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# NORTH YUKON PERMAFROST CONFERENCE

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Dawson City, Yukon — August 21 to 26, 2022



Vuntut Gwitchin Government



CANADIAN PERMAFROST ASSOCIATION  
ASSOCIATION CANADIENNE DU PERGÉLISOL



Crown-Indigenous Relations  
and Northern Affairs Canada

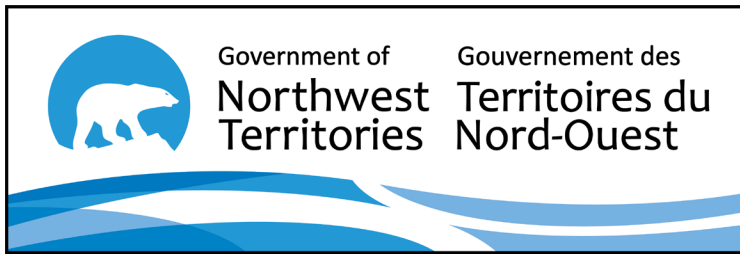
Relations Couronne-Autochtones  
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# Our Sponsors!

The North Yukon Permafrost Conference is funded by the Climate Change Preparedness in the North Program administered by the Department of Crown-Indigenous Relations and Northern Affairs Canada and is made possible by our generous sponsors.



łuk Cho



  
**Yukon**

**CNC-IPA**

**Canadian National Committee  
International Permafrost Association**



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# NORTH YUKON PERMAFROST CONFERENCE

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The North Yukon Permafrost Conference, held August 21 to 26, 2022 in Dawson City, Yukon, is an initiative of the First Nation of Na-Cho Nyak Dun (FNNND), Tr'ondëk Hwëch'in Government (THG), Vuntut Gwitchin Government (VGG), and the Canadian Permafrost Association (CPA). This unique conference focuses on climate change impacts in the traditional territories of the three partner First Nations. The conference themes include climate change impacts on First Nations, community and transportation infrastructure, geohazards, and approaches to adaptation. To allow time for relationship building and small group discussions, the program is unconventional and consists of keynote presentations, panel discussions, poster presentations, half-day field excursions, and evening public lectures. The conference program was developed by a Steering Committee with representatives from the three First Nations and the CPA.

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## Steering Committee

Erika Tizya-Tramm

Vuntut Gwitchin Government

Jim Taggart

Tr'ondëk Hwëch'in Government

Katie Fraser

Tr'ondëk Hwëch'in Government

Josée Tremblay

First Nation of Na-Cho Nyak Dun

Stephan Walke

First Nation of Na-Cho Nyak Dun

Adrienne Hill

First Nation of Na-Cho Nyak Dun

Lukas Arenson

Canadian Permafrost Association

BGC Engineering Inc.

