CITY OF CALGARY CLIMATE ADVISORY COMMITTEE

September 26, 2023

Re: Updated Letter of Support for The Drought Resilience Plan

Dear Mayor Gondek and Members of the Community Development Committee:

The Calgary Climate Advisory Committee is mandated to provide Council and Administration with advice on policies and strategic initiatives related to climate change mitigation and adaptation. Using the lens of climate action, we see a current opportunity to encourage Council to adopt the Drought Resilience Plan. The Climate Advisory Committee supports the Plan as it represents a critical step forward in enhancing our community's ability to cope with the impacts of drought in the context of a warming and changing climate.

Multi-year drought is one of our city's top climate hazards and the impacts of prolonged drought have been summarized within the Plan's climate modeling and risk analysis. This work has informed the strategies needed to mitigate these impacts, and recommends accelerated action for climate adaptation as follows:

Water Security: The Plan emphasizes the importance of ensuring a water supply that can meet the needs of our residents, support the environment, and sustain our economy.

Community-Wide Impacts: Drought impacts range from water supply constraints to environmental and ecosystem impacts, and economic impacts for The City of Calgary. These impacts will need to be considered when planning resilient city infrastructure, operations, and communities. The plan incorporates the mitigation of unequal impacts on equity-deserving individuals. Climate equity is an important consideration in the plan.

Action Planning: The Drought Resilience Plan identifies key actions to adapt effectively to drought.

Demand Management: The Plan places a priority on improved demand management. By investing in ongoing water demand reduction efforts, we can reduce water use, thus reducing vulnerability to water shortages during drought and enhancing the resilience of residences and businesses.

Water Storage Solutions: Innovative water storage solutions are essential for ensuring a secure water supply that supports long-term regional growth while simultaneously managing flood and drought risks in a rapidly changing climate.

The Drought Resilience Plan offers a clear and well-defined path for our community to adapt to the multifaceted challenges posed by drought. It is designed to ensure that people, ecosystems, and businesses have the resilience required to endure and recover from prolonged periods of dry conditions and water shortages.

The Calgary Climate Advisory Committee supports the adoption of the Drought Resilience Plan as a climate adaptation tool that can safeguard The City from drought impacts. The recommendations within the Plan reflect a commitment to climate adaptation and mitigation and improving the resilience of the City of Calgary.

Sincerely,

Pat Letizia
Chair, Calgary Climate Advisory Committee

Cc: Stuart Dalgleish, General Manager, Planning & Development Services; Deputy City Manager
Climate Advisory Committee Members:
Brian Hahn, Vice Chair
Christine Gibson
Dick Ebersohn
Andree Iffrig
Fred Edwards
Harris Switzman
Israr Ahmad
Jennifer Saldana
Joanne Perdue
Joel Trubilowicz
Maham Aftab
Rob Tremblay
Ryan Germaine
Stephanie Ho Lem
Tim McMillan

September 28, 2023

City of Calgary
P.O. Box 2100, Station "M"
Calgary, AB T2P 2M5
(via email to City Clerk)

Attention: Members of the Community Development Committee

Re: Drought Resilience Plan

Dear Committee Members:

On behalf of the Bowness Responsible Flood Mitigation Society, I am writing to you in response to the City of Calgary Drought Resilience Plan that will be presented to you on October 2, 2023. The City of Calgary, BRFM and other Calgary residents will surely benefit from a comprehensive, cost effective and practical approach to addressing the challenges of drought and flood.

The Bowness Responsible Flood Mitigation Society ("BRFM") was formed to advocate for responsible and effective flood solutions for Calgary, specifically as they relate to the community of Bowness. BRFM is entirely non-profit, fully registered and membership funded. BRFM has approximately 350 members and represents many flood zone stakeholders in the community. On behalf of our members, we provide the following feedback on the Drought Resilience Plan:

Strategic Action B3 - Identify and advocate for new water storage option

We agree with the statement from this report: "*a new reservoir on the Bow River remains a critical component of upstream storage for flood mitigation, water supply and climate change resilience for Calgary and downstream communities on the Bow River*". Before the initiation of the Bow River Reservoir Options study (BRRO), BRFM has been advocating with the Province to find an upstream flood protection solution that has the ability to reduce the maximum controlled release rate on the Bow River through Calgary to 800 meters cubed per second (m3/s).

