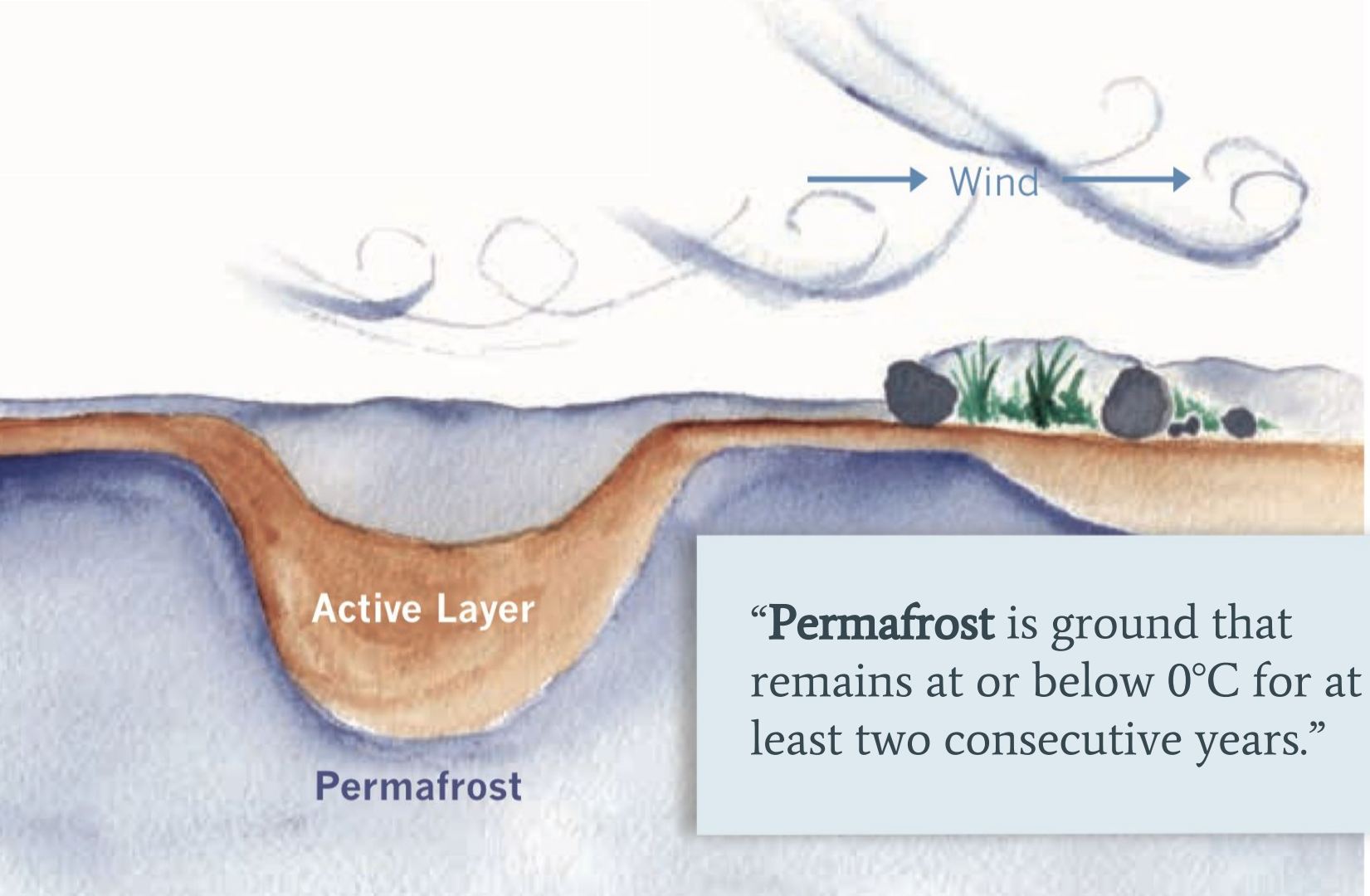
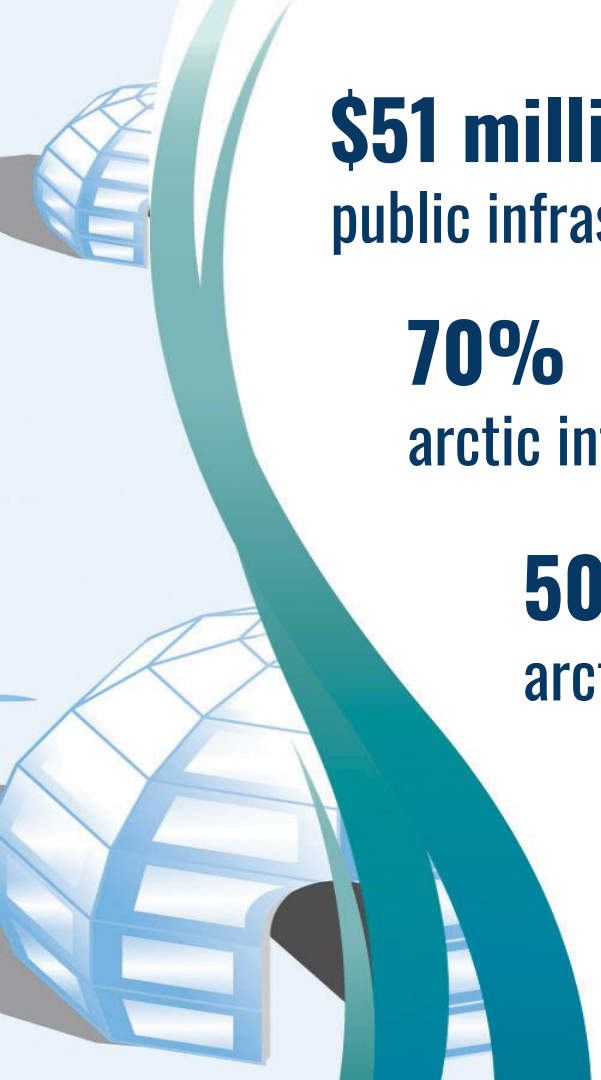