Kumari Karunaratne

Canadian Permafrost Association

Northwest Territories Geological Survey

Chris Burn

Canadian Permafrost Association

Carleton University

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## Organizing Committee

Fiona Nastasi

Tr'ondëk Hwëch'in Government

Louis-Philippe Roy

Yukon University

Derek Cronmiller

Yukon Geological Survey

Peter Morse

Canadian Permafrost Association

Geological Survey of Canada

Astrid Schetselaar

Canadian Permafrost Association

Carleton University

Jennifer Humphries

Canadian Permafrost Association

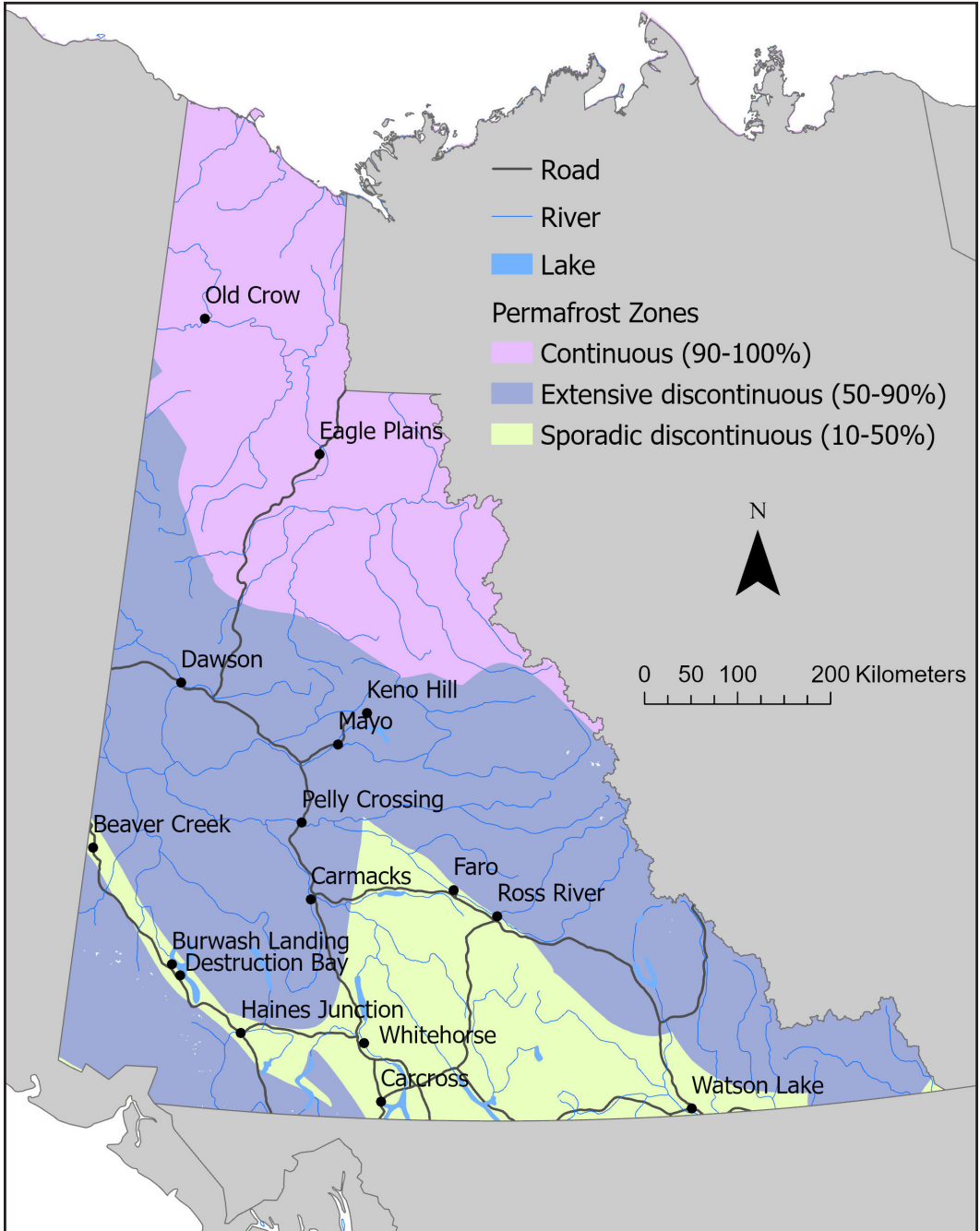
Aurora Research Institute

Barb Fortin

Canadian Permafrost Association

Tetra Tech

# Yukon Permafrost Zones



Map prepared by Fabrice Calmels, Yukon University.