This would require greater upstream storage than is currently being considered by the BRRO team. A change to the design peak flow rate on the Bow would deliver both improved water security and flood protection.

Water release rates from the Trans Alta operated dam leave hundreds of Calgarians vulnerable in the flood fringe along the Bow River. Homes, businesses and residents would be better protected with a flow rate of 800 m3/s.

Shortly after the 2013 flood, an Advisory group, the Bow River Working Group was established by the Government of Alberta to provide options for flood mitigation along the Bow River. In May 2020, the

Government of Alberta proposed to comprehensively assess feasibility of three options but it could not have accounted for recent advances in the science of climate change and glacier recession, the importance of the sustainable health of the Bow River and the increased interest for irrigated land. **The proposed combination of a flood barrier and an upstream flood mitigation designed to deliver flow rates of 1200 m3/s will not protect Bowness residents from extensive flood damage, while failing to capitalize on an opportunity to improve resiliency against climate change impacts to the ecological and economic health of the Bow River.** The City of Calgary commissioned Hydrogeological Characterization and GW Flow Modelling report by Klohn Crippen Berger confirms the damaging effects of the 1200 m3/s flow rate including the flood waters rising to surface behind different sections of the studied barrier.

In Conclusion

This report recommends a passive approach with the Province. The Report suggests, "*The City of Calgary remains a key interested party and will continue to monitor the progress of the Bow River Reservoir Options study*". We ask that you take a more active position and join BRFM's effort in advocating for a better solution to both flood and drought resiliency. As a demonstration of our commitment to our community and advocacy efforts, I have included with this package a summary of BRFM's Engagement with Government Officials, as well as the briefing note and presentation that was presented to Minister Savage (Environment & Protected Areas), Minister Nicolaides (MLA Calgary-Bow) and officials from Alberta Environment and Protected areas in March 2023. Throughout the summer, we have continued to meet with Officials from the Ministry of Agriculture and Ministry of Environment and Protected Areas (elected and otherwise).

We look forward to hearing from you.

Kind regards,

Jean Woeller

Jean Woeller
President, Bowness Responsible Flood Mitigation Society (BRFM)
www.bownessrfm.ca

cc: Councillor Sharp

Attachment:
Bow River - Minister Savage - Final.pdf
2023_03_29_BRFM_Final.pdf
BRFM GoA Engagement Summary.pdf

Issues

Flow rates set by the Officials with the City of Calgary and the Government of Alberta leave hundreds of Calgarians vulnerable in the flood fringe along the Bow River. Homes, businesses and residents would be better protected with a flow rate of 800 m^3/s.

An Advisory group the Bow River Working Group was established by the Government of Alberta to provide options for flood mitigation along the Bow River. In May 2020, it proposed to comprehensively assess feasibility of three options but it could not have accounted for recent advances in the science of climate change and glacier recession, the importance of the sustainable health of the Bow River and the increased interest for irrigated land. A fourth option should be included in the feasibly stage that addresses climate adaptability, irrigation and the health of the Bow River.

The proposed combination of a flood barrier and an upstream flood mitigation designed to deliver flood rates of 1200 m^3/s will not protect Bowness residents from extensive flood damage and will potentially increase the flood risk to homeowners, while failing to capitalize on an opportunity to support agricultural through irrigation expansion and improve resiliency against climate change impacts to the ecological and economic health of the Bow River The City of Calgary-commissioned Hydrogeological Characterization and GW Flow Modelling report by Klohn Crippen Berger confirms the damaging effects of the 1200 m^3/s flow rate.

Background

Department officials with the Government of Alberta and the City of Calgary have led the work on options for improved flood mitigation based on a maximum flow rate of 1200 m^3/s in a 100-year flood event, rather than 800 m^3/s. The target flow rate of 1200 m^3/s was first referenced in a 2016 document from the Bow River Working Group, but the record and rationale of this decision cannot be found through publicly available information.

The three options at the feasibility study stage continue to look at reservoir options in the Bow River basin, upstream of Calgary, that would only meet the 1200 m^3/s standard, including:

- Morley: A new reservoir between Seebe and Morley, on Stoney Nakoda Nations reserve lands;
- Relocated Ghost Dam: An expansion of the existing Ghost Reservoir; and,
- Glenbow East: A new reservoir between Cochrane and the Bearspaw Dam at the western edge of Calgary.

