

**NATURAL RESOURCES CONSERVATION BOARD**

**IN THE MATTER OF THE *NATURAL RESOURCES CONSERVATION BOARD ACT*, RSA  
2000, c. N-3**

**IN THE MATTER OF NRCB APPLICATION NO. 1701 BY ALBERTA TRANSPORTATION**

**SRPINGBANK OFF-STREAM RESERVOIR (SR1) PROJECT**

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**CLOSING ARGUMENT OF THE INTERVENER, THE CITY OF CALGARY**

**APRIL 6, 2021**

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## Introduction

1. Thank you Mr. Chair and members of the Panel. I suspect I won't need the full 40 minutes requested. I'll start by thanking counsel for Alberta Transportation and Calgary River Communities Action Group and Flood Free Calgary for their submissions. The City of Calgary ("The City") supports their remarks. I'd also like to thank the Board staff and panel members, court reporters, and Zoom host for their patience and assistance, and all parties for taking the time to participate in this very important hearing. Like the other parties you've heard this morning, I will submit a written copy of my submissions to the Board, which contains references to the evidence which I will not include in my oral submissions.
2. There has been a lot of information communicated, tested, and digested over the past two weeks. You've heard about the need for SR1. You've heard about the devastating impacts of the 2013 flood, the design flood for the project. And you've heard a number of concerns from some of the interveners.
3. The Board's task, under section 2 of the *Natural Resources Conservation Board Act*, is to determine whether SR1 is in the public interest, having regard to the social and economic effects of the project and its effect on the environment. Mr. Chair, The City submits that the evidence has overwhelmingly shown that SR1 is in the public interest, and, indeed, that the public cannot afford to wait any longer for that interest to be met.
4. The City submits that project meets its stated purpose of reducing the effects of future extreme flood events on the City of Calgary and downstream communities (**Exhibit 20, p. 1.1**). SR1 is not about protecting pockets of residences along the Elbow River. It will protect critical infrastructure and economic assets needed for the entire region, and will potentially save lives. For our closing, The City will highlight the dramatic benefits SR1 offers, the conservative approach to design, safety and risk incorporated into the project, and why The City believes that SR1 is a preferable choice to alternatives put forward.

## Project Need and Benefit

5. The City of Calgary is located at the confluence of the Bow and Elbow Rivers. Both of these rivers drain steep, high-elevation mountain terrain that is subject to heavy rainfall and rapid runoff, and both lack sufficient natural storage, leaving Calgary at a unique potential for severe

flooding (**Exhibit 357, p. 320-321; Exhibit 229, PDF p. 7**). I don't need to repeat the devastating impacts of the 2013 floods on Calgarians. This Board has heard the evidence. Some of you may have lived it. Nearly everyone who has spoken during this hearing has recognized it. Years of technical, economic, engineering and citizen engagement have shown that upstream storage on both rivers is greatly needed, particularly on the Elbow River (**Exhibit 229, p. 6; Exhibit 231, PDF p. 221**).

6. The City of Calgary faces constraints in addressing flooding risks from the Elbow River within City limits, but it has done what it can. Since 2013, it has doubled the storage capacity of Glenmore Reservoir from 10 to 20 million cubic metres (**Exhibit 229, Appendix B, PDF page 25**). The City has completed streambank and riparian erosion protection improvements, gravel bar modifications, rehabilitated fish habitat, replaced bridges with higher flow capacity structures, and completed stormwater, water and wastewater system improvements (**Exhibit 229, Appendix B, PDF p. 25**). Mitigation efforts have reduced the flood risk to Calgary by 54% (**Exhibit 229, Appendix B, PDF p. 33**).
7. Unfortunately, the mitigation that was possible for the City to undertake on its own is not enough. Unless additional mitigation is undertaken, flood damages on the Elbow River will be approximately \$2-3 billion over the next hundred years (**Exhibit 357, p. 331**). In 2014, in recognition of the City's limitations respecting flood mitigation within its boundaries, it was agreed that the Province would lead the study and configuration of resilience elements outside of City limits (**Exhibit 357, p. 323**).
8. Nearly 8 years later, and after extensive study and careful, thoughtful design, the SR1 project is before this Board. Over 1.3 million Calgarians are now relying on the completion of SR1 to protect public safety, private property, critical regional infrastructure including wastewater treatment, road and rail networks, utilities, and vital services, and Calgary's downtown core (**Exhibit 229, Appendix B, PDF p. 22**).
9. With SR1 in place, the likelihood of another flood like that in 2013 causing widespread damage and disruption is significantly reduced. SR1 will work synergistically with other flood resilience measures in Calgary, including the Glenmore Dam itself, to virtually eliminate overland flooding in a 2013 sized flood downstream of the Glenmore Reservoir (**Exhibit 229, Appendix B, PDF p. 28; Exhibit 351, slide 12**).