# Permafrost in North and Central Yukon

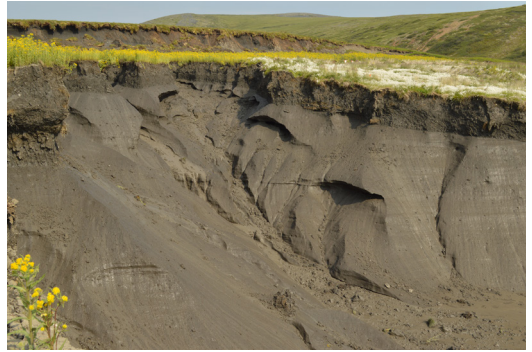
By Chris Burn

Permafrost, that is ground at or below 0 °C for 2 or more years, is present throughout north and central Yukon. Permafrost is found beneath almost all of the ground in and north of the Ogilvie and Wernecke mountains. In central Yukon, the permafrost is discontinuous and underlies over half of the terrain. Vegetation is a useful guide to the presence of permafrost. A moss layer more than 10 cm thick generally indicates permafrost, as well as spruce and birch forest.

Throughout the boreal forest, the ground temperature in permafrost is between -2 and 0 °C. North of tree line, in the tundra, the ground temperature declines to -5 °C and depends on snow cover. The ground is warmest where the snow is thickest. The coldest (-6 °C) and thickest (250 m) permafrost in Yukon is near the Beaufort Sea coast. In central Yukon, the mean permafrost temperature at undisturbed sites is near -1 °C. In Dawson City, where half of the town is underlain by permafrost, the temperature is -0.5 or -0.25 °C and the ground is slowly thawing.

The significance of permafrost for many practical purposes comes from the ice it contains and the consequences for terrain stability of the ground ice melting. In northern parts of the traditional territory of Na-Cho Nyak Dun First Nation, many large thaw slumps have developed in the last 15 years. In this area, glacial ice was buried at the end of the last glaciation about 14,000 years ago and has recently been exposed and is starting thaw. Melting of ground ice may cause failure of infrastructure, as at km 27 of the Dempster Highway in NWT, again in transboundary traditional territories.

Climate change has increased the number and scale of many disturbances to permafrost. The role of increasing groundwater flow has not been emphasized, but it creates many of the problems encountered by infrastructure. Thawing of permafrost is proceeding steadily and gradually but challenges posed by groundwater occur more rapidly. Landslides have also increased in frequency, normally occurring after heavy rain or forest fire. Increases in ground temperature suggest that the permafrost is losing its bearing capacity as the ground approaches 0 °C.



A large thaw slump visible from the Dempster Highway on Peel Plateau in 2016 and a close up of glacial ice buried and intact since the last Ice Age.



Failure of the driving surface of Dempster Highway due to melting of near-surface ground ice, km 27 in 2012.



Sinkhole in 2017 at km 82 of the Dempster Highway from groundwater washing embankment materials downslope. Landslide at km 244 of Dempster Highway in 2019 after a forest fire the previous year.

# Program

## Sunday, August 21

2:00 — 6:00 p.m.	<b>Conference Registration</b>	<b>Yukon University</b>
7:30 — 8:30 p.m.	<b>Opening Reception</b> <b>Sponsored by Carleton University – Northern Studies Program</b> M.C. Kumari Karunaratne, Canadian Permafrost Association Opening prayer — Tr'ondëk Hwëch'in Elder Words of welcome — Chief Roberta Joseph, Tr'ondëk Hwëch'in Government Words of context — Chief Simon Mervyn, First Nation of Na-Cho Nyak Dun Words of commission — Chief Dana Tizya-Tramm, Vuntut Gwitchin Government	<b>Tr'ondëk Hwëch'in Community Hall</b>

## Virtual Program

The presentations and panel discussions of the North Yukon Permafrost Conference can be viewed remotely by registering through the Canadian Permafrost Association website. Funding for the virtual program is provided by the Canadian National Committee of the International Permafrost Association.

## Breakfast

Join us for coffee and a light breakfast at the Palace Grand Theatre from 8:00 to 9:00 am on August 22 to 26. Please bring your own travel mug if possible.

## Lunch

Bagged lunches are provided for the field trips on August 22 & 25. On August 23 & 24 your bagged lunch can be picked up at Yukon University.