Fourth option – Benchlands

In support of an option that can attenuate the design flood event to below the damage threshold in Calgary of 800 m3/s, necessary to protect residents in Calgary, BRFM has proposed an alternative reservoir option, the Benchlands Hydro Storage project.

This innovative option would be located off the main stem of the Bow River on the Ghost River. The Ghost River contributed significantly to peak flow in the 2005 and 2013 floods, is the largest tributary without a reservoir, and has the steepest gradient.

Irrigation opportunities for southern Alberta

The Benchlands project will help expand and improve the irrigation network within , enhancing Alberta's standing as a global leader in agri-food production. The Government of Alberta has recently made attempts to attract major agriculture projects though tax credits and irrigated land. Improving the stability of the water supply for agriculture producers will also make Alberta more attractive for investment and expansion.

Healthier Bow River and water security

The overall health of the Bow River watershed, water quality and fish health has varied from fair to poor since the 2013 floods. Currently, the water level of the Bow River is low, but this can change suddenly with snow melt or spring weather events. The Benchlands project helps provide a sustainable water level for the Bow as river health changes, by more than doubling the upstream storage capacity of the Bow River, creating much more resilience against drought than the three existing options.

The Benchlands project also offers additional campground, recreation and tourism opportunities on provincial lands, contributing to an environmentally responsible policy framework for recreation.

Hydro power

The Benchlands option offers the innovative use of pumped hydro storage by pumping water 160-190 m up from Ghost Lake to a new Benchlands Reservoir, critically supporting Alberta's electricity system while further strengthening resilience of the Bow Riers flow and health. Hydro storage projects have been developed in southern Alberta for over 70 years and are critical to stabilizing power supply. They offer unique and necessary attributes for a reliable electricity system, including the only black start capacity in Alberta's electricity system. Pumped hydro, in particular, offers an essential component of Alberta's electricity system reliability as intermittent renewable sources of electricity (wind and solar) grow.

In Ontario, TC Energy is developing the Ontario Pumped Storage Project. This project is being developed at a projected cost of $4.3B and will generate 1000 MW of power (same as Benchlands) and 8000 MWh of storage (about 1/3 proposed for Benchlands). In Alberta, TC Energy is developing a smaller hydro storage facility at Canyon Creek. This project has an expected cost of $200MM with generating and storage capacity that is on the order of 10 percent than proposed for Benchlands. TransAlta have also proposed a 900 MW Hydro Storage facility at their Brazeau dam which in 2016 was estimated to cost approximately $2.5M. The hydro storage concept as presented with the Benchlands project can be applied at a reduced scale: 1000 MW of reliable on demand green power generation and over 20 MWh of power storage.

Climate adaptation

The research and response to climate change and adaptation has expanded significantly over the past decade. Climate predictions had suggested annual flow on the Bow River will increase by up to 20 percent. However, recent evidence shows that flow rate variability will increase, dominated by extended rainfall and flooding in the spring and early summer, followed by drought in the late summer as glacier melt diminishes as a

result of glacial recession caused by climate change. Increased storage is essential for climate adaptation and could contribute to the provincial government made-in-Alberta climate strategy. Climate adaptation attributes, along with the climate mitigation attributes of pumped hydro electricity storage, means that the Benchlands project is a prime candidate for external funding sources.

Protection of communities along the Bow River

Construction of the Benchlands project would be almost entirely on crown land and does not involve designated provincial parkland. There is no requirement to relocate rail lines or major highways. The Minister of Transportation and Economic Corridors is mandated to lead an initiative in consultation with Municipal Affairs, Indigenous Relations, Environment and Protected Areas, Agriculture and Irrigation, and Treasury Board and Finance to develop an integrated water program that facilitates water treatment and distribution for residential, industrial, and agricultural water usage across Alberta. The Benchlands project directly contributes to this initiative for Albertans along the Bow River.

Indigenous economic opportunity

The Ministers of Environment and Protected Areas, Energy and Transportation and Economic Corridors work to ensure Indigenous businesses and communities play a central role in our provincial energy strategy and economic partnerships. The Benchlands project could create an opportunity for indigenous communities to be economic partners with the hydro storage project. The implementation of a hydro storage facility would add significant economic benefit to the project that could accrue to the First Nation. Development and construction of the hydro project on indigenous territory could be supported by the Alberta Indigenous Opportunities Corporation.

