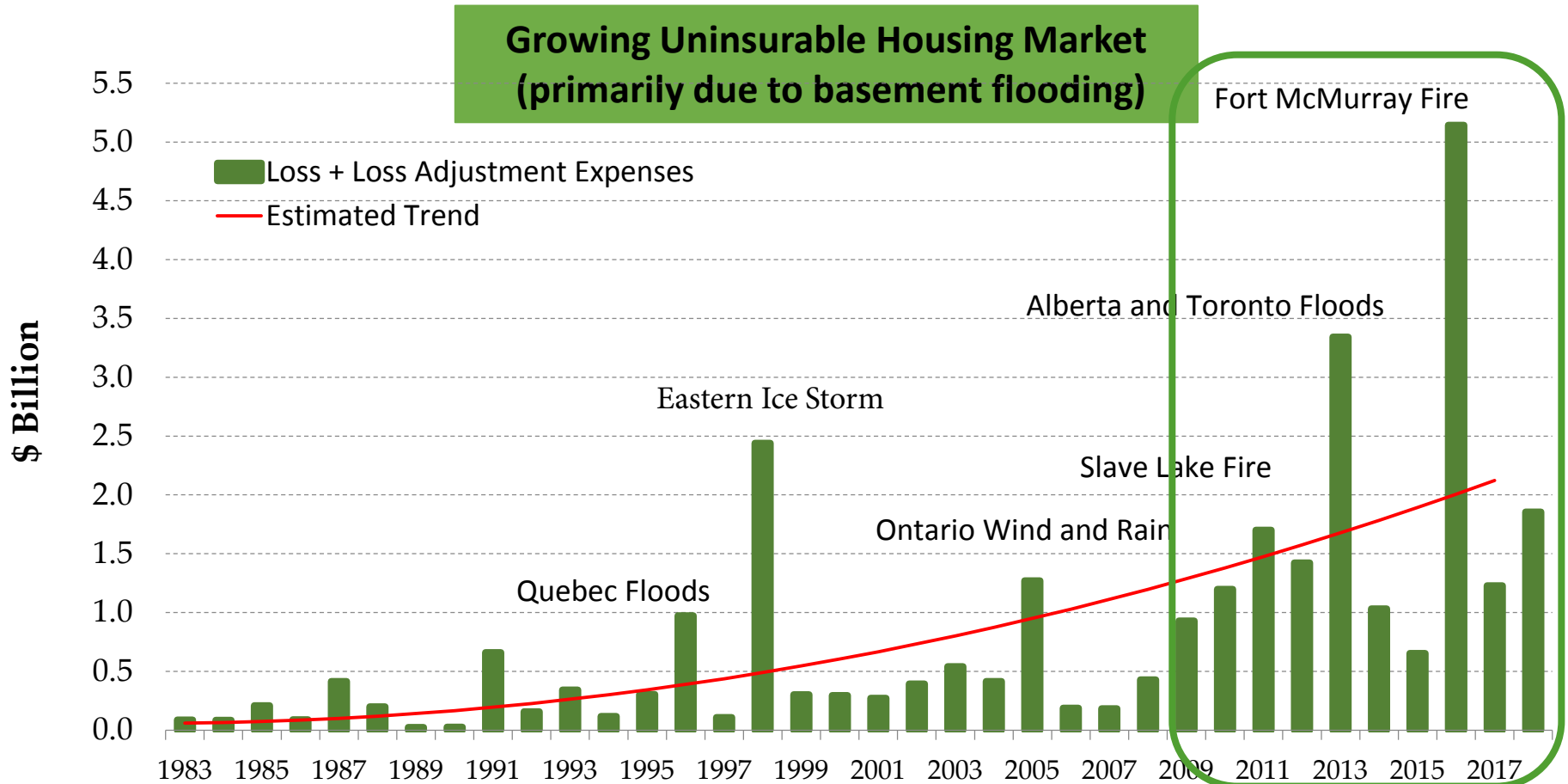
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1. Climate change: a problem that won't go away
 - Rising costs of extreme weather and flooding
 - Record floods increase risk of mortgage arrears
 - Mental stress and time off work claims
2. Adaptation examples: guidelines, standards and professional training on flood-resilience:
 - Homes
 - New Communities
 - Existing Communities
 - Commercial Real Estate
3. Discussion

COSTS OF EXTREME WEATHER: P&C CATASTROPHIC INSURABLE LOSSES (\$CAD)

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Loss + Loss Adjustment Expenses

\$2017 - total natural-catastrophe losses normalized by inflation and per-capita wealth accumulation

Courtesy: Insurance Bureau of Canada

Note: Cost to governments, businesses and individuals 3-4X that of private insurers.