## Barbecue



All conference participants are invited to the barbecue at 7:30 pm on Thursday, August 25 at the Dawson City Firehall. All other dinners are on your own.

## Field Trips



The North Yukon Permafrost Conference includes the choice of three field trips offered in the afternoons of August 22 & 25. Please dress appropriately to be outside and bring your own water bottle if possible. The buses will be departing shortly after 12:00 pm so be prepared to go directly from the conference to the Dawson City Visitor Information Centre to get on the bus.




## Monday, August 22

8:00 — 9:00 a.m.	<b>Breakfast</b>	<b>Palace Grand Theatre</b>
9:00 — 9:15 a.m.	<b>Setting the Scene</b> M.C. Joella Hogan, First Nation of Na-Cho Nyak Dun	<b>Palace Grand Theatre</b>
9:15 — 10:15 a.m.	<b>Opening Remarks</b> <i>Conducting permafrost research in the North Yukon First Nations' Traditional Territories</i> Debbie Nagano, Tr'ondëk Hwëch'in Government Mark Wedge, Carcross-Tagish First Nation	 <b>Start of Live Stream</b>
10:15 — 10:30 a.m.	<b>Coffee Break</b>	
10:30 — 11:30 a.m.	<i>Permafrost in North and Central Yukon</i> Chris Burn, Carleton University	
11:30 — 11:45 a.m.	<i>Towards a Vision and Strategy for Canadian Permafrost Knowledge</i> Stephan Gruber, Carleton University	 <b>End of Live Stream</b>
12:00 — 6:00 p.m.	<b>Field Trips</b> <b>Field trips sponsored by</b> <b>Government of Yukon – Department of Highways and Public Works</b> <b>Government of Northwest Territories</b> <b>Lunch sponsored by</b> <b>BGC Engineering</b>  <b>Klondike Goldfields</b> <b>Field Trip Guides</b> Duane Froese, University of Alberta Deputy Chief Simon Nagano, Tr'ondëk Hwëch'in Government Elizabeth Hall, Government of Yukon Derek Cronmiller, Yukon Geological Survey  <b>Dempster Highway</b> <b>Field Trip Guides</b> Fabrice Calmels, Yukon University Cathy Brais, Government of Yukon Gladys Netro, Tr'ondëk Hwëch'in Government Georgette McLeod, Tr'ondëk Hwëch'in Government  <b>Top-of-the World Highway</b> <b>Field Trip Guides</b> Antoni Lewkowicz, University of Ottawa Debbie Nagano, Tr'ondëk Hwëch'in Government Peggy Kormendy, Tr'ondëk Hwëch'in First Nation	<b>Dawson City Visitor Information Centre</b>