10. SR1 will also have appreciable effects on events larger than the design flood. Though overland flooding cannot be eliminated in floods larger than a 1:200 event, the combined mitigation of SR1 and Glenmore Reservoir offers significant attenuation of larger flows. For example, after passing through SR1 and the Glenmore Reservoir, a 1:500 year event turns into a 1:29 year event (**Exhibit 351, slide 11**). This makes SR1 an adaptive measure that offers substantial benefits, should changes in climate and hydrologic regime bring more frequent or severe floods.
11. Even those Calgarians upstream of the Glenmore Reservoir will benefit from SR1. Discovery Ridge, the only Calgary community upstream of Glenmore, was regulated at the time of development to be designed to 1:100 standards, meaning that it was designed to a flow rate of 883 cubic metres per second (**Exhibit 357, p. 327-328**). SR1, by diverting up to 600 cubic metres per second, will increase the threshold for damages in this area to around the 1:350 year range (**Exhibit 357, p. 402**).
12. The benefits of SR1 are staggering. SR1 will avert major social, environmental and economic impacts along the Elbow and Bow rivers in Calgary, including about \$1.2 billion in damages for a 1:100 flood and \$1.9 billion in damages for a 1:200 event (**Exhibit 229, Appendix B, PDF p. 33**). The average annual damages to public and private infrastructure averted by SR1 are approximately \$27 million a year (**Exhibit 229, Appendix B, PDF p. 21**).
13. The City submits that, with SR1 on the landscape, almost \$3 billion in damages will be avoided over 100 years, resulting in a 5:1 benefit to capital cost ratio (**Exhibit 229, Appendix B, PDF p. 33**). While the benefit cost analyses performed by Alberta Transportation have been more conservative (**Exhibit 365, p. 846**), all benefit cost analyses have shown net benefits. It is likely as well that the net benefits are greater than those shown, given that most analyses do not account for some crucial factors that are difficult to monetize, such as the increased flood response flexibility afforded by SR1, health and safety elements, potential increased (and avoided) damages due to climate change, and benefits that would be felt outside of the City of Calgary (**Exhibit 357, p. 326; 330**).
14. While upstream mitigation on the Bow River would certainly have its own positive impacts on the flood outlook for the City of Calgary and other downstream communities, upstream

mitigation on the Bow is not necessary for SR1 to provide benefits – the \$27 million of average annual damages avoided by SR1 are solely attributable to SR1 and are not dependent on any additional projects on the Bow River (**Exhibit 385, p. 1740-1741**). Furthermore, flooding on the Bow River would have a minimal impact on a mitigated Elbow River, as the topography of the riverbeds would not allow water to travel very far upstream at the confluence of the two rivers (**Exhibit 373, p. 1268**).

15. River flooding has caused at least seven fatalities in Southern Alberta since 2005, three of which were in Calgary (**Exhibit 229, PDF p. 26, Exhibit 349, p. 41; Exhibit 357, p. 322**). It must be highlighted that any further loss of human life to flooding in Calgary is intolerable to The City. Beyond the life safety impacts of further flood mitigation along the Elbow, tens of thousands of Calgarians stand to benefit from the peace of mind this infrastructure will provide, particularly those still impacted mentally and economically by the 2013 flood.

### **Safety and Risk**

16. There have been many suggestions to this Board that SR1 is underdesigned. With respect, The City submits that the evidence shows the opposite: the design approach taken by Alberta Transportation and its consultants has been conservative. This conservative design, combined with stringent regulatory requirements, results in infrastructure that has been engineered to be safe.