Requests:

BRFM requests that the Provincial Government:

- Set a target peak flow rate on the Bow River no greater than 800 m^3/s as there should be equitable flood damage protection.
- Add the Benchlands Hydro Storage project as the fourth option with the same rigor of engineering, environmental and economic impact assessment alongside the current BRRO options.
- Implement a flood mitigation strategy for the Bow River that achieves flood protection in Calgary without reliance on surface flood barriers that have been demonstrated to be ineffective in locales of highly conductive subsurface.

Contact: Jean Woeller, President, Bowness Responsible Flood Mitigation Society
c: 403-606-7100 email: jwoeller@shaw.ca

Summary of BRFM GoA Engagement

Date	GoA Official
August 2023, April 2023	Danielle Smith, Premier
August 2023 - current	RJ Sigurdson, Minister of Agriculture
July 22, 2023	John Conrad, Assistant Deputy Minister (Agriculture)
July 7, 2023	Rebecca Schulz, Minister of Environment & Protected Areas
June 1, 2023	Tom Davis, Assistant Deputy Minister (Environment & Protected Areas) Carcey Hincz, Executive Director (Environment & Protected Areas) Ken Kress, Consultant to Bow River Reservoir Options Study
April 2023	Nate Horner, Minister of Agriculture
March 29, 2023	Sonya Savage, Minister of Environment & Protected Areas Demetrios Nicolaides, MLA Calgary-Bow Assistant Deputy Minister, Tom Davis
June 24, 2021	Bow River Reservoir Options Study team, Stakeholder engagement
2020	Devin Dreeshen, Minister of Agriculture
January 28, 2020	Jason Nixon, Minister of Environment & Parks Mark Comerford, Director (Environment & Parks)
2019 - current	Demetrios Nicolaides, MLA Calgary-Bow
September 30, 2019	Alberta Environment & Parks Bow Basin Stakeholder Engagement Team
September 20, 2019	Ric McIver, Minister of Transportation
September 4, 2019	Mark Comerford, Director (Environment & Parks) Bow Basin Project Team Members
March 16, 2018 April 27, 2018	Deborah Drever, MLA Calgary-Bow
2018 - current	Bow River Reservoir Options Study team, monthly or bimonthly call
June 15, 2018	Shannon Phillips, Minister of Environment & Parks Deborah Drever, MLA Calgary-Bow

THE SLOW BOW

BOWNESS RESPONSIBLE FLOOD MITIGATION SOCIETY

Meeting with Hon. Sonya Savage, Minister of Environment & Protected Areas

March 29, 2023

Request #1 Reduction of the design flow rate for the Bow River Reservoir Option Study (BRRO)