## Tuesday, August 23

8:00 a.m. — 9:00 a.m.	<b>Breakfast</b>	Palace Grand Theatre
9:00 a.m. — 9:10 a.m.	<b>Theme 1: Impacts of climate change on First Nations</b> M.C. Jackie Olson, Tr'ondëk Hwëch'in First Nation	Palace Grand Theatre
9:10 a.m. — 10:00 a.m.	<b>Opening Remarks</b>  <i>How Climate Change Impacts First Nation Communities</i> Mark Wedge, Carcross-Tagish First Nation	 Start of Live Stream
10:00 a.m. — 10:15 a.m.	<b>Coffee Break</b> Sponsored by Na-Cho Nyak Dun Development Corporation	
10:15 a.m. — 11:00 a.m.	<b>Panel: Using Indigenous Knowledge in Land-Use Planning</b> Chair: Mathieya Alatini, GSD Strategies Panelists: Mark O'Donoghue, Government of Yukon Debbie Nagano, Tr'ondëk Hwëch'in Government Robert Bruce Jr., Vuntut Gwitchin First Nation	 End of Live Stream
11:00 a.m. — 12:00 p.m.	<b>Breakout discussion groups</b>	
12:00 p.m. — 2:00 p.m.	<b>Poster Session and Lunch</b> Lunch sponsored by beadedstream	Yukon University
2:00 p.m. — 2:10 p.m.	<b>Theme 2: Geohazards</b> M.C. Jeff Bond, Yukon Geological Survey	 Start of Live Stream
2:10 p.m. — 3:00 p.m.	<b>Opening Remarks</b>  <i>Thawing Permafrost and Landscape Dynamics</i> Steve Kokelj, Northwest Territories Geological Survey Jurjen van der Sluijs, Northwest Territories Centre for Geomatics	
3:00 p.m. — 3:15 p.m.	<b>Coffee Break</b> Sponsored by Village of Mayo	
3:15 p.m. — 4:00 p.m.	<b>Panel: Permafrost Carbon</b> Chair: Keely Bass, Vuntut Gwitchin Government Panelists: Pascale Roy-Léveillé, Université Laval Don McPhee, Yukon Environmental and Socio-economic Assessment Board Sue Natali, Woodwell Climate Research Centre	 End of Live Stream
4:00 p.m. — 5:00 p.m.	<b>Breakout discussion groups</b>	
7:30 p.m.	<b>Public Lecture</b> Sponsored by Mayo Renewable Resources Council  M.C. Barb Shannon, Mayo Renewable Resources Council  <i>Animals, People, and Climate Change in Central and Northern Yukon</i> Mark O'Donoghue, Government of Yukon Chris Burn, Carleton University	Palace Grand Theatre

## Wednesday, August 24

8:00 a.m. — 9:00 a.m.	<b>Breakfast</b>	Palace Grand Theatre
9:00 a.m. — 9:10 a.m.	<b>Theme 3: Climate Change Adaptation</b> M.C. Lukas Arenson, BGC Engineering	Palace Grand Theatre  Start of Live Stream
9:10 a.m. — 10:00 a.m.	<b>Opening Remarks</b> <b>Panel:</b> <i>A Northern Tutchone Perspective on Climate Change Adaptation</i> Chair: John Meikle Panelists: Jimmy Johnny, First Nation of Na-Cho Nyak Dun Frank Paterson, First Nation of Na-Cho Nyak Dun Kadrienne Hummel, First Nation of Na-Cho Nyak Dun	
10:00 a.m. — 10:15 a.m.	<b>Coffee Break</b> Sponsored by Core Geosciences	
10:15 a.m. — 11:00 a.m.	<b>Panel:</b> <i>Environmental Components of Mining in Permafrost Terrain</i> Chair: Stephan Walke, First Nation of Na-Cho Nyak Dun Panelists: Justin Pigage, Crown-Indigenous Relations and Northern Affairs Canada Bill Slater, Slater Environmental Elliott Skierszkan, University of Saskatchewan	 End of Live Stream
11:00 a.m. — 12:00 p.m.	<b>Breakout discussion groups</b>	
12:00 p.m. — 2:00 p.m.	<b>Poster Session and Lunch</b> Lunch sponsored by Cryogeek	Yukon University
2:00 p.m. — 2:10 p.m.	<b>Theme 4: Community infrastructure</b> M.C. Jocelyn Hayley, University of Calgary	Palace Grand Theatre  Start of Live Stream
2:10 p.m. — 3:00 p.m.	<b>Opening Remarks</b> <i>The Impact of Permafrost on Construction: Experience from Dawson City in the 1970s</i> Don Hayley, Hayley Arctic GeoConsulting	
3:00 p.m. — 3:15 p.m.	<b>Coffee Break</b> Sponsored by Golder - Member of WSP	
3:15 p.m. — 4:00 p.m.	<b>Panel:</b> <i>Infrastructure and Permafrost in Yukon Communities</i> Chair: Bill Kendrick, Mayor of Dawson City Panelists: Bill Kendrick, Mayor of Dawson City Joann Aird, Village of Mayo Priyank Thatté, Government of Yukon Richard Trimble, Tetra Tech	 End of Live Stream
4:00 p.m. — 5:00 p.m.	<b>Breakout discussion groups</b>	
7:30 p.m.	<b>Public Lecture</b> Sponsored by Yukon Geological Survey M.C. Jody Beaumont, Tr'onðëk Hwëch'in First Nation <i>Klondike 'Cold' Rush: Treasures in Ancient Ice</i> Duane Froese, University of Alberta	Palace Grand Theatre

