

Community Resilience

2020 RMWB Overland Flood Considerations

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Department: Planning and Development

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Overview

WHY WE'RE HERE

- April 26, 2020 ice jam flood affected Taiga Nova & area, Downtown, Ptarmigan Court, Waterways and Draper.
- Revisit how development in flood hazard areas occurs.



Overview

WHY WE'RE HERE

**Either we protect areas from flooding
and preserve access to DRP
OR
Buy out affected properties**

Overview

WHY WE'RE HERE

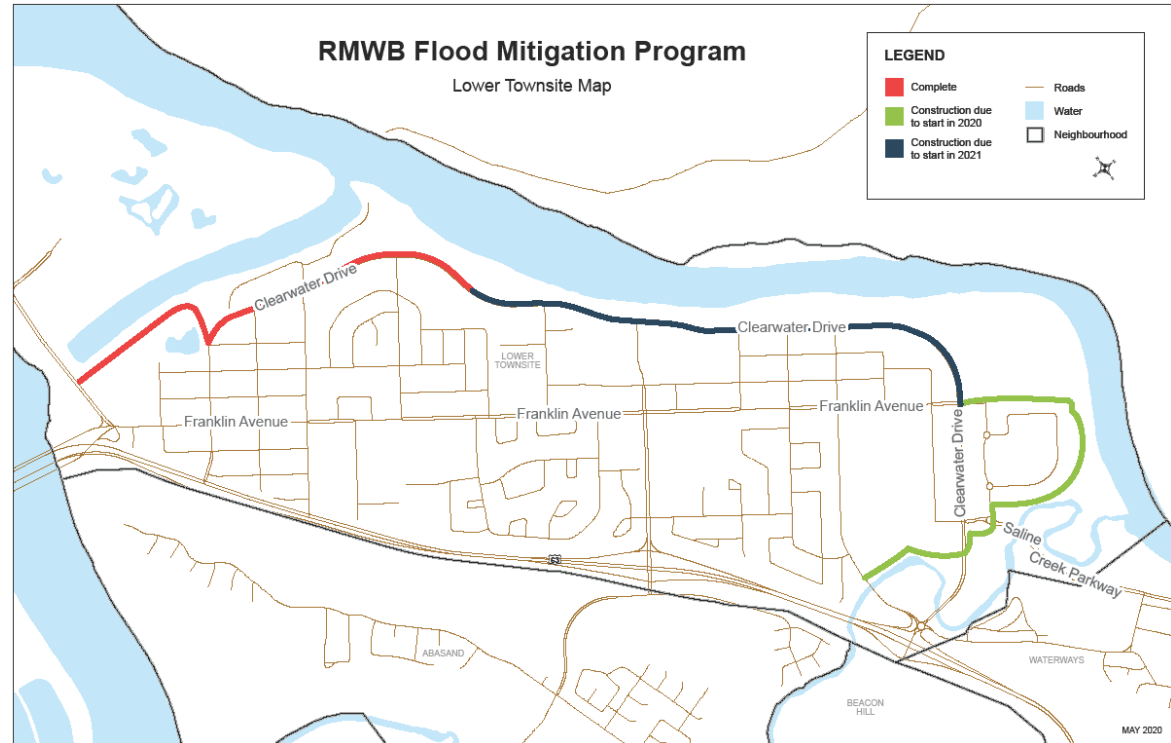
- Using *CSA 31000-10: Risk Management - Principles and Guidelines*.
- Technical approach, no public feedback included.

Do no harm
Increase long term resilience
Do not allow repeat event
Understand impact, context

Focus on well-being
Maximize gov. support
Planned, adaptive approach
Engage stakeholders

Flood Mitigation Project

- Building berms and retaining walls to 250.5m elevation.
- 1:100-year flood level is GOA minimum standard



Land Use Bylaw Provisions

- Due to unpredictable nature of flood levels, berms can eventually fail or be overtopped.
- Flood provisions in the LUB provide added protection.

Elevating property, structures
Elevate utilities, mechanical

Restricting development
Limit expansions

Floodplain Designations

- Floodplain designations vary, with jurisdictions adopting a flood level of 1:100, 1:200, or higher.
- In Alberta, floodplains are based on 1:100 flood event.
- 1:100 threshold is lowest level of protection.
- 63% chance of 1:100 flood occurring within 100 years

Funding Assistance

DISASTER FUNDING ASSISTANCE ARRANGEMENTS (DFAA)

- Federal Government reimburses Provinces for a portion of disaster response and recovery costs, for weather-related disasters.
- Annual cost for DFAA has been increasing steadily:
 - \$54 million per year from 1970 to 1994;
 - \$291 million from 1995-2004;
 - \$410 million between 2005 and 2014.