REPEATED FLOODING ELEVATES RISK OF MORTGAGE ARREARS

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[Updated flood plain maps will send the housing market underwater ...](#)

CBC.ca - May 14, 2019

Flood plain maps in **Canada** are about 25 years out of date. New risk maps will give it clear justification to begin dramatic



[Flooding in 4 provinces sparks evacuations](#)

CTV News - Apr. 27, 2019

Rain is expected in Ontario's cottage country, stretching across the Atlantic **Canada**. Montreal, Ottawa and many smaller

Flooding: Ottawa declares state of emergency, army Local Source - [Ottawa Citizen](#) - Apr. 25, 2019

[View all](#)



[Provinces asking feds for \\$138 million to help](#)

CTV News - 6 hours ago

OTTAWA -- **Flood**-ravaged provinces are asking the federal Safety **Canada** says provinces and territories have as

Flooding Woes Cause Provinces To Request \$138 M [HuffPost Canada](#) - 2 hours ago

[View all](#)



['The 500-year flood': Dozens forced from homes in Whitewater Region](#)

CBC.ca - May 12, 2019

About 100 homes have been affected by **flooding**, Mayor Michael Moore said ... In all, about 150 members of the **Canadian** Armed Forces are ...



[Inside the process for approving flood-fighting technologies](#)

[Ottawa Citizen](#) - 3 hours ago

Trevor Wright, the sales and **flood** procurement advisor with **Canada Flood Control Corp.**, which now sells Tiger Dam, said **Canada's** a world ...



[Here's what you need to know about flooding in Quebec, Ontario and ...](#)

[The Globe and Mail](#) - Apr. 26, 2019

Meanwhile, the **Canadian** Red Cross will disperse \$600 in emergency ... a **flooding** disaster for several communities from Ottawa to Montreal.



[Hundreds of Canadian soldiers deployed to flood zones in Quebec ...](#)

[National Observer](#) - Apr. 21, 2019

Hundreds of **Canadian** troops are being deployed to **flood** zones in Quebec and New Brunswick as another wave of spring **flooding** drives ...

1 dead, hundreds of homes evacuated as **floods** swamp eastern **Canada**

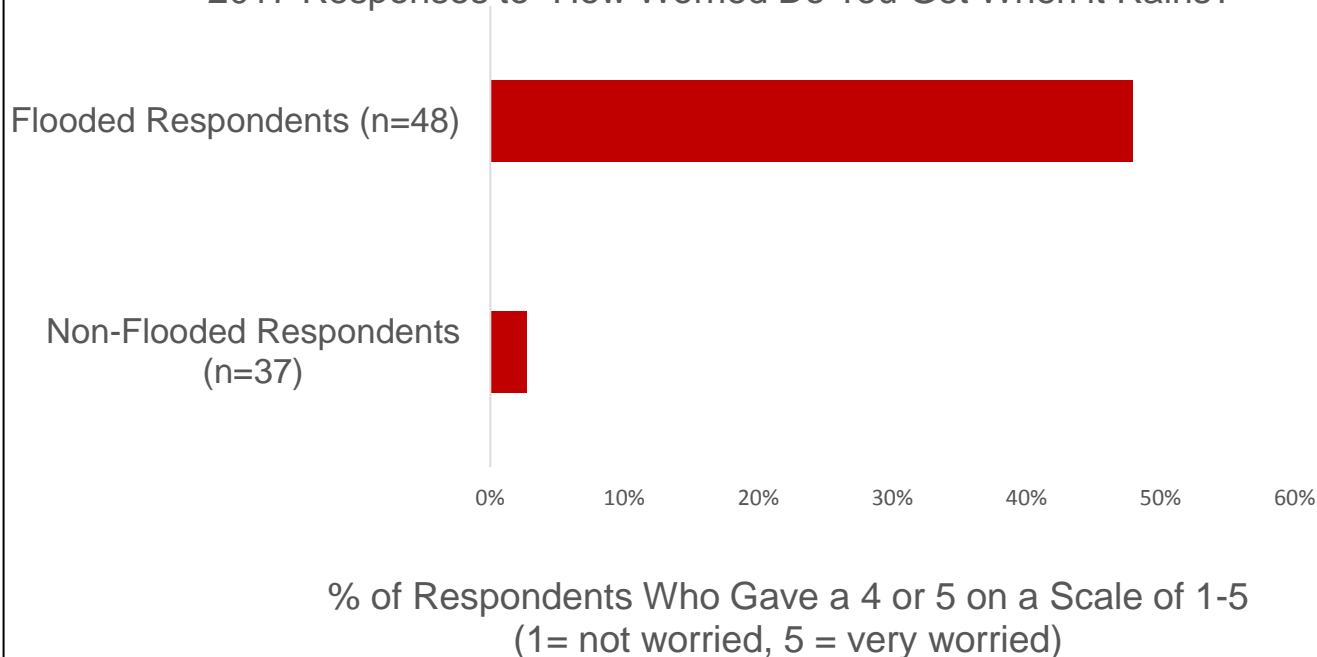
In-Depth - [CTV News](#) - Apr. 20, 2019