## Thursday, August 25

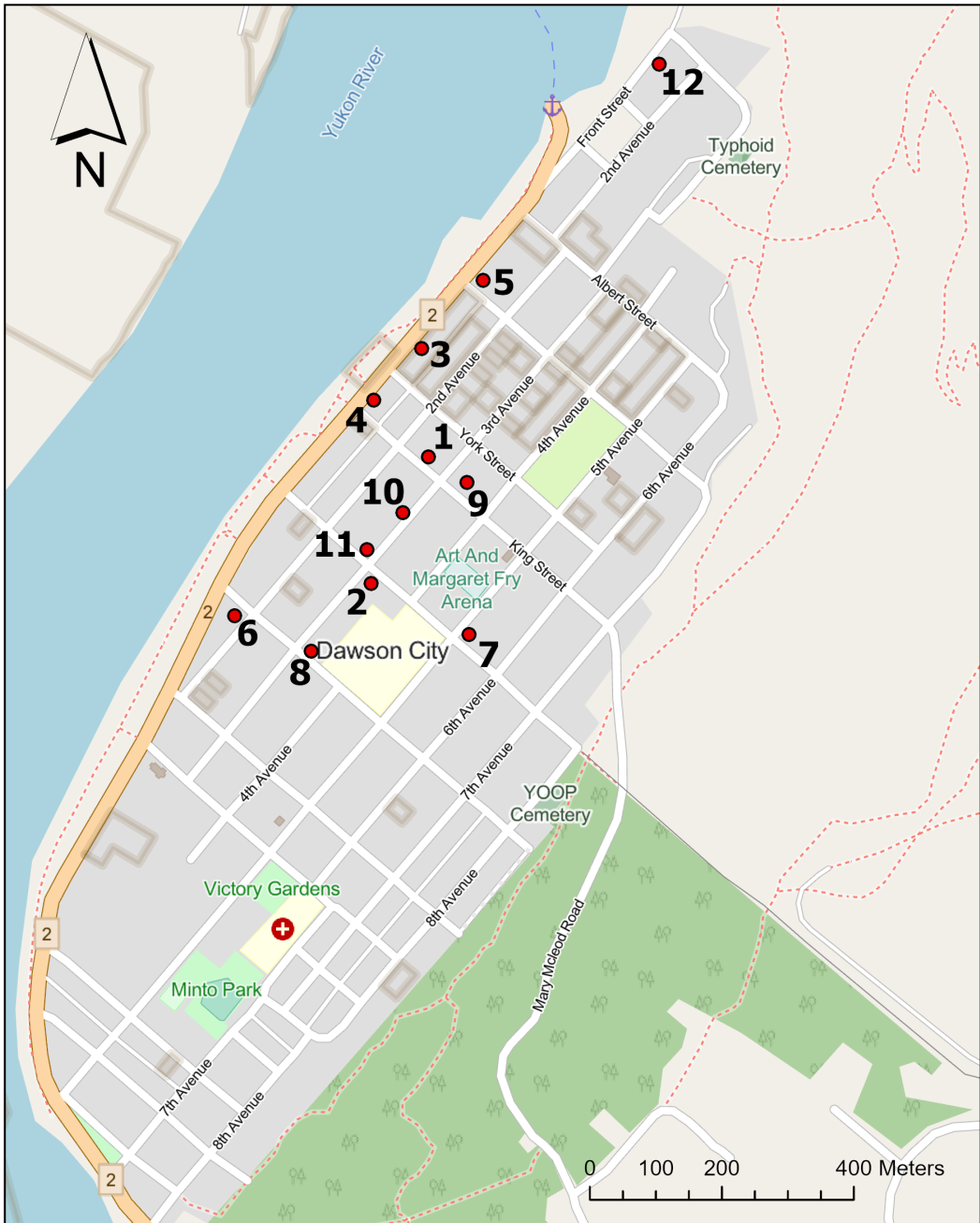
8:00 a.m. — 9:00 a.m.	<b>Breakfast</b>	Palace Grand Theatre
9:00 a.m. — 9:10 a.m.	<b>Theme 5: Transportation Infrastructure</b> M.C. Guy Doré, Université Laval	Palace Grand Theatre  Start of Live Stream
9:10 a.m. — 9:30 a.m.	<b>Opening Remarks</b> <i>From Sinkholes to Thaw slumps: Impacts of permafrost on Yukon Highways</i> Fabrice Calmels, Yukon University	
9:30 a.m. — 9:50 a.m.	<i>Dry Creek Permafrost Stabilization Project: Evaluating Adaptation Techniques for the Long Road Ahead</i> Chris Stevens, Northern Permafrost Consulting	
9:50 a.m. — 10:05 a.m.	<b>Coffee Break</b> <b>Sponsored by Associated Engineering</b>	
10:05 a.m. — 10:45 a.m.	<b>Panel: Managing Highway Sustainability</b> Chair: Robin Chambers, Government of Yukon Panelists: Cathy Brais, Government of Yukon Ryley Beddoe, Royal Military College of Canada Ed Hoeve, Hoeve engineering	 End of Live Stream
