

# Alberta Environment and Parks

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Recommendations on the Elbow River  
major infrastructure decisions

October 2015

## SUMMARY

In June 2015, Alberta Environment and Parks commissioned the Dutch research foundation Deltares to review the original infrastructure proposal reports and a subsequent benefit/cost study for flood mitigation work on the Elbow River and provide a recommendation on which project to take forward to construction-ready status.

The Deltares (2015) report recommends moving forward with project design and Environmental Impact Assessment for the Springbank Off-stream Reservoir (SR1) in combination with local mitigation for Bragg Creek and Redwood Meadows because of lower environmental effects, lower cost and less risk during construction when compared to the McLean Creek Dam (MC1).

Deltares' view on protecting communities against flooding over the long term highlights the government's approach to multiple mitigation elements. This includes the importance of being prepared for a range of flood hydrographs. Building infrastructure must be considered a complement to the multiple other facets of mitigation.

The assessment that follows is focused on MC1 and SR1 in combination with upstream mitigation. The scale of these projects offers a substantial reduction in risk and is being designed to the 2013 scale event.

## VALUES AT RISK

- The IBI/Golder Calgary benefit/cost study of 2015 suggests that there is up to \$942 million at risk on the Elbow River during a 1:200 event.

## PROJECT EFFECTIVENESS

- SR1 is more effective than MC1 because it is further downstream and has a larger catchment area. It can respond to rainstorms occurring over a significantly larger area than MC1 by also managing water entering the Elbow River downstream of MC1.
- SR1 is significantly less affected by sedimentation. The amount of large sediment that the Elbow River carried in 2013 is a key factor in supporting off-stream storage.
- MC1 is on-stream, closer to the mountains, and is more likely to trap rocks and trees, putting the structure and its operations at risk.
- Through the design of the SR1 diversion structure, it is possible to look at ways to reduce the impact of sediment on the dam itself.
- SR1 is closer to Calgary and is more accessible. This means that dam operations are more robust, as emergency access to the dam is less likely to be hampered by damage to access roads.

## ENVIRONMENTAL IMPACTS

- The environmental reviews undertaken have consistently described the MC1 proposal as fundamentally more ecologically sensitive to disturbance than SR1.
- The Elbow Valley is home to a number of species at risk or concern, including grizzly bears, harlequin ducks, bull trout, westslope cutthroat trout, and wolverine.
- Construction of MC1 would permanently alter fish habitat and interfere with fish spawning.
- MC1 would require the removal of trees and vegetation from the reservoir area, and would irreparably alter the habitat for wildlife and fish population.
- Deltares notes that “From an environmental point of view, SR1 leaves the river as a more natural system.”<sup>1</sup>
- Since SR1 is an off-stream project, less in-stream work will be required during its construction.

## CONSTRUCTION AND OPERATION RISKS

- Deltares indicates that fewer construction risks makes SR1 the preferred project.<sup>2</sup>
- SR1 is less subject to the risks of flooding and the consequent threat of catastrophic failure during construction when compared to MC1, which involves building a dam in the river itself. Further, should MC1 fail during construction, the communities of Bragg Creek and Redwood Meadows would be subject to severe damage from debris from the partially built dam.
- SR1 is estimated to require less time to build than MC1 because it is less subject to construction windows required by environmental concerns.
- MC1 is an on-stream dam and would be constrained by construction windows which limit when work can happen in the river.
- There is a greater risk of cost increases associated with MC1 because of the complex engineering required, the on-stream nature of the dam, the comparatively limited access to the site, and the more difficult geology.
- The approval process for MC1 has a higher risk of delays to address mitigation of environmental impacts, and it is possible that the project could not receive approval at all.
- The MC1 site is less accessible and more remote than the SR1 site making on-site response to emergencies more challenging.
- Potential debris flows during a flood are more likely at MC1 and could threaten the structure.