Funding Assistance

DISASTER FUNDING ASSISTANCE ARRANGEMENTS (DFAA)

Province	\$ all years	% of total	Per capita	2005-2014	% of total	Per capita
NL	296	4%	561	174	4%	329
PE	32	0%	220	3	0%	21
NS	134	2%	143	16	0%	17
NB	269	3%	357	87	2%	115
QC	2,062	25%	251	166	4%	20
ON	387	5%	28	125	3%	9
MB	1,505	18%	1,174	767	19%	598
SK	914	11%	812	812	20%	722
AB	2,325	28%	564	1,758	43%	427
BC	391	5%	84	162	4%	35
NT	9	0%	200	6	0%	131
YT	25	0%	693	12	0%	332

Note: Alberta received more than \$2.3 billion from the DFAA (1970-2014)

Funding Assistance

PROVINCIAL DISASTER RECOVERY PROGRAMS

- Disaster recovery is funded through Disaster Recovery Programs (DRP).
- Federal DFAA is shared with provinces as follows:

Eligible cost sharing of provincial expenses after per capita threshold met	Government of Canada Share
First \$3.07 (per capita)	0%
Next \$6.15 (per capita)	50%
Next \$6.15 (per capita)	75%
Remainder	90%

Policy Shift

- Federal and Provincial governments are analyzing frequency of disasters and increasing recovery costs.
- Indications at Federal and Provincial level that distribution of disaster recovery funding will shift due to increasing costs.
- This will result in disaster recovery costs being redistributed to municipalities and property owners.

Policy Shift

RMWB must position itself for a shifting policy landscape at the Federal and Provincial levels.

Intent

WHAT WE KNOW

- Funding model will change.
- Expectation & responsibility will be redistributed.
- To remain eligible for DRP, areas must be protected.
- Insurance more difficult and/or expensive to access.

RMWB must increase community resilience over the long term.

Analysis

KEY TERMS FOR THE EVALUATION

Community Resilience: ability of a community exposed to hazards to resist, absorb, adapt to and recover from the effects of a hazard in a timely and efficient manner

Disaster Risk: the potential disaster losses, in lives, health status, livelihoods, assets and services

Residual Risk: the risk remaining after risk treatment.

Resiliency Options

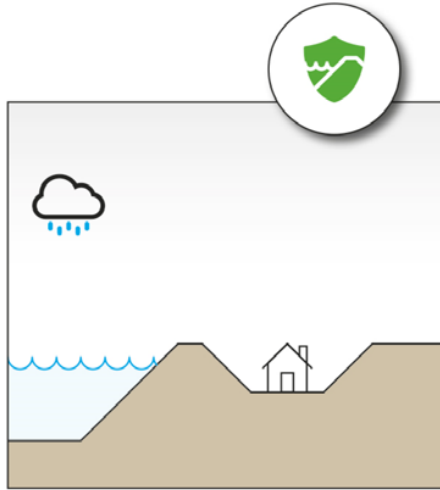
APPROACHES

1. Flood Mitigation
2. Flood Provisions (LUB)
3. Limited Development Below 250
4. Buyout
 - Below 250m or Buyout everything
 - Land Swap
5. Mix and match the approaches