10:45 a.m. — 11:45 p.m.	<b>Breakout discussion groups</b>	
12:00 p.m. — 6:00 p.m.	<b>Field Trips</b> <b>Field trips sponsored by</b> <b>Government of Yukon – Department of Highways and Public Works</b> <b>Government of Northwest Territories</b> <b>Lunch sponsored by</b> <b>Tetra Tech</b>  <b>Klondike Goldfields</b> <b>Field Trip Guides</b> Duane Froese, University of Alberta Deputy Chief Simon Nagano, Tr'ondëk Hwëch'in Government Elizabeth Hall, Government of Yukon Derek Cronmiller, Yukon Geological Survey  <b>Dempster Highway</b> <b>Field Trip Guides</b> Fabrice Calmels, Yukon University Cathy Brais, Government of Yukon Gladys Netro, Tr'ondëk Hwëch'in Government Georgette McLeod, Tr'ondëk Hwëch'in Government  <b>Top-of-the World Highway</b> <b>Field Trip Guides</b> Antoni Lewkowicz, University of Ottawa Debbie Nagano, Tr'ondëk Hwëch'in Government Peggy Kormendy, Tr'ondëk Hwëch'in First Nation	Dawson City Visitor Information Centre
7:30 p.m.	BBQ	Dawson City Firehall