Team 2



"**Permafrost** is ground that remains at or below 0°C for at least two consecutive years."



$51 million
public infrastructure damage per year in NWT

70%
arctic infrastructure sitting on permafrost with high thaw risk

50%
arctic permafrost gone by 2050

$800 000
federal investment in permafrost monitoring research

The Homeowner

1. Is my home at risk?

Investigate Your House and the Area Around It

Black spruce and willows can be indicators of permafrost

Ask around for advice

Permafrost is often not very deep

Vegetation provides a good clue about the existence of permafrost in a location. Look for an undisturbed area near your house that looks similar to your lot. Stunted black spruce, willows, labrador tea and peaty or spongy ground often indicate permafrost. Firm, well-drained soil and large trees such as white spruce and pine often indicate a lack of permafrost.

Soil Type can also be used to determine the location of ice-rich permafrost. Greyish fine-grained clay or river soil is more likely to contain ice-rich permafrost. Gravel, sand, and coarse soils allow water to drain through and, therefore, are less likely to contain ice-rich permafrost.

House Shifting is common in the NWT and is not always caused by permafrost. If you have cracks in the drywall, doors that don't close, sloping floors and an uneven roofline, your house could be built on permafrost.

Ask your neighbours, the community foreman, an equipment operator or the town Senior Administrative Officer (SAO). Many people will know about permafrost in your neighborhood.

Dig a hole to see if you hit permafrost. The best time to perform this test is in late summer, when the active layer is deepest. You'll know you hit permafrost when you can dig no deeper. Dig in a undisturbed area of your property that appears similar to where your house sits. Pay attention to the soil type as you dig.

The Homeowner

2. How can I prevent & monitor damage?

- [x] Level your house periodically if you are on a surface foundation.
- [ ] Clear snow from around the foundation so the ground can freeze more solidly.
- [ ] Check wooden pilings for rot.
- [ ] Reduce water and ice build-up under your house.
- [ ] Clean your eavestroughs and extend your downspouts so they drain away from the house.
- [ ] If snow is drifting or piling up because of the wind, remove the cause of the build-up.
- [ ] Check the natural drainage during a rainstorm. Is water flowing away from your house or towards it?