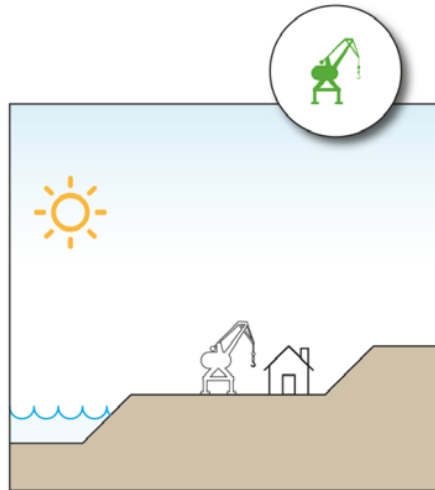
Resiliency Options

APPROACHES

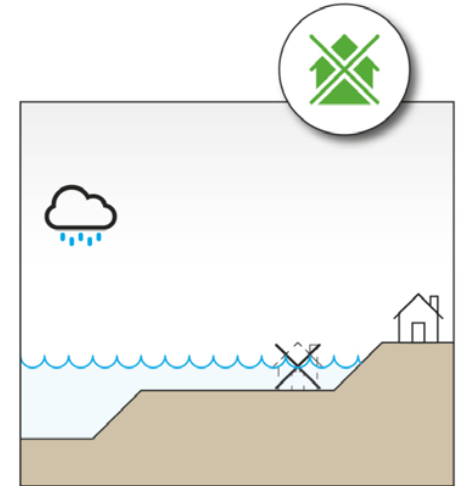
Flood
Mitigation



Land Use Bylaw
Provisions



Limited Development
Below 250



Resiliency Options

EVALUATION CRITERIA

Evaluation Criteria		Definition
Cost		Limited to the estimated net cost to implement each policy option. It also includes avoided infrastructure costs for the municipality. It does not include opportunity costs, loss/disruption of income and revenue for residents, businesses or the municipality, or expected future flood damages.
Residual Risk	Social	Residual risk to physical, physiological, and psychosocial well-being of residents and the community; as well as the network of relationships in the community.
	Built	Residual risk to residential homes, commercial and industrial infrastructure, as well as municipal and provincial essential services and infrastructure.
	Economic	Residual risk from the loss of livelihoods, loss of employment, economic losses associated with property losses, decreased business revenue due to work stoppages, loss of employees, infrastructure damage, loss of childcare and school facilities, and opportunity costs related to future flood events.
	Natural	Residual risk from loss or contamination of greenspaces, woodlands, cropland and rangeland, degradation to air, soil and water quality, and impacts to the watershed.

Resiliency Options

GUIDANCE ON SCORING

1. Cost (not relative)

- Weighs the full cost range possible for the area
- Low-cost policy options – score low on the scale (i.e. 1)
- High-cost options – score substantially higher

2. Residual Risk Factors (relative)

- Scored relative to each other
- Which policy options do the most and least effective job

***Public Feedback** must also be considered – can't be scored

Analysis

SCORING TABLE EXAMPLE - DOWNTOWN

Cost Bracket	Score	Cost Bracket	Score
< 50 million	1	1.4 – 1.49 billion	11
50 – 99 million	2	1.5 – 1.59 billion	12
100 – 199 million	3	1.6 – 1.69 billion	13
200 – 399 million	4	1.7 – 1.79 billion	14
400 – 499 million	5	1.8 – 1.89 billion	15
500 – 699 million	6	1.9 – 1.99 billion	16
700 – 899 million	7	2 – 2.29 billion	17
900 – 999 million	8	2.3 – 2.39 billion	18
1 – 1.29 billion	9	2.4 – 2.49 billion	19
1.3 – 1.39 billion	10	2.5 billion +	20

- Scoring ranges from < 50 million (score of 1) to 2.5 billion+ (score of 20)
- For other communities - < 5 million (score of 1) to 90 million+ (score of 10)

Cost Considerations

POTENTIAL CAPITAL PROJECT COST SAVINGS

- **\$40 million** - approximate remaining costs for flood mitigation in Waterways.
- **\$22.8 million** for flood protection in Ptarmigan Court or **\$23.5 million** for the temporary relocation and raising of properties in Ptarmigan Court (rough estimate)
- **\$27 million** for Rural Water and Servicing Project for Draper

Cost Considerations

POTENTIAL CAPITAL PROJECT COST SAVINGS

- **\$5 million** for private service connections in Draper
- **\$0.3 million** for Community Gathering Place Project in Draper
- **\$2.3 million** for Jubilee Major Maintenance
- **\$36 million** for Clearwater Drive – Riedel Street to Franklin Design and Construction
- **\$1.5 million** for four-laning Franklin Avenue

Cost Considerations

POTENTIAL CAPITAL PROJECT COST SAVINGS

- **\$1 million** for Waterways landscaping improvement
- Up to **\$202.7 million** for remaining Flood Mitigation
- **\$1.6 million** for downtown portions of Urban Infrastructure Rehabilitation Construction
 - **\$845,000** remaining for Morrison and Main Street deep utility excavation
 - **\$750,000** remaining for Pond Crescent

Community Treatment Evaluations

- Treatment option combinations tailored to each area.
- Addresses community resilience through a technical assessment approach.
- Community feedback not factored into this methodology but will be available and shared separately.

Taiga Nova & Area

1. Flood mitigation partially exists in the area.
2. 81 private properties and 65 businesses.
3. 66 private properties (81% of the total) are below the 250m elevation. 42 (52%) affected by the 2020 flood.
4. 15 private properties (19% of the total) are above the 250m elevation. None affected by the 2020 flood.

