## ACKNOWLEDGMENTS

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Mate, D. and Reinhart, F. (Ed.), 2011. Nunavut Climate Change Partnership Workshop, February 15-16, 2011; Geological Survey of Canada, Open File 6867, 1 CD-ROM. doi:10.4095/288645

This map illustrates the surficial geology of Iqaluit, Nunavut's capital city. Rather flat, sandy and gravelly glaciofluvial and glaciomarine sediments extend under the airport and its surroundings as well as in Apex. Precambrian bedrock with partial and uneven till cover is found under newly built areas on hilly terrain and plateaus. The area is underlain by continuous permafrost, which causes important technical challenges for the maintenance of infrastructure. A

larger scale view of the airport sector emphasizes

patterned ground features and the networks of frost

Cette carte présente les dépôts de surface de la région d'Iqaluit, capitale du Nunavut. Des dépôts fluvioglaciaires et glaciomarins sableux et graveleux formant des reliefs peu accidentés s'étendent sous l'aéroport et ses environs de même que dans le secteur d'Apex. Le roc précambrien partiellement couvert de till caractérise la plupart des secteurs de construction récente sur les collines et les plateaux. La ville est entièrement bâtie sur le pergélisol continu, ce qui représente un défi technique important pour le maintien de l'intégrité des infrastructures. Une étude à plus grande échelle du secteur de l'aéroport est aussi présentée afin d'illustrer le réseau de sols structurés et de fentes de contraction

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National Topographic System reference

Cover illustration: City of Iqaluit. Photograph by A.-M. LeBlanc. 2011-050

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**CANADIAN GEOSCIENCE MAP 64** (preliminary version) SURFICIAL GEOLOGY **IQALUIT** 