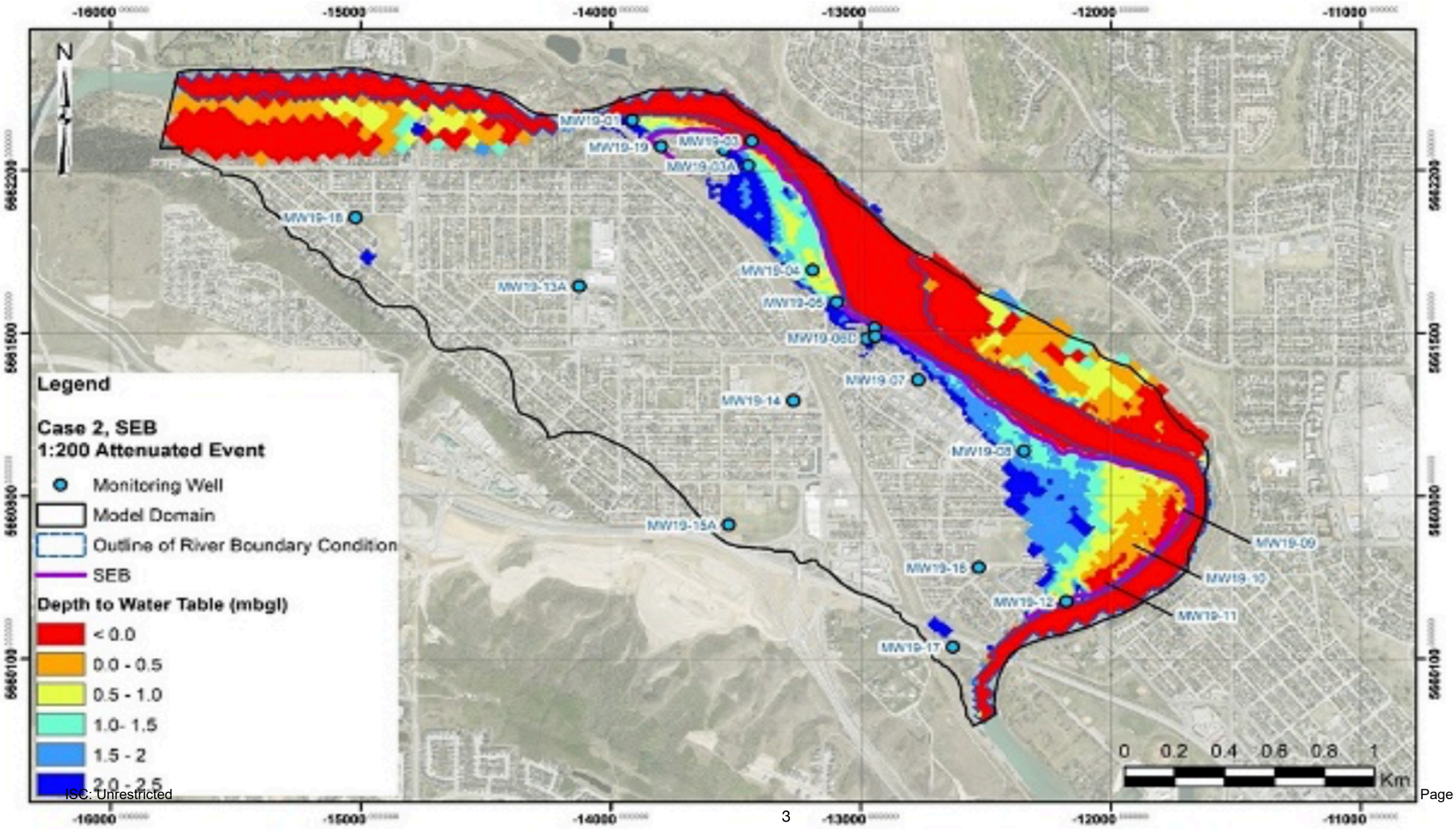
Ask: Please direct your officials to consider options, as part of the BRRO, based on a design peak flow rate of 800 m^3/s.

Rationale: City of Calgary commissioned groundwater report concluded the community will experience significant property damages from groundwater at the peak flow rate of 1,230 m^3/s that is being used to assess upstream mitigation options.

- Groundwater impacts will occur with or without the proposed barriers in Bowness
- Groundwater flooding presents risks and dangers to Bowness and other Calgary communities

Photo taken June 7, 2020 when flow rate was approx. 250 m3/s at Bearspaw

Extent of Groundwater Flooding



Request #2 Give further consideration to the Benchlands Hydro Storage Options

Ask: Please direct your officials to give the Benchlands Hydro Storage Option a more thorough assessment and evaluation along with the current BRRO options being considered.

Rationale: In addition to flood mitigation for vulnerable Calgary neighbourhoods, this option provides five other key benefits:

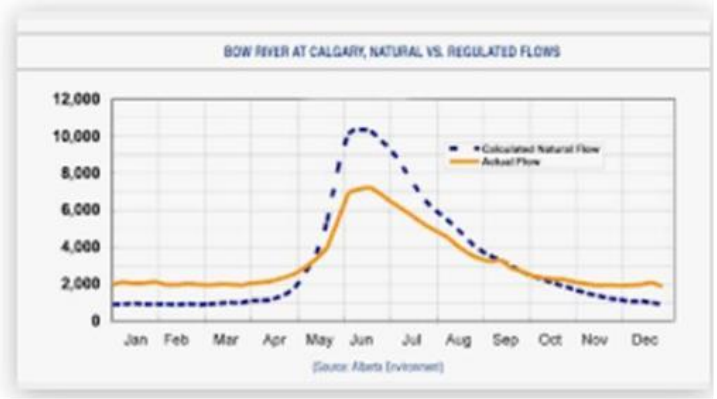
- Improved irrigation opportunities for southern Alberta
- Healthier Bow River and water security
- Hydro power and valuable energy storage
- Climate adaptation
- Indigenous economic opportunity