Evaluation Criteria		Weight	Policy Options Evaluation					
			Flood Mitigation only	Flood Mitigation & LUB Provisions	Flood Mitigation, LUB Provisions & Limited Development below 250m	Flood Mitigation, LUB Provisions & Buyout Below 250m / Land Swap	LUB Provisions and Buyout Below 250m / Land Swap	Buyout all properties / Land Swap
Minimize Cost		4	1	1	1	7	6	8
Minimize Residual Risk	Social	1	6	5	4	1	2	3
	Built	1	6	5	4	2	3	1
	Economic	1	6	5	4	2	3	1
	Natural	1	6	5	4	3	2	1
Total Score			28	24	20	36	34	38
Total Treatment Cost			\$25.2M	\$25.2M	\$25.2M	\$375.7M	\$350.5M	\$463.4M
Flood Mitigation Costs			\$25.2M	\$25.2M	\$25.2M	\$25.2M	~	~
Buyout Costs			~	~	~	\$350.5M	\$350.5M	\$463.4M
Reclamation Costs			~	~	~	***	***	***
Total Cost Saved			~	~	~	~	\$25.2M	\$25.2M
Flood Mitigation			~	~	~	~	\$25.2M	\$25.2M
Net Cost			\$25.2M	\$25.2M	\$25.2M	\$375.7M	\$325.3M	\$438.2M
Net Cost Per Capita			\$336	\$336	\$336	\$5,009	\$4,337	\$5,843

Taiga Nova & Area

PROPOSED APPROACH

1. Construct new flood mitigation & enhance existing berms.
2. Introducing enhanced flood provisions in the LUB.
3. Limiting existing development below 250m and prohibiting new development below 250m.
4. **Alternative** is to continue with flood mitigation and LUB provisions, but not prohibit new development below 250m but instead limiting development in general.

Downtown

1. Flood mitigation underway.
2. Population of 10,993 (2018 Census) and 6,231 private properties.
3. 4374 private properties (70% of the total) below 250m. 2582 (41.44%) affected by the flood.
4. 1857 private properties (30% of the total) above 250m. 44 (0.71%) affected by the flood.

Evaluation Criteria		Weight	Policy Options Evaluation					
			Flood Mitigation	Flood Mitigation & LUB Provisions	Flood Mitigation, LUB Provisions, & Limited Development below 250m	Flood Mitigation, LUB Provisions, & Buyout Below 250m / Land Swap	LUB Provisions, and Buyout Below 250m / Land Swap	Buyout all properties / Land Swap
Minimize Cost		4	2	2	2	10	9	14
Minimize Residual Risk	Social	1	6	5	4	2	3	1
	Built	1	6	5	4	2	3	1
	Economic	1	6	5	3	2	4	1
	Natural	1	6	5	4	3	2	1
Total Score			32	28	23	49	48	60
Total Treatment Cost			\$70M	\$70M	\$70M	\$1.37B	\$1.3B	\$1.9B
Flood Mitigation Costs			\$70M	\$70M	\$70M	\$70M	~	~
Buyout Costs			~	~	~	\$1.3B	\$1.3B	\$1.9B
Reclamation Costs			~	~	~	***	***	***
Total Cost Saved			~	~	~	~	\$70M	\$111.4M
Flood Mitigation			~	~	~	~	\$70M	\$70M
Jubilee Maintenance			~	~	~	~	~	\$2.3M
Clearwater Design & Const.			~	~	~	~	~	\$36M
4-Laning Franklin Ave.			~	~	~	~	~	\$1.5M
Infrastructure Rehab			~	~	~	~	~	\$1.6M
Net Cost			\$70M	\$70M	\$70M	\$1.37B	\$1.23B	\$1.79B
Net Cost Per Capita			\$933	\$933	\$933	\$18,267	\$16,400	\$23,867

Downtown

PROPOSED APPROACH

1. Continue with the Municipality's structural flood mitigation project.
2. Introducing enhanced flood provisions in the LUB.
3. Limiting existing development below 250m and prohibiting new development below 250m.
4. **Alternative** is to continue with flood mitigation and LUB provisions, but not prohibit new development below 250m but instead limiting development in general.

Ptarmigan Court

1. Flood mitigation not planned.
2. Population included within Waterways (population 232) in the 2018 Census.
3. 68 private properties (99% of the total) below 250m. 49 are developed.
4. 1 private property (1% of the total) above 250m but is vacant.