# Friday, August 26

8:00 a.m. — 9:00 a.m.	<b>Breakfast</b>	Palace Grand Theatre
9:00 a.m. — 10:30 a.m.	<b>Reporting &amp; Recommendations</b> M.C. Kumari Karunaratne, Canadian Permafrost Association  <b>Opening Remarks</b> <b>Panel:</b> <i>Conference Theme Recommendations</i> Chair: Stephan Gruber, Carleton University	 <b>Start of Live Stream</b>
10:30 a.m. — 11:00 a.m.	<b>Coffee Break</b>	
11:00 a.m. — 12:00 p.m.	<b>Closing Ceremony</b> M.C. Kumari Karunaratne, Canadian Permafrost Association Closing Remarks Chief Dana Tizya-Tramm, Vuntut Gwitchin Government Chief Simon Mervyn, First Nation of Na-Cho Nyak Dun Chief Roberta Joseph, Tr'ondëk Hwëch'in Government Closing prayer – Tr'ondëk Hwëch'in Elder	 <b>End of Live Stream</b>

# Conference Locations

- 1. Palace Grand Theatre**  
255 King St., Dawson City, YT
- 2. Yukon University – Tr’odëk Hätr’unohtän Zho Campus**  
982 Third Ave, Dawson City, YT
- 3. Tr’ondëk Hwëch’in Hall**  
1242 Front St, Dawson City, YT
- 4. Dawson City Visitor Information Centre**  
1102 Front St., Dawson City, YT
- 5. Dawson City Firehall**  
1336 Front St., Dawson City, YT
- 6. Dawson City Bunkhouse**  
Princess St & 2nd Ave, 883 2nd Avenue, Dawson City, YT
- 7. Triple J Hotel**  
5th & Queen, Dawson City, YT
- 8. Eldorado Hotel**  
902 Third Ave, Dawson City, YT
- 9. Klondike Kate’s Cabins**  
1136 Third Ave, Dawson City, YT
- 10. Dawson Lodge**  
1057 Third Ave, Dawson City, YT
- 11. Midnight Sun Hotel**  
3rd Ave &, Queen St, Dawson City, YT
- 12. Whitehouse Cabins**  
1626 Front St, Dawson City, YT Y0B 1G0



# Schedule at a Glance

	Sunday 21 August	Monday 22 August	Tuesday 23 August	Wednesday 24 August	Thursday 25 August	Friday 26 August
8:00 a.m.		Palace Grand Theatre Breakfast	Palace Grand Theatre Breakfast	Palace Grand Theatre Breakfast	Palace Grand Theatre Breakfast	Palace Grand Theatre Breakfast
9:00 a.m.		<b>Setting the Scene</b>  Presentation by: Mark Wedge & Debbie Nagano  Presentation by: Chris Burn  Canadian Permafrost Knowledge Strategy by: Stephan Gruber	<b>Theme 1: Climate Change Impacts on First Nations</b>  Presentation by: Mark Wedge  Panel Discussion: <i>Using Indigenous Knowledge in Land Use Planning</i>  Breakout Discussion Groups	<b>Theme 3: Climate Change Adaptation</b>  Panel Discussion: <i>A Northern Tutchone Perspective on Climate Change Adaptation</i>  Panel Discussion: Mining in Permafrost Terrain  Breakout Discussion Group	<b>Theme 5: Transportation Infrastructure</b>  Presentation by: Fabrice Calmels  Presentation by: Chris Stevens  Panel Discussion: <i>Managing Highway Sustainability</i>  Breakout Discussion Group	<b>Reporting and Recommendations</b>  Panel Discussion: Reporting & recommendations on the five conference themes  <b>Closing Ceremony</b>
12:00 p.m.		Depart from Dawson City Visitor Information Centre	Yukon University Posters & Lunch	Yukon University Posters & Lunch	Depart from Dawson City Visitor Information Centre	
2:00 p.m.	Yukon University Conference Registration	Field Trips	Palace Grand Theatre <b>Theme 2: Geohazards</b>  Presentation by: Steve Kokelj & Jurjen van der Sluis  Panel Discussion: <i>Permafrost Carbon</i>  Breakout Discussion Group	Palace Grand Theatre <b>Theme 4: Municipal Infrastructure</b>  Presentation by: Don Hayley  Panel Discussion: <i>Yukon Community Infrastructure</i>  Breakout Discussion Groups	Field Trips	
		Return 4:00 – 6:00pm			Return 4:00 – 6:00pm	
7:30 p.m.	Tr'ondëk Hwëch'in Hall Opening Reception		Palace Grand Theatre <b>Public Lecture</b>  <i>Animals, People, and Climate Change in Central and Northern Yukon</i>  Mark O'Donoghue & Chris Burn	Palace Grand Theatre <b>Public Lecture</b>  <i>Klondike 'Cold' Rush: Treasures in Ancient Ice</i>  Duane Froese	Dawson City Firehall BBQ	