Thank you and discussion

Bowness Responsible Flood Mitigation - BRFM

Advocating for Effective and Equitable Flood Mitigation for Bowness

- BRFM formed 6 years ago to advocate for Bowness residents. Our organization seeks a collaborative solutions-0riented relationship with the City of Calgary and GoA
- We have employed technical expertise to review and verify the proposed flood mitigation designs
- City of Calgary Groundwater Study demonstrates that in order to achieve effective and equitable protection, maximum controlled flow rate needs to be less than 800 m3/s.
- Effective climate adaptation strategies will require focus on increasing upstream reservoir size
    - Existing upstream reservoirs on the Bow River have been effective for stabilizing the flow on the Bow River through Calgary;
    - Significantly decrease in spring flow rates (flood control), as demonstrated by flood history; and
    - Maintains stable fall/winter flow rates enhancing fish habitat and hydro-power generation.

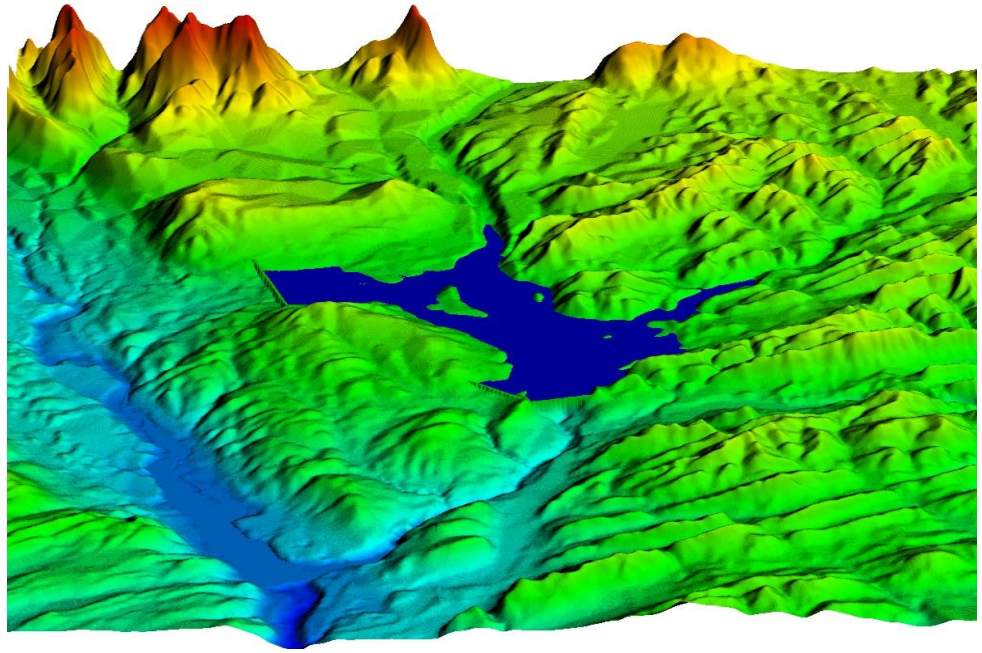


BRFM Proposed Water Management Solution

A response to City of Calgary declaration of Climate Emergency

- **Benchlands Hydro-Storage Project is a Climate Adaptation Project**

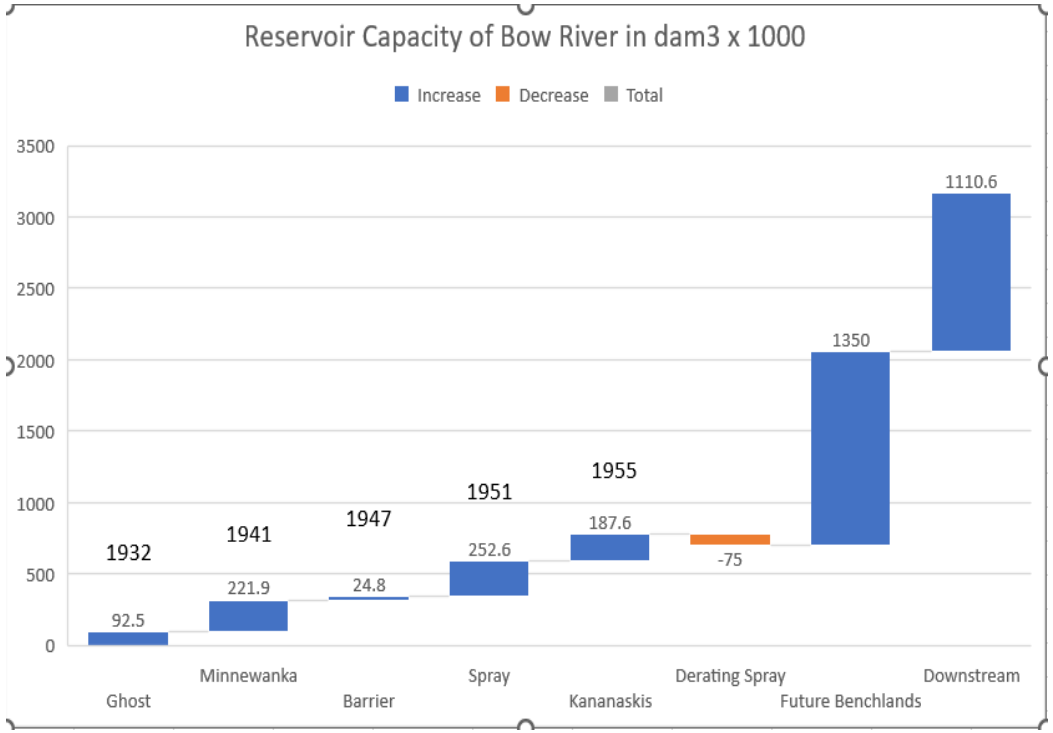
- Massive Drought Mitigation/Water Security up to 1,350 MM m3
  - More than doubles the current Bow River water storage upstream of Calgary
  - Increases total irrigation water storage on Bow River by over 75%
- Massive Grid Level Green Power Storage with
  - Hydro Storage with capacity of ~1000 MW and +30,000 MWh
  - Provide reliable backup power and storage for intermittent renewable power
  - Could power Calgary for ~1.5 days independent of other power sources.
- Attenuates peak flow rate in both the 100 and 200 year flood to less than 800 m3/s (Current damage threshold and equitable protection with SW communities) with only a single new reservoir.