## **SOCIAL AND RECREATIONAL VALUE**

- MC1 would have a direct negative impact on the recreational and social values of the region.
- AMEC notes that “current users appear to place a high social value on the area in its present state”.<sup>3</sup>
- The area is the single access point for one of the most heavily used recreational areas in Kananaskis Country with an estimated half a million visitors annually.
- This area includes the primary access to the McLean Creek Off-Highway Vehicle Zone, Moose Mountain Downhill Biking and secondary access to the West Bragg Creek trails, the Elbow River camping and trailhead facilities, and numerous sight-seeing and day use facilities such as “Elbow Falls”.
- Other outdoor recreational opportunities and experiences include cross-country skiing, snowshoeing, hiking, camping, equestrian riding, off-highway vehicle (OHV) use, backpacking, rafting, fishing, hunting, canoeing, kayaking, and paddle boarding.
- The recreation sites and parks in the Elbow Valley that are directly affected by the MC1 proposal are:
  - Gooseberry Public Recreation Area (PRA), including the campground (83 sites) and Elbow Visitor Centre;
  - McLean Creek PRA and OHV Zone, including day use, campground (170 sites), and concession;
  - Elbow River PRA, including Allen Bill day use, River Cove Group Camp, Paddy’s Flats Campground (98 sites) and Group Camp, Station Flats Staging Area, and Elbow Ranger Station.
- There were 17 special events permitted in the Elbow Valley parks this year from May 1, 2015 to October 15, 2015.
- SR1 affects grazing areas and ranch lands for a small number of Albertans. This will have an impact as these are legacy ranching families with a strong stewardship ethic.

## **COMMERCIAL AND TOURISM VALUES**

- From commercial and tourism valuation perspective, SR1 is the preferred project.
- The McLean Creek access point is one of the main arteries into the recreational area.
- In 2014, there were 107 Commercial Guiding and Outfitting Permits representing over 40 different commercial companies involved in over 20 different activities.

## CONSTRUCTION COST ESTIMATES

- SR1 is the preferred project because it is less expensive and therefore has a more favourable benefit/cost ratio.
- The cost referred to in the Deltares report says it includes funding for mitigation in Bragg Creek and Redwood Meadows, but it doesn't include the latest cost estimates required to provide the necessary level of flood protection.
- The actual amount for the project (earmarked for SR1 plus upstream mitigation) is \$297 million. This figure remains cheaper than MC1 and provides protection against the same level of cost damage. Therefore, SR1 still provides the better benefit/cost ratio.
- The initial cost estimates are susceptible to change but the cost-escalation risk for MC1 is higher than for SR1.
- Deltares recommended that compensating landowners after flood events should be considered because it could be less costly than buying the land.

## CONSTRUCTION TIMELINES

- It is expected that SR1 will take less time to construct than MC1.
- AMEC notes that "Special measures would be required for winter construction, including heating and hoarding for concrete, and continuous 24-hour per day earthfill operations" should rapid, year-round construction proceed. Such measures would also affect the cost of construction.<sup>4</sup>
- An additional concern with respect to the construction time of the MC1 project is the uncertainty around identified zones of "moderate and high archaeological potential". Projects unable to avoid damage to historical resources require an "extended regulatory timeline ... including restrictions on winter fieldwork".<sup>5</sup>
- Approval for environmental impacts will likely take longer for MC1 than SR1.
- With reference to MC1, AMEC notes that "The EIA process (preparation and review), combined with the NRCB process ... could take between 2 to 5+ years for these types of projects. Some projects have taken longer."<sup>6</sup> Note that this time would be in addition to the time required for construction.

## CONCLUSION

- Deltares agreed with previous assessments that SR1, combined with local mitigation at Bragg Creek and Redwood Meadows, was less expensive, more environmentally-friendly, could be delivered on a shorter timeline, and presented less risk during construction than MC1.

- There is also a clear recognition that SR1 would capture a storm surge that entered a much wider area of the basin, offering better protection for the City of Calgary over the long term.
- The off-stream design for SR1 better handles sedimentation and is more cost effective.
- The complexity and remote location of MC1 comes with an inherently higher risk of escalating construction costs. Deltares highlighted the potential risk of a major flood event during the construction phase.
- Overall, the assessment and scoring for SR1 are considerably more favourable than for the proposed MC1. When social and recreation values enter into the equation the evidence is overwhelmingly in favour of the social good created by the SR1 project from a cost, environmental, and risk basis.

## REFERENCES

1. *Review of Bragg Creek / Springbank Off-stream Storage and McLean Creek Flood Storage*, Deltares (p.1, 2015)
2. *Review of Bragg Creek / Springbank Off-stream Storage and McLean Creek Flood Storage*, Deltares (p.3, 2015)
3. *Environmental Overview of McLean Creek Dry Dam*, AMEC (p.ii, 2015)
4. *Southern Alberta Flood Recovery Task Force Flood Mitigation Measures for the Bow River, Elbow River and Oldman River Basins*, AMEC (Appendix F, p.25, 2014)
5. *Environmental Overview of McLean Creek Dry Dam*, AMEC (p.ii, 2015)
6. *Environmental Overview of McLean Creek Dry Dam*, AMEC(p.156, 2015)