The Homeowner

3. Do I have a plan B?

"It's pretty much impossible to get insurance or sell a house once permafrost damage starts to show."

- Colleen Healey, climate change program manager, Nunavut Govt

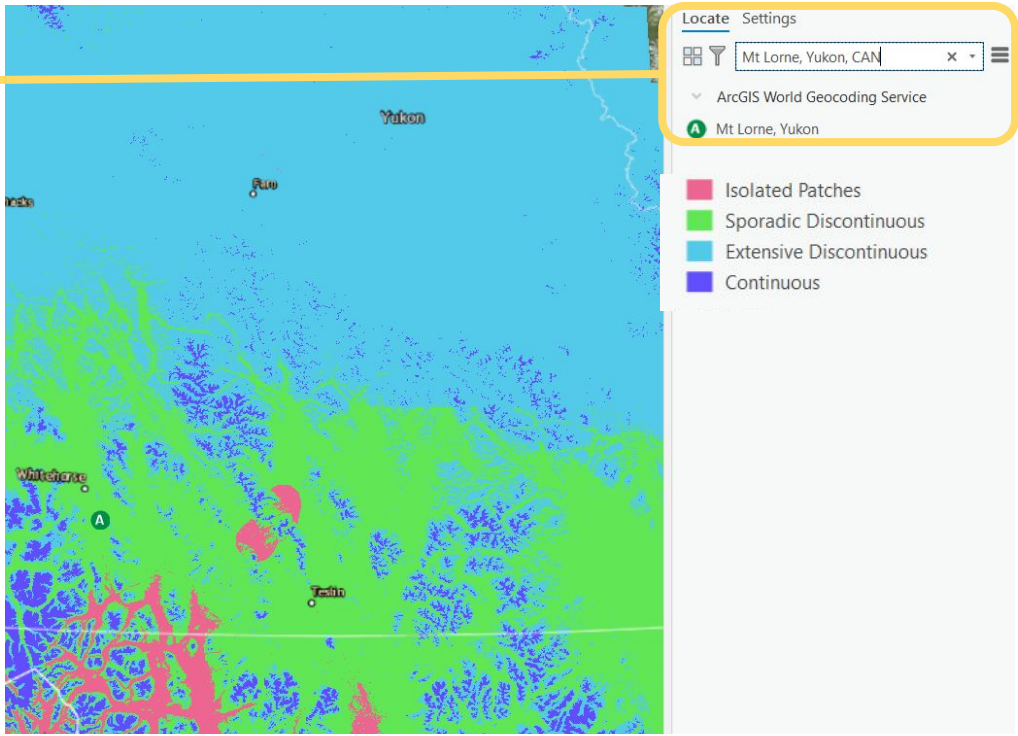
Our Solution

1. Basic **risk assessment** for homes
2. Tangible steps to **mitigate** the effects of permafrost
3. Access to **permafrost insurance**