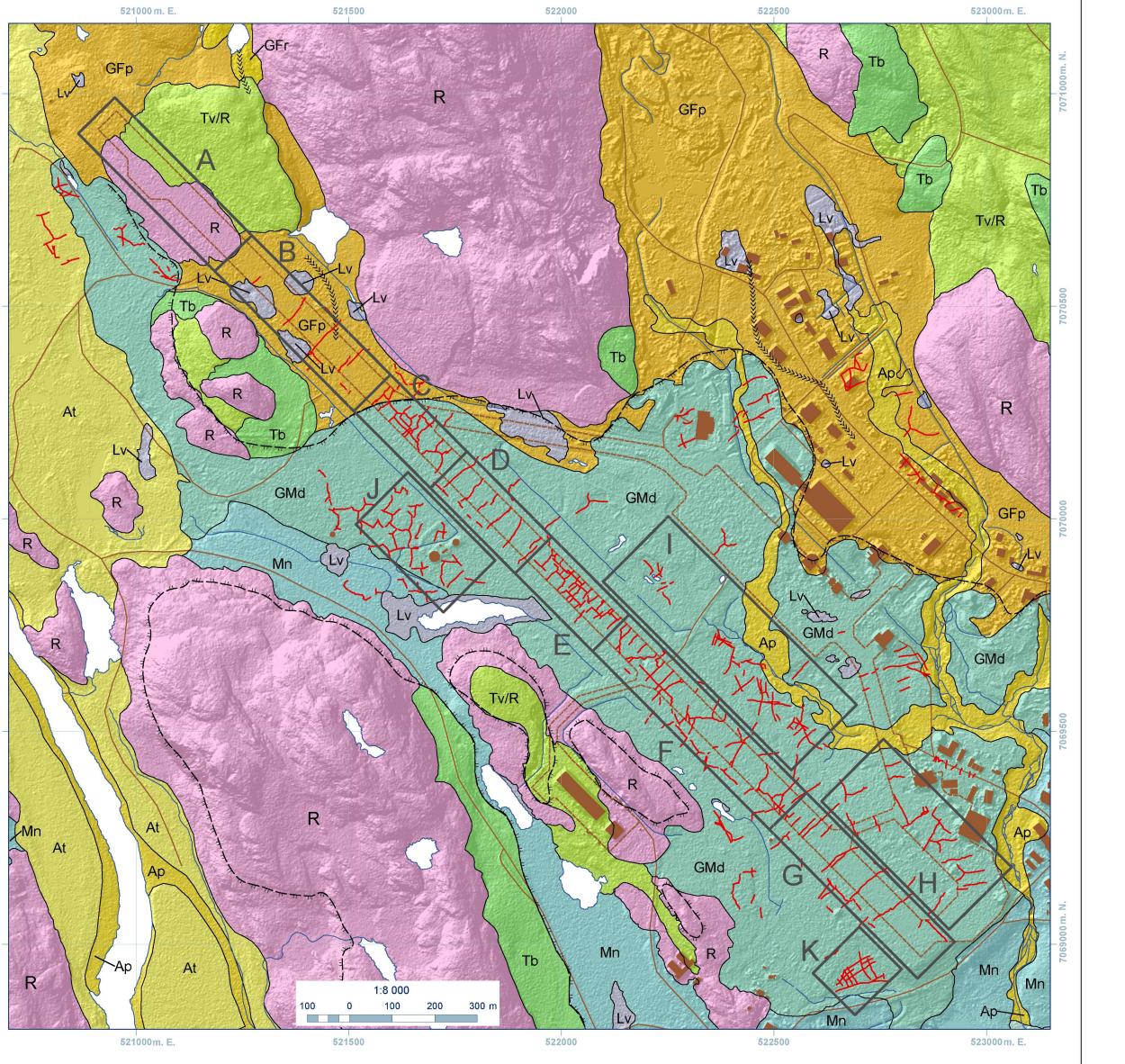


Four trim marks around perimeter of map sheet. Trim map sheet first, then fold at folding marks.

Canadian **Geoscience** Maps du Canada

Canada

## 521000 m. E. 528000m. E.



## Airport sector: frost crack patterns

This map enlargement shows the surficial geology and frost crack patterns in the Iqaluit airport area. These patterns have been mapped based on ground surveys (2011) and from aerial photographs from 1976 (A24492-86 to 92 and 120 to 125) at the nominal scale of 1:6000. Only the cracks visible on the photographs (the main ones) were mapped. The current interpretation is that in runway sectors with widely spaced frost cracks transverse to the runway (B, D, G), winter frost contraction takes place principally in the thick embankment. Runway sectors on a thin embankment (C, E, F, H) have polygonal cracks patterns similar to nearby natural terrain (I, J, K). Therefore frost cracking would have propagated from the underlying pre-construction patterned ground. Sector A, with no large

Large crack pattern			
Sector	Pattern	Average crack spacing (m)	Interpretation
Α	No major frost cracks	0	Runway on cut bedrock
В	Transverse	100	Thick embankment: little or no influence of the pre-construction cracking conditions
С	Orthogonal	45	Relatively thin embankment: pattern similar to natural terrain and influence by pre-construction cracking conditions
D	Transverse	45	Thick embankment: little or no influence of the pre-construction conditions
E	Orthogonal	12 to 30	Relatively thin embankment: pattern similar to natural terrain and influence by pre-construction cracking conditions
F	Transverse, longitudinal and oblique	85 (oblique) 25 (transverse)	Relatively thin embankment: pattern similar to natural terrain and influence by pre-construction cracking conditions
G	Transverse	85	Thick embankment: little or no influence of the pre-constructions conditions
Н	Orthogonal	40	Relatively thin embankment: pattern similar to natural terrain and influence by pre-construction cracking conditions
Ì	Orthogonal non-oriented	2 to 60	Natural terrain: cracking pattern influenced by soil properties
J	Hexagonal (isotropic)	45 (larger ones) 25 (smaller ones)	Natural terrain: cracking pattern influenced by soil properties
K	Orthogonal oriented	30 (larger ones) 15 (smaller ones)	Natural terrain: cracking pattern influenced by soil properties

This publication, including digital data, can be downloaded

free of charge from GeoPub (http://geopub.nrcan.gc.ca/).

It is also available from the Geological Survey of Canada

Bookstore (http://gsc.nrcan.gc.ca/bookstore).

Table 1. Large crack pattern

Allard, M., Doyon, J., Mathon-Dufour, V., LeBlanc, A.-M., L'Hérault, E., Mate, D., Oldenborger, G.A., and Sladen, W.E., 2012. Surficial geology, Iqaluit, Nunavut; Geological Survey of Canada, Canadian Geoscience Map 64 (preliminary version), scale 1:15 000.

QUATERNARY

HOLOCENE SEDIMENTS

Alluvial and lacustrine deposits

drained kettle lake sediments.

Permafrost may be present.

regression of a high sea level.

ridges. Ice wedges occasionally present.

front of ice margins.

and massive ice bodies.

PLEISTOCENE AND EARLY HOLOCENE

тттт Limit of submergence, glaciomarine - approximate

Limit and label of frost cracks pattern sectors - airport area

PRE-QUATERNARY

R Bedrock: Precambrian.