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The average cost of a flooded basement is over **\$40,000**



3 Years After – August 2014 Burlington Flood
2017 Responses to “How Worried Do You Get When it Rains?”



56% of flooded households had at least one working member taking time off work. **7 days off work** was the average time off work per flooded household (10x the Ontario average).

NEW GUIDELINES AND STANDARDS FOR FLOOD-RESILIENCE (EXAMPLES):

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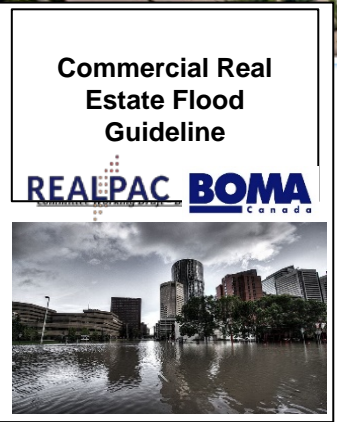
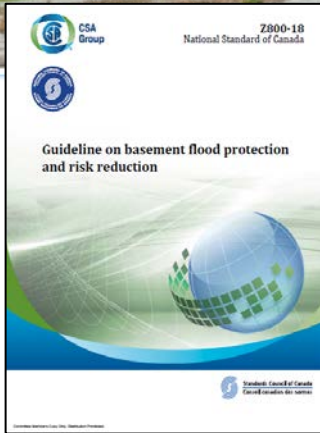
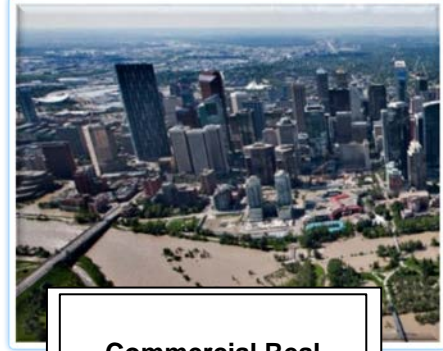
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Homes - Flood Protection Guideline

New Community Design Standard

Existing Community Retrofits Standard

Commercial Real Estate Retrofits Guideline

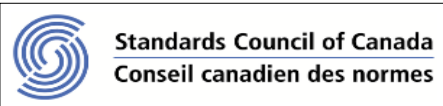


https://store.csagroup.org/ccrz_ProductDetails?sku=Z800-18

<https://www.intactcentreclimateadaptation.ca/wp-content/uploads/2017/10/Preventing-Disaster-Before-it-Strikes.pdf>

<https://www.intactcentreclimateadaptation.ca/wp-content/uploads/2019/01/Weathering-the-Storm.pdf>

New Standards Supported by:



... and experts across Canada, who contribute to research and standards development...

P&C INSURANCE INCENTIVES FOR FLOOD RISK REDUCTION

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*"Water damage is now the leading cause of personal property claims. Over the last 10 years, water losses for personal property claims have doubled to 40% (of \$ paid in losses). There are a number of improvements that Canadians can take to better protect their homes and communities against water damage. **By taking these steps, Canadians could lower their annual premiums - anywhere from 5 to 15%.** Those who live in municipalities who make climate resilient infrastructure a priority could also benefit from more affordable premiums, higher coverage limits and enhanced insurance coverage."*

Intact Financial Corporation, 2017

PROFESSIONAL TRAINING ON FLOOD-RESILIENCE

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Home Inspector Training on Flood Risk
E.G., Collaboration with Seneca and Fleming Colleges to create home inspector training on flood risk


Insurance, Real Estate and Mortgage Broker Training on Flood Risk:
E.G., Collaboration with the Insurance Broker Association of Canada (IBAC) to create education modules on flood risk

Red Cross Volunteer Training on Flood Risk (Train the Trainer Program)



Canadian **Red Cross** launches a door-to-door pilot program in ...
Squamish Chief - Mar. 28, 2019
That knock on the door may just be **Red Cross** volunteers. ... The program was developed in partnership with the **Intact Centre** on Climate ...