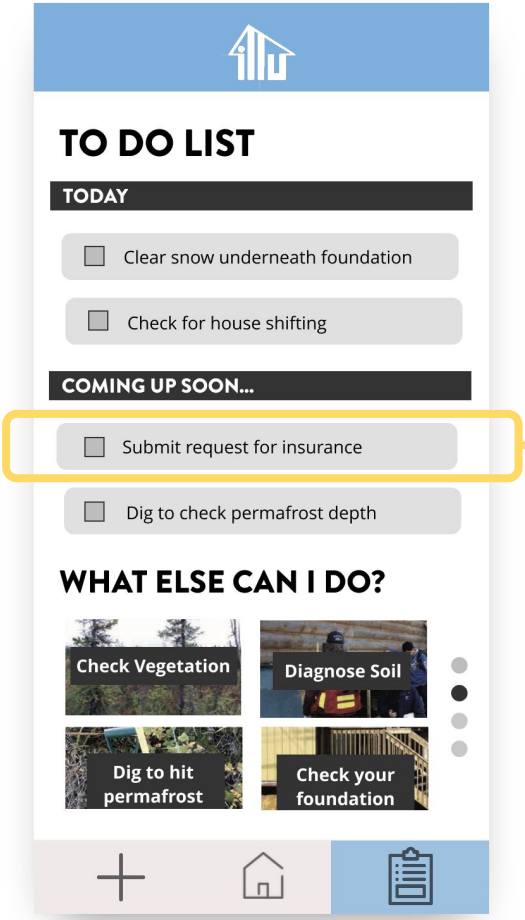

Identify Risk Areas

- Use open data to **predict permafrost** probability & type
- Provide this **information** to homeowners



Mitigate Effects

- Checklist to **assess your home**
- Information and updates on how to **maintain your home**
- Community-based data



Insurance Partnership

- **Derisk homes** through documented prevention strategies
- **Incentivize** sustained, scheduled action & data collection
- Enable **home security** through affordable permafrost insurance

But it is doubly difficult to build in the Arctic if you cannot get insurance for the risks your infrastructure will face. Communities and businesses understandably don't want to build in risky permafrost areas if their infrastructure is not insured. Meanwhile, insurance companies are not confident in their ability to profit off the risk of permafrost thaw. Hence, no market exists, and no one builds.

Through research, risk mapping, and public support, we've managed to create viable insurance markets for infrastructure in earthquake-prone areas around the world, from Mexico to the Philippines. Shouldn't we be able do it in the Arctic with permafrost too?

You may be wondering: If we know permafrost is going to thaw, why built on it at all? First, it's not that easy not to; more than 85 percent of Alaska, for example, is at least partially permafrost. While we know permafrost is thawing, what we don't yet know is where exactly in the Arctic will experience the most severe effects, and where the thaw will be manageable and support construction. Second, it is of vital importance for indigenous communities in the Arctic to maintain their connection to their cultural and spiritual homes in permafrost-rich areas. Third, permafrost is found in places of strategic interest to government and business, like ports and mines, that require nearby infrastructure. And fourth, the alternative to permafrost is finding Arctic bedrock, which, while strong, is exceedingly complex and expensive to build on and creates urban sprawl and new transportation challenges.

Benefit

174 communities impacted

⇧ Increased housing security

$300,000 potential savings for every home

Cost

$33,100 app development

leverage partners for community engagement

The Global Scale

Simple expansion: rich permafrost data exists across the arctic circle

High Impact: 60% percent of buildings in Norilsk, Russia damaged by thaw

Partnership

Moving Forward

Form partnerships

⇩

Adapt to cultural context

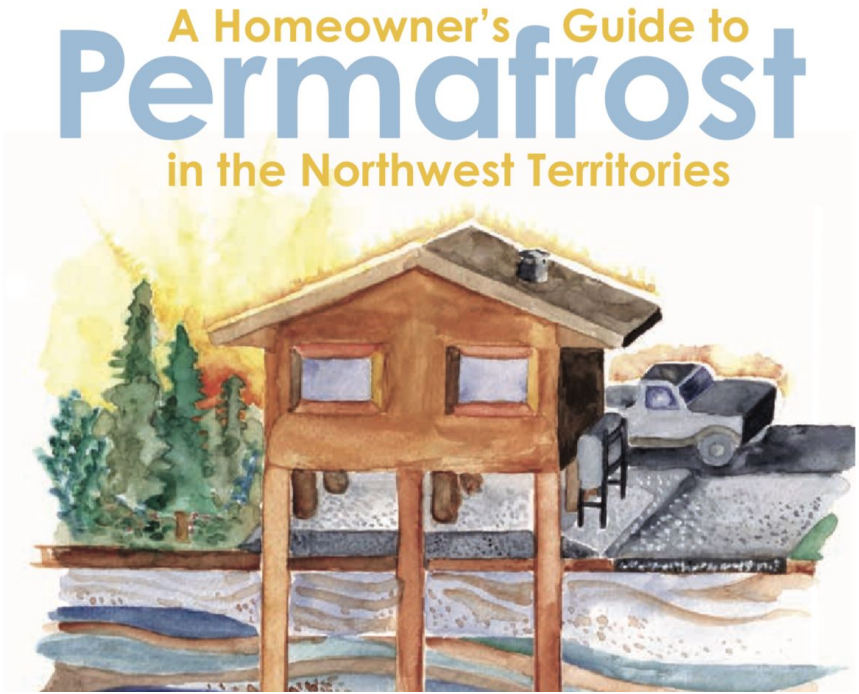
⇩

Enhance risk mapping tool


Thank you!