Evaluation Criteria		Weight	Policy Options Evaluation	
			Flood Mitigation	Buyout all properties / Land Swap
Minimize Cost		4	5	1
Minimize Residual Risk	Social	1	2	1
	Built	1	2	1
	Economic	1	2	1
	Natural	1	2	1
Total Score			28	8
Total Treatment Cost			\$22.8M	\$21.8M
Flood Mitigation Costs			\$22.8M	~
Buyout Costs			~	\$14M
Reclamation Costs			~	\$7.8M
Total Cost Saved			~	\$22.8M
Flood Mitigation			~	\$22.8M
Net Cost			\$22.8M	\$0.00
Net Cost Per Capita			\$304	\$0.00

Ptarmigan Court

PROPOSED APPROACH

1. Buyout of all properties

- Increased community resilience.
- Not proceeding with capital projects results in no net cost to taxpayers.
- Buyouts still necessary even if flood mitigation was implemented.

Waterways

1. Flood mitigation planned but not started.
2. Population of 232 (2018 Census), and 164 private properties.
3. 94 private properties (48% of the total) below 250m. 43 are developed.
4. 68 private properties (42% of the total) above 250m. 48 are developed.

Evaluation Criteria		Weight	Policy Options Evaluation					
			Flood Mitigation Only	Flood Mitigation & LUB Provisions	Flood Mitigation, LUB Provisions & Limited Development below 250m	Flood Mitigation, LUB Provisions & Buyout Below 250m / Land Swap	LUB Provisions and Buyout Below 250m / Land Swap	Buyout all properties / Land Swap
Minimize Cost		4	3	3	3	8	2	6
Minimize Residual Risk	Social	1	6	5	4	2	3	1
	Built	1	6	5	4	2	3	1
	Economic	1	6	5	4	2	3	1
	Natural	1	6	5	4	3	2	1
Total Score			36	32	28	41	19	28
Total Treatment Cost			\$20M	\$20M	\$20M	\$75.5M	\$35.5M	\$72.3M
Flood Mitigation Costs			\$20M	\$20M	\$20M	\$20M	~	~
Buyout Costs			~	~	~	\$25.5M	\$25.5M	\$56.7M
Reclamation Costs			~	~	~	\$10M	\$10M	\$15.6M
Total Cost Saved			~	~	~	~	\$20M	\$21M
Flood Mitigation			~	~	~	~	\$20M	\$20M
Landscaping Improvements			~	~	~	~	~	\$1M
Net Cost			\$20M	\$20M	\$20M	\$75.5M	\$15.5M	\$51.3M
Net Cost Per Capita			\$266	\$266	\$266	\$1,006	\$207	\$684

Waterways

PROPOSED APPROACH

1. LUB provisions and buyout below 250m.

- Increased community resiliency.
- Not proceeding with capital projects results in low cost to taxpayers.

Draper

1. No flood mitigation planned.
2. Population is 187 (2018 Census) and 98 private properties.
3. 64 private properties (65% of the total) below 250m.
34 are developed.
4. 34 private properties (35% of the total) above 250m.
28 are developed.

Evaluation Criteria		Weight	Policy Options Evaluation					
			Flood Mitigation Only	Flood Mitigation & LUB Provisions	Flood Mitigation, LUB Provisions & Limited Development below 250m	Flood Mitigation, LUB Provisions & Buyout Below 250m / Land Swap	LUB Provisions and Buyout Below 250m / Land Swap	Buyout all properties / Land Swap
Minimize Cost		4	6	6	6	9	1	1
Minimize Residual Risk	Social	1	6	5	4	2	3	1
	Built	1	6	5	4	2	3	1
	Economic	1	6	5	4	2	3	1
	Natural	1	6	5	4	3	2	1
Total Score			48	44	40	45	15	8
Total Treatment Cost			\$118M	\$118M	\$118M	\$166.8M	\$48.8M	\$76.9M
Flood Mitigation Costs			\$118M	\$118M	\$118M	\$118M	~	~
Buyout Costs			~	~	~	\$40M	\$40M	\$60.3M
Reclamation Costs			~	~	~	\$8.8M	\$8.8M	\$16.6M
Total Cost Saved			~	~	~	~	\$118M	\$150.3M
Flood Mitigation			~	~	~	~	\$118M	\$118M
Rural Water Sewer Servicing			~	~	~	~	~	\$27M
Private Service Connections			~	~	~	~	~	\$5M
Community Gathering Place			~	~	~	~	~	\$300,000
Net Cost			\$118M	\$118M	\$118M	\$166.8M	\$0.00	\$0.00
Net Cost Per Capita			\$1,573	\$1,573	\$1,573	\$2,224	\$0.00	\$0.00

Draper

PROPOSED APPROACH

1. Community-wide buyout of all properties

- Safest approach for residents.
- Slopes with geotechnical concerns.
- Not proceeding with capital projects results in no net cost to taxpayers.

THANK YOU