17. The clearest example of SR1's conservative design is the design flood itself. Despite the Alberta standard being mitigation to a 1:100 year event, SR1 was designed to a standard of roughly 1:200 (**Exhibit 349, p. 95-96; Exhibit 163, PDF p. 56**). In addition, there has been a 25% increase from the flood of record to the maximum diversion rate to allow for flexibility and maximum effectiveness throughout a flood event (**Exhibit 357, p. 302-303**).

18. SR1 is designed to safely withstand and pass the probable maximum flood (**Exhibit 350, p. 172-173**). While not SR1's intended operation, it is also notable that SR1 has an available incremental capacity that will bring SR1's storage capacity from 77 million cubic metres up to approximately 100 million cubic metres if required (**Exhibit 357, p. 296-299**).

19. In addition, multiple redundancies have been built into SR1's design to increase its safety, including respecting debris management, mechanical and operational systems, and, as noted, an emergency spillway that is designed to safely pass the probable maximum flood (**Exhibit 368, p. 1009-1010**).
20. SR1 will be classified as an extreme consequence dam (**Exhibit 20, p. 5.6**). The City owns and operates 13 classified dam structures, including the Glenmore Reservoir, which is itself classified as extreme consequence (**Exhibit 368, p. 1259**). The City is therefore familiar with the stringent design, surveillance, operation and maintenance standards such a consequence classification entails (**Exhibit 229, PDF p. 12**).
21. Unlike other extreme consequence dams, SR1 will only be operating for periods of up to 40 days following a major flood and will not hold large amounts of water continuously, making the already remote chance of "fair weather failure" even less likely (**Exhibit 373, p. 1260**). With its off-stream design, components configured to meet or exceed its extreme consequence classification, large storage volume capable of holding back-to-back 1:100 floods, and significant operational flexibility (**Exhibit 373, p. 1256; 1260**), The City submits that SR1 has a vanishingly remote chance of failure and that these remote risks are far outweighed by the benefits I've already described.
22. In addition, and importantly, providing this higher level of permanent flood protection on the Elbow River will provide The City with more time to respond to flood events (**Exhibit 229, PDF p. 13**). It will also allow The City to eliminate over 40 percent of the emergency actions in its emergency response plan in a 1:200 year event and direct more emergency response resources during such a flood to mitigate impacts on the Bow River, where less flood mitigation infrastructure has been completed to date, increasing overall public safety and reducing damages on both rivers (**Exhibit 357, p. 326-327**). With this additional emergency response capability, combined with the reduced flooding impacts discussed earlier, It is clear from the evidence, Mr. Chair, that not only is SR1 safe, but it increases public safety

### **Alternatives**

23. There have been numerous claims throughout this hearing that MC1 ought to have been chosen by Alberta Transportation over SR1. The City reminds the Board that the Board's

mandate is limited to determining whether SR1 is in the public interest (**Exhibit 156, p.5**). However, given that this Panel indicated in its Prehearing Conference Decision Report (**Exhibit 156, p. 5**) that "a general understanding of the relative merits associated with project alternatives" may be contextually relevant to the Board's decision on public interest, The City presents the following submissions supporting SR1 as the superior choice to MC1.