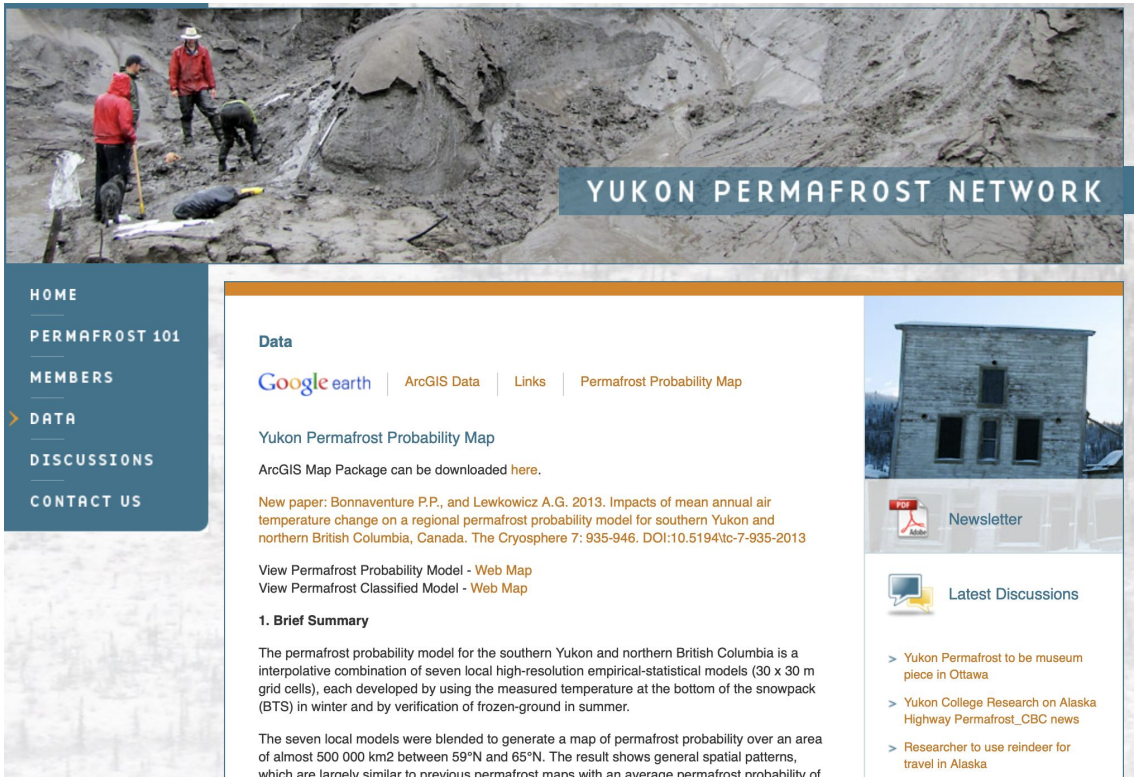
Appendix

https://www.enr.gov.nt.ca/sites/enr/files/permafrost-homeowners-guide.pdf



Appendix

http://permafrost.gov.yk.ca/data/permafrost_probability_map/



Appendix

https://www.arctictoday.com/permafrost-insurance-revolutionize-arctic-development/

How permafrost insurance could revolutionize Arctic development

Permafrost — and its vulnerability to climate change — makes Arctic development risky and expensive. A robust, tailored insurance market could change that.

By **Ross Eisenberg** - December 7, 2018

2300

Share on Facebook | Tweet on Twitter | G+ | P