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## Developing a collaborative permafrost research program: The Dempster - Inuvik to Tuktoyaktuk highway research corridor, Northwest Territories, Canada

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The Beaufort Delta region in Northwest Territories, Canada is one of the most rapidly warming areas on Earth. Permafrost thaw and climate change are major stressors on northern infrastructure, particularly in this region which hosts the highest density of Arctic communities and the longest road network constructed on ice-rich permafrost in Canada. The Dempster and Inuvik to Tuktoyaktuk Highways (ITH) comprise a 400-km corridor connecting the region with southern Canada. The corridor delivers a unique opportunity to develop a societally-relevant, northern-driven permafrost research network to encourage collaboration, and support pure and applied studies that engage stakeholders, encourage community participation, and acknowledge northern interests. Successful implementation requires leadership and institutional support from the Government of the Northwest Territories (GNWT) and Inuvialuit and Gwich'in Boards and landowners, and coordination between research organizations including NWT Geological Survey, Aurora Research Institute, Geological Survey of Canada, and universities to define key research priorities, human and financial resources to undertake studies, and protocols to manage data collection and reporting.

In 2017, a state of the art ground temperature monitoring network was established along the Dempster-ITH corridor by the GNWT in collaboration with Federal and Academic partners. This network in combination with the maintenance of the Dempster Highway and recent design and construction of the ITH, has created a national legacy of permafrost geotechnical, terrain and geohazard information in this region. The objectives of this program are to integrate old and new data to synthesize physiographic, hydrological, thermal, and geotechnical conditions along the corridor, and to develop applied permafrost research projects that support planning and maintenance of this critical northern infrastructure. In this presentation, we highlight: 1) a collaborative research framework that builds northern capacity and involves northerners in the generation of knowledge and its application to increase community based permafrost monitoring; 2) summaries of existing infrastructure datasets and their foundation for research; and 3) new projects that address emerging climate-driven infrastructure stressors. As the effects of climate

change on permafrost environments, infrastructure and communities continue to increase, the need for northern scientific capacity and applied research to support informed decision-making, climate change adaptation and risk management will become increasingly critical. The development of resilient researcher-stakeholder-community relationships is also necessary for the scientific and research initiatives to reach their potential.