Benchlands Project Provides Massive Water Security

Water is essential for Calgary/Alberta Economy

- Annual flow of Bow River is about 3MM m3/year. Global warming will increase this to about 3.5MM by 2050
  - More water, but increased drought and flood periods
- **No new dams or reservoir capacity has been added in 70 years – Capacity has been lost over time.**
- Irrigation contributes $5.4B to Alberta economy. Irrigated land produces 4.5 times higher yield than dryland
- Global warming is increasing frost free growing season and time/temperature days
  - Water is essential to increase food production
  - We export water through food



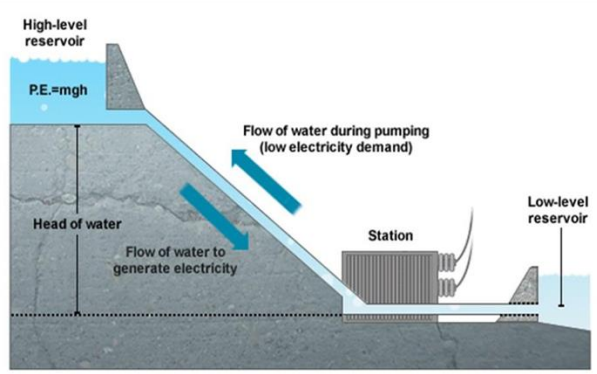
- Proposed Benchlands Reservoir is optimally located
  - Water can be diverted to any downstream reservoir and irrigation can be extended north
  - Evaporation is reduced
  - Maintains stable flow in Calgary for fish habitat

Benchlands Provides Reliable Green Power

Project Delivers 1000 MW of Hydro Power Storage – 5.5% of Alberta Total Generating Capacity

Enough to power Calgary for ~1.5 days

- Hydro storage is cost effective and proven method of storing grid level power
- Storage is needed as Alberta transitions to interruptible wind and solar power. In 2022 AESO had 7 grid alerts - AESO not able to provide contingency reserve
- High electricity bills are due in large part to the lack of power storage. Spread between off peak and on peak price is widening with increased renewables
- Transition to nuclear or CCS technology will not lessen need for storage
- Benchlands involves no new or unproven technology
- Large hydro storage projects are attractive to private sector with investments of $3-4B for similar size
  - TC Energy moving forward with similar sized project in Ontario and smaller project in Hinton
  - TransAlta has proposed a similar sized project for Brazeau Dam
  - Market based power trading system integrates power storage