Fleming College PROGRAMS & COURSES



ENROL IN HOME FLOOD RISK ASSESSMENT TRAINING
Course Code: CNST223



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Homes

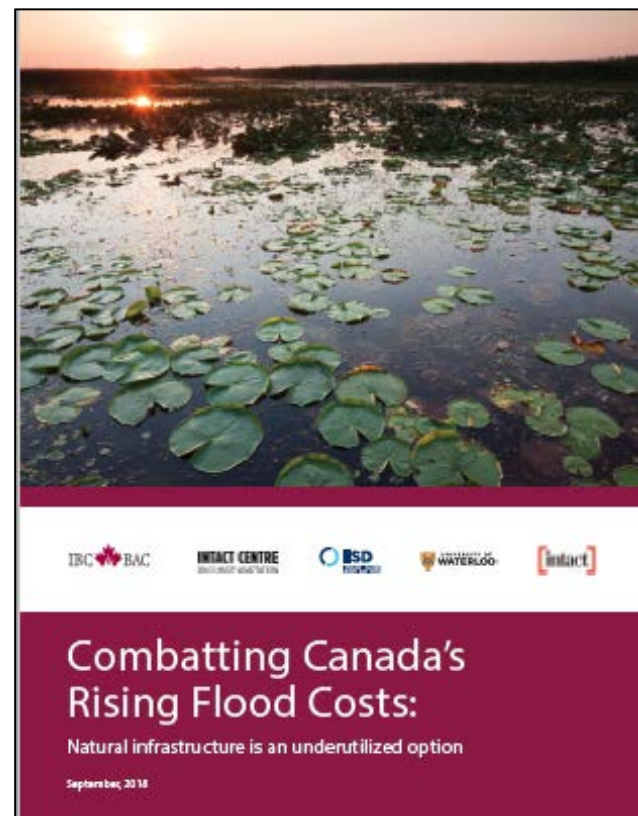
Protecting Your Basement Against Flooding



ASSESSING THE VALUE OF NATURAL INFRASTRUCTURE

A [framework](#) was developed for assessing the business case of natural infrastructure for climate adaptation.

Key finding: natural infrastructure can be a strong complement to grey (built) infrastructure for climate adaptation (e.g., flood/drought attenuation), but it's essential to quantify its total economic value for an informed investment analysis.



ASSESSING THE VALUE OF NATURAL INFRASTRUCTURE (CONT'D)

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Naturally occurring **wetlands** in Waterloo, ON reduce flood damage costs to buildings in Uptown Waterloo by \$51M (Intact Centre, 2016)

Naturally occurring **ponds** in the coastal town of Gibsons, BC provide \$3.5M - \$4M of stormwater storage services annually (MNAI, 2018)

An **engineered wetland** in Manitoba is valued at \$3.7M for the flood reduction, water quality improvement, carbon sequestration and other benefits it provides (IISD, 2017)



TOTAL ECONOMIC VALUE ASSESSMENT NATURAL VS GREY INFRASTRUCTURE

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Costs (examples)	Costs	NI	Grey
Pre-Construction			
• Baseline data collection		X	X
• Stakeholder consultation		X	X
• Site identification		X	X
• Assessment of design alternatives		X	X
• Detailed engineering design of selected alternative		X	X
• Land acquisition		X	X
• Environmental assessment		X	X
• Permitting and legal fees		X	X
• Development of construction specifications		X	X
• Development of monitoring program and key performance indicators (KPIs)		X	X
Construction			
• Site preparation		X	X
• Site construction		X	X
Post-construction			
• Infrastructure maintenance activities		X	X
• Infrastructure condition assessment		X	X
• Monitoring against KPIs		X	X
• Evaluation and reporting		X	X
• Carbon cost over project life cycle			X
Administrative			
• Project management and oversight			
Benefits (Example)	Benefits	NI	Grey
• Storm water storage		X	X
• Water quality		X	
• Habitat creation / improvement		X	
• Microclimate stabilization (e.g., urban heat island reduction)		X	
• Air filtration		X	
• Recreational amenity and aesthetic services		X	
• Energy savings		X	
• Carbon savings		X	

A comprehensive assessment of the financial, environmental and social costs and benefits (i.e., a total economic value [TEV] assessment) is required to illuminate otherwise uncaptured benefits of natural infrastructure projects.

- Water quality improvement
- Habitat creation
- Urban heat island reduction
- Air filtration
- Recreational amenity
- Aesthetic services
- Carbon sequestration