24. SR1 takes advantage of a natural topographic and geological feature that happens to be underlain by low permeability materials (**Exhibit 385, p. 1680**). The off-stream design of SR1 means that only intermittently, during and for relatively short periods following major floods does it appreciably interact with the Elbow River's fluvial system (**Exhibit 385, p. 1744**). In addition, as already discussed, SR1's off-stream nature makes it less susceptible to "fair weather failure", giving it an advantage over MC1 in terms of operational risk (**Exhibit 229, p. 10**).
25. SR1's catchment is 28% larger than that of MC1 (**Exhibit 131, p. 2517**). The proposed position of MC1 higher in the catchment means that it would not capture rainfall events occurring lower down in the basin that could raise flows between MC1 and the Glenmore Reservoir, such as the event observed in 2005 (**Exhibit 350, p. 158; Exhibit 357, p. 1291**).
26. Drought management has been frequently cited by the interveners opposed to this project as a reason that MC1 ought to have been selected over SR1 by Alberta Transportation. The City's witness was cross examined extensively on The City's water security concerns. With respect, water security is not the purpose of SR1 – its purpose is flood mitigation (**Exhibit 20, p. 1.1; Exhibit 349, p. 100-101**).
27. It is an added public benefit of SR1 that it does provide a modest incremental benefit for water supply: the existence of SR1 will allow The City the flexibility of not needing to draw down Glenmore Reservoir in anticipation of flood season, allowing The City to maintain higher levels in Glenmore for its potable water needs (**Exhibit 373, p. 1273**).
28. The City agrees that water is a precious and limited resource. The City supplies potable water to almost 25 percent of Alberta's population, and takes water quality and supply very seriously (**Exhibit 385, p. 1745-1746**). SR1 will not negatively impact its citizens' and regional

customers' access to water. The City does not anticipate any appreciable changes to the timing and availability of water in the Elbow River with SR1 in place (**Exhibit 229, p. 16**).

29. Further, as an off-stream structure, any potential water quality changes in the Elbow River as a result of the operation of SR1 are expected to be intermittent, of short duration, reversible, and manageable by the water treatment infrastructure at Glenmore Reservoir and the flexibility of The City's water treatment strategy (**Exhibit 229, p. 16; Exhibit 373, p. 1282, Exhibit 385, p. 1746-1747**). Indeed, in the event of an unmitigated flood, pipelines, utilities, and construction materials found in the urban environment are a real concern, and these would pose a real threat to water quality – a threat that would be mitigated by SR1 (**Exhibit 373, p. 1282-1283**).
30. The City has 50-70 year horizon plans in place to address the financial, infrastructure and licensing needs of The City and its regional partners, while considering the region and basin's sustainability for all water licence holders (**Exhibit 385, p. 1746**). While the modest increase in water security provided by SR1 is, as I mentioned, an added benefit, The City does not view the Elbow River as the preferable or practical source as longer-term population, hydrology, treatment, and climate dynamics unfold.
31. The City's water license capability on the Elbow River is essentially optimized with the Glenmore Reservoir, particularly since the installation of the new gates. As stated by Frank Frigo: "the Elbow is only so large of a roof. If you put a bucket at the end of that roof, you're only going to get so much water off of it, especially in times that are more, if you will, "droughty."" (**Exhibit 373, p. 1278**). On the Elbow, there would simply not be enough water; even a larger bucket would provide no appreciable benefit in terms of water supply.
32. The Bow River is the preferable candidate for upstream storage given its larger catchment, higher elevation, glacier, permanent snowfield, less seasonal variability and higher precipitation (**Exhibit 373, p. 1273; 1278; 1279**). That said, as The City has submitted repeatedly throughout these proceedings, while upstream storage on the Bow River is important, so is flood mitigation on the Elbow River. SR1 is necessary.



**Conclusion**

33. There has been a lot of discussion throughout these proceedings about what sort of water management strategies The City wants and needs; to be clear, The City is before this Board to very clearly and emphatically state that what The City needs, today, is SR1. In The City's submission, SR1 is the most important piece of proposed infrastructure in the history of the City of Calgary and the broader Calgary Region. This is not a for-profit natural resources project. This is critical public investment necessary for the protection of human life and regional infrastructure.

34. The Board has seen the evidence of SR1's economic benefits. You've heard how it has been designed to stringent and conservative standards. And you've heard, from the source, that the project's construction and operation will not sacrifice water quality or security. If this project is completed, the residents of Calgary will finally have protection from one of the greatest threats currently facing the City. SR1 is very much in the public interest, and The City urges this Board to recommend its approval.

ALL OF WHICH IS RESPECTFULLY SUBMITTED at the City of Calgary, in the Province of Alberta, this 6<sup>th</sup> day of April, 2021.

**THE CITY OF CALGARY**

Original signed

Per: \_\_\_\_\_

David Mercer

Original signed

Per: \_\_\_\_\_

Melissa Senek

Original signed

Per: \_\_\_\_\_

Sara Munkittrick