

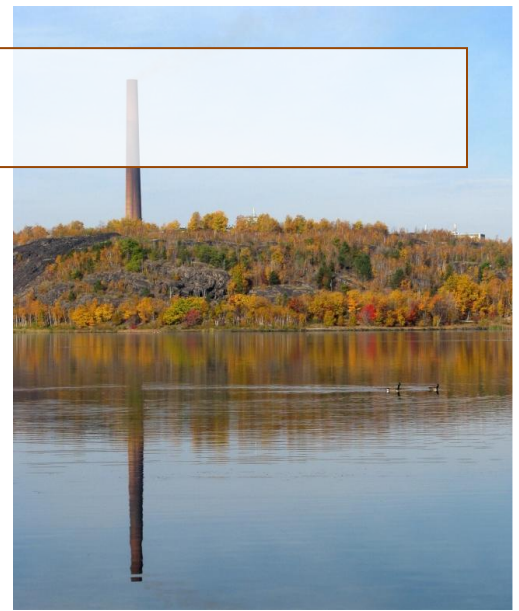
# Mining: in a changing climate

Ontario has already experienced increases in the intensity and frequency of extreme weather events, changes in the distribution of precipitation and warmer temperatures. As the climate continues to change, the province's mining sector will need to recognize these changes, understand how the changes will impact them and develop adaptation strategies to minimize negative impacts to infrastructure and operations. Research on industry perspectives by Ford et al (2010) indicates that climate change is an emerging concern for the mining industry but limited action has been taken to plan for or adapt to changing conditions<sup>2</sup>.

## Mining Infrastructure

Mining infrastructure is vulnerable to changes in climate and weather, for example:

- Climate change has the potential to affect buildings and built structures, slope stability, tailings and water retention structures, and site hydrology<sup>2</sup>.
- Extreme rainfall, rain-on-snow events and rapid melting of the snowpack within a watershed could also overwhelm site drainage and diversion structures, causing excess runoff to tailings impoundments<sup>2</sup>.
- Increased temperatures could lead to increased evaporation and erosion from tailings ponds and passive contamination reduction systems (e.g. wetland filtration)<sup>2,3</sup>.
- In the north, where tailings retention structures depend on frozen conditions, a warming climate could cause the dams to lose their structural integrity over time, possibly leading to failure. At minimum, warming air temperatures could result in increased maintenance and operational costs to keep the embankment frozen<sup>2</sup>.



## Vulnerable areas include<sup>2</sup>:

- Transportation routes (i.e. ice roads, air strips, bridges and pipelines)
- Mining infrastructure (i.e. containment facilities, buildings, energy sources, mine site drainage infrastructure)
- Mine processes (that are highly dependent on water)
- Mine closure (abandoned structures, tailings and waste ponds)



# Mining

## Transportation Infrastructure

- Land-based transportation routes, in northern locations, could face risks from melting permafrost including road embankment instability and accelerated erosion. Ice road networks will also be compromised, as a warming climate will make it more difficult to maintain sufficient ice thicknesses to support heavy traffic flows<sup>2</sup>.

## Acid Rock Drainage

- Increased precipitation may result in increased percolation into the release layer of store and release covers and compromised permafrost covers leading to increased flushing of acid rock drainage and release into the environment<sup>4</sup>.

## Mine closure

Climate change could also impact mine closure plans.

- Decreases in mean annual precipitation and increases in evapotranspiration may lead to drought conditions and may make it difficult to maintain closure scenarios, such as sufficient water cover over tailings

<sup>4</sup>.

- Structures left on-site after closure will need to withstand changing climatic conditions long into the future<sup>2</sup>.
- Abandoned tailings ponds or waste rock stacks may not have been designed for changing climatic conditions and will need to be monitored and retrofitted accordingly<sup>2</sup>.

## References

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3. Pearce, T., Ford, J., Prno, J., and Duerden, F. 2009. Climate change and Canadian mining: opportunities for adaptation. Report prepared for the David Suzuki Foundation Climate Change Program. 159pp.
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