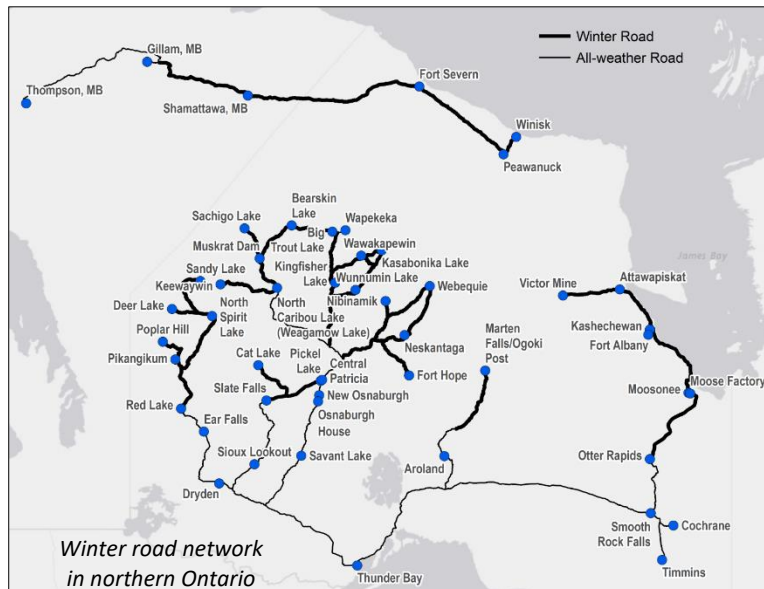




Winter Road Construction

In the far north of Ontario, winter roads connect 31 First Nation communities to an all-season road system further south or west. The winter road season in the far north typically runs about 3 months, from January to March, and connects First Nations to each other and to urban centres, allowing for transportation of goods and access to special services. The climate is changing, and winter roads have and will continue to be affected.

- Weaker, thinner ice
- Delays in winter road opening dates
- Reduction in winter road quality
- More slush
- Melting of underlying permafrost
- Roads may have air pockets and earth patches
- Muskeg no longer freezing well
- Rivers freezing later or not completely, river ice melts faster and break-ups are earlier



Winter road near Peawanuck, March 2014, JIH3Photography



Winter road connecting KI and Wapekeka

What are some construction options?

Change/improve ice road flooding technique

Flooding roads is a common practice to increase the thickness of the ice road and technique varies based on local practice, but the strength of the ice can vary depending on flooding method. Thickening of the ice is usually done with high volume pumps which pump water from beneath the ice onto the surface. The water is applied in layers about 3 cm thick and allowed to freeze before another layer is applied. Read about construction methods in "State of the art of ice bearing capacity and ice construction" by D.M. Masterson.



Flooding pump with submersible auger. (Masterson, 2009)

Reroute roads to avoid water or add bridges over water

To reduce the number of times that the road goes over water where ice can be unsafe, consider moving existing routes away from major rivers to high ground like beach ridges. Extensive consultation and assessments of the land are required similar to what is being done for Webeque's Supply Road <http://www.supplyroad.ca/>. Another option is to build a bridge over rivers and creeks.



Permanent crossing over creek: Government of NWT.

All-season road

As the length of the winter road season continues to shorten, consider building an all-season road. This option can be very expensive and social aspects of connecting remote communities must be considered. Follow the progress of the western James Bay all season road on Facebook: [Mushkegowuk Council All Season Road Feasibility Study](#)



Winter Road Best Practices

Follow the rules!

Proper use of the winter road, especially over water crossings, will help to road last as long as possible. The rules are in place to extend the life of the road. Not following the rules will impact the integrity and safety of winter ice roads.

Vehicles (especially heavy ones) should not park on water crossings as they fracture the ice, reducing its strength. It is also important to follow the speed limit and to keep your distance from the vehicle ahead of you.

Speed limits are not just for the safety of the vehicles and the people in them. Going too fast damages the road. Vehicles travelling on ice generate waves in the ice. When staying below the speed limit, the ice sinks and flexes with the movement of the vehicle. If you speed, waves are formed in the ice which can stress and break it. If the vehicle is travelling too fast, the stress on the ice increases and can lead to extensive cracking, and blowouts that may even break through the ice. The speed vehicles can travel on ice depends on the thickness of the ice, the depth of the water below it and the length of the crossing. More information in [Best Practices for Building and Working Safely on Ice Covers in Ontario](#).



A slow-moving vehicle causes the ice to bend and forms a deflection bowl under the vehicle



A fast-moving vehicle causes the ice to bend and creates dynamic waves in the ice ahead and behind the vehicle



Alert system for unsafe conditions/closure of road

To enforce these best practices, users need to be aware of them. A combination of signs on the road and Facebook posts may help residents and transport drivers follow best practices. Wetum Road, among others, have a Facebook page to keep everyone informed: <https://www.facebook.com/wetumroad/>

Next Steps?

Assess vulnerability of winter roads currently and in the future with changing climate. Consider the alternative construction options and make an action plan to implement them. Communities can also look to incorporate safety training as part of the construction costs.

Resources:

Findings from CIER and Manitoba First Nations research on climate change impacts on winter roads: http://www.yourcier.org/uploads/2/5/6/1/25611440/findings_pamphlet2_3.pdf

Impact of Climate Change on Winter Road Systems in Ontario's Far North: First Nations' and Climatological Perspectives on the Changing Viability and Longevity of Winter Roads. (Hori, Y., University of Toronto, 2016): https://tspace.library.utoronto.ca/bitstream/1807/76442/3/Hori_Yukari_201611_PhD_thesis.pdf