

THE IMPACT OF BEAVER DAMS ON THE DESIGN AND CONSTRUCTION OF RECLAIMED MINE SITES

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ABSTRACT

The 1990 failure of the Matachewan Consolidated Gold tailings dam in Ontario should have been a wake-up call to the mining industry. Beavers blocked the spillway of this abandoned tailings dam causing the reservoir to overtop, and toxic tailings to be released into the Ottawa River. Almost ten years later, most miners remain unaware of the risk of beaver dams to post-closure landscapes. There is little guidance about how to assess the risk of beaver dams and how to design reclaimed landscapes to endure beaver activity.

As part of its investigations into creating sustainable landscapes at its oils sands mining operations, Synerude Canada Ltd. conducted an interdisciplinary study of beaver dams in northeastern Alberta. The program included observations from visits to over 70 beaver dams and 29 lake outlets, cataloguing of 784 dams from aerial photographs, and review of over 350 books and articles on beaver behaviour.

The program confirmed that beaver activity, especially dam building, has a profound effect on the natural landscape. Beaver dams block streams and lake outlets, attenuate flows, divert streams, flood large areas, trap sediment, create beaver meadows, trigger landslides, and significantly alter the boreal forest ecology. Beaver dams can reach three to four metres high and be over a kilometer long - no stream is too small to dam and few rivers are too large. Large dams can be constructed in just a few days and can be repaired overnight. Beaver colonies can consume up to a hectare of deciduous forest per year and a beaver pond can affect tens of hectares of forest. Outburst flooding of abandoned beaver dams has caused numerous cases of damage to infrastructure.

Reclaimed landscapes must be designed to encourage, discourage, or, in most cases, accommodate beaver behaviour. The cost of building landscapes to accommodate beavers can be significant, although retrofitting previously reclaimed areas is even more expensive. Even given the best design and construction, residual risks remain owing to extreme beaver behaviour and the prohibitive cost of designing for all risks. Because beaver behaviour varies geographically, a local study of dams would be required to adapt landscape design parameters for mines in other regions.