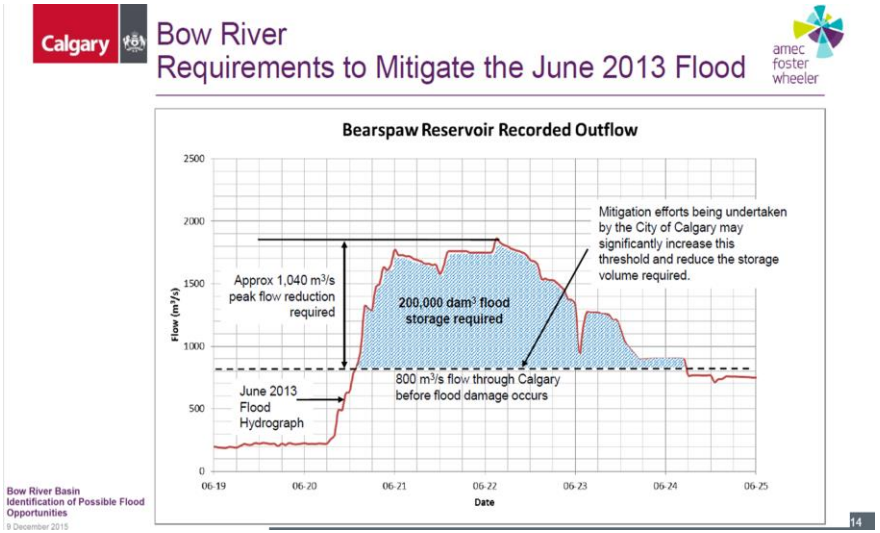


Source Hydro Review

Benchlands Can Achieve 800 m3/s Peak Flow Rate

Can achieve 1:200 year protection (city of Calgary target) with a single new reservoir

- City of Calgary acknowledges that damage threshold flow rate is 800 m3/s in Calgary. Groundwater study has confirmed that Bowness Barrier will not increase damage threshold to 1230 m3/s as proposed.
- Utilizes hydro storage pumping capacity to transfer about 600 m3/sec from Ghost Lake Reservoir to Benchlands Reservoir for 1:200 event.
    - Works in combination with modified operations at Ghost Dam
    - Natural attenuation of Ghost River; a large contributor to both 2005 and 2013 flood.



- Provides both overland and groundwater flood protection for Bow River communities
    - Equitable to SR-1 mitigation for Elbow River communities
    - In SR-1 NRCB hearing the City of Calgary testified that mitigation of groundwater flooding was a requirement for Elbow River mitigation; Bowness deserves the same level of protection.
- As with SR-1, this flood mitigation scheme involves a simple operating protocol that is in response to actual conditions and does not require operator discretion and weather forecast
- This option provides water conservation during heavy rainfall/flooding event that allow for later allocation to irrigation supply.

Benchlands Reservoir is a Generational Opportunity

Climate Adaptation will require bold initiative and leadership

- The current climate crisis will not be addressed only through reducing CO2 emissions. It will require adaptive infrastructure.
- Over 100 years ago our industry and political leaders responded to climate conditions that turned barren land into productive farmland, delivered water security for a growing population and mitigated frequent flooding through reservoir storage.
  - Climate change is presenting the same challenge, and BRFM have a proven solution with expanded water storage.
  - It will be difficult to demonstrate net public good of new flood mitigation reservoir as being currently considered by the BRRO. It will need significant other benefits which Benchlands could provide.
- BRFM has offered innovative solutions to the GoA and the City of Calgary.
- Main obstruction for the Province to move forward with a larger reservoir with 800 m3/s target release rate is that the City of Calgary has asserted they can mitigate flood damage up to 1200 m3/s. The City's own studies have demonstrated that Bowness will continue to experience extensive flood damage.
  - In the Flood Mitigation Measures Assessment (FMMA) A TBL, for the Bow River options considered, in all three categories the option of a larger reservoir and no community barriers scored higher than the recommended option of a smaller reservoir and community barriers. A 4th criteria called "implementation" outweighed the other 3 categories. Why are we not pursuing the best option from the TBL? Why are we not asking for what we need from the GoA?
  - BRFM requests the City of Calgary to join us in advocacy for effective and equitable flood mitigation providing both overland and groundwater mitigation. - Increase upstream reservoir and reduce peak flow rate to 800 m3/s