Geological boundary

>>>>> Esker ridge

---- Beach crest

\_\_\_\_\_ 2006 drainage network

Bedrock outcrops

Date Material Lab no Elev.(m) F 14C date location

••••• Moraine

contain ice wedges and massive ice bodies.

matrix; 0.5–2 m thick; bedrock topography is evident.

permafrost may be occasionally present.

bouldary mudflats. No permafrost expected.

Actual marine deposits

Undifferientiated organic deposits: thin organic rich soils in poorly drained

Alluvial floodplain sediments: gravel, sand, boulders, minor silt, and muck;

Alluvial terraced sediments: gravel, sand, boulders, minor silt, and muck;

environment; includes allochthonous organic sediment and drained kettle lake

Intertidal sediments: silt and sandy silt deposited in the intertidal zone; mostly

Littoral and nearshore sediments: sediments deposited as beaches.

Postglacial marine deposits: sediments deposited during post-glacial

Littoral and nearshore sediments: sand, silty sand, gravelly sand, and gravels generaly stratified and well sorted; deposited as beaches where ice wedges in

Marine veneer: sand, silty sand, gravelly sand, and gravel; 0.5-2 m thick; Mv discontinuous cover of littoral and offshore sediments; characterised by beach

Glaciomarine deposits: sediments deposited in the high pro-glacial sea.

termination of outwash trains or meltwater channels; deposited in a higher

Glaciomarine delta: sand, silt, boulders, and gravel; 2-20 m thick; massive to crossbedded sediments that coarsen upwards in ice-contact deposits or at

postglacial sea. Near surface deposits are affected by extensive ice-wedge

Glaciofluvial deposits: sediments deposited by meltwater behind, at, and in

Glaciofluvial esker deposits: poorly stratified to sorted gravel, sand, and

Glaciofluvial subaerial outwash plain: stratified gravel and sand; 1–30 m thick; proglacial floodplains, terraces, and fans; includes kame terraces, buried esker ridges, minor subglacial, and subaquatic deposits, locally kettled: sediments deposited by meltwater behind, at, and in front of ice margins. May

Till: sediments deposited in subglacial and ice-marginal environments. Till blanket: diamicton; sand, gravel, and boulders in a silty sand matrix; 1–10 m thick; generally masks bedrock structure; also appears in end moraines; affected by periglacial processes such as solifluction lobes, frost boils, and sorted patterns. Susceptible to thaw slumping on slopes or in

Till veneer: diamicton, contains sand, stones, and boulders in a silty sand

boulders; 5–20 m thick, forming ridges and hummocks; sediments deposited by meltwater behind, at, and in front of ice margins. May contain ice wedges

At 1–10 m thick on raised fluvial terraces. Ice-wedges present in the near surface

Lacustrine veneer: gravel, sand, silty sand, and silt deposited in a lacustrine

sediments; may include reworked sediments from underlying units; includes

1–10 m thick; deposited in braidplains; actual floodplain.

**Preliminary** 

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Geology by M. Allard, J. Doyon, and V. Mathon-Dufour, 2010 Surficial and periglacial-permafrost geology mapping based on ground surveys (2010–2011; M. Allard, V. Mathon-Dufour, J. Doyon, E. L'Hérault and A-M. LeBlanc), and air photo interpretation by M. Allard, V. Mathon-Dufour and J. Doyon using 1:20 000 scale black and white vertical photos, flight line A11535, July 23, 1948, photos 1-43.

Cartography by J. Doyon, V. Mathon-Dufour, and R. Boivin Map projection Universal Transverse Mercator, zone 19. North America Datum 1983 Infrastructure on this map provided by the city of Iqaluit, 2010.

524000

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**CANADIAN GEOSCIENCE MAP 64** 

528000m. E.

527000

**SURFICIAL GEOLOGY IQALUIT** Nunavut 1:15 000 250 0 250 500 750 1000 1250 1500 m **Preliminary** 

Shaded relief image prepared by J. Doyon and derived from digital elevation model created from 50cm Worldview-1 stereo satellite images acquired August 19, 2008. 1m DEM created with proprietary stereo image matching process by PhotoSat Information Ldt.

Illumination: azimuth 315°, altitude 45°, vertical factor 1x. Proximity of the North Magnetic Pole causes the magnetic compass to be erratic in this area.

Magnetic declination 2012, 29°58'W, decreasing 25.0' annually.

**Preliminary** 

**CANADIAN GEOSCIENCE MAP 64** 

(preliminary version) **SURFICIAL GEOLOGY**