Résumé

Cette carte présentele potentiel de construction et les types de fondations selon les cond itions de pergélisol et les pentes de la région de Salluit. Ce village se situe au Nunavik, sur la la rive sud du détroit d'Hudson, à 600 km au nord-ouest de Kuujjuaq (62°12' N ; 75°39' O).

Note

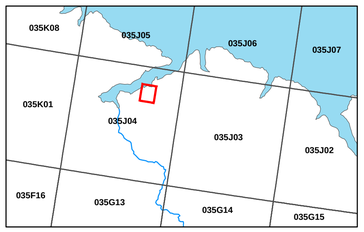
Cette carte a été compilée principalement par photo-interprétation et validée avec un nombre limité d'observations de terrain, de sondages et de forages dans le pergélisol. Toute information pouvant en améliorer la précision et éventuellement conduire à la production d'une mise à jour sera appréciée.

Abstract

This map shows the construction potential and foundation design options based on permafrost conditions and slopes of the Salluit region. This Nunavik village is located on south shore of the Hudson Strait, at 600 km to the North-West of Kuujjuaq (62°12' N ; 75°39' W).

Note

This map was compiled mainly by air photo interpretation and validated by a limited number of terrain observations, probing and drill holes in the permafrost. Any information leading to an improvement of precision and, eventually, an update of the map will be received with thanks.



Système national de référence cartographique

The National Topographic System of Canada

RNCan, gouvernement du Canada, centre d'information topographique (2008). Index vectoriels du système national de référence cartographique du Canada.

Vector Indexes of the National Topographic System of Canada. Government of Canada, Natural Resources Canada, Earth Sciences Sector, Mapping Information Branch, Centre for Topographic Information (2008).

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Salluit, Nunavik, Québec.
Photographie par Antoine Boisson / Photocredits: Antoine Boisson

Centre d'études nordiques, Québec, 2020

Construction potential and foundation design adapted to permafrost conditions and slopes

SALLUIT

Québec, Nunavik

1 : 8 000

INFRASTRUCTURE

Buildings · Roads · Airport · Water bodies · Isolated rock outcrops

Construction potential and foundation design adapted to permafrost conditions and slopes

Thaw-stable ground: Bedrock and superficial deposits with no or little ice content

1a Massive bedrock of Precambrian age with a very sparse thin and discontinuous cover of sand, gravel and boulders (till).

Active layer depth varies across the terrain from 2.5 to 3.5 m.

All types of northern foundations. Adaptations to rugged topography are often necessary.

- Terrain manageable for construction (slope < 7.5°).
- Terrain manageable for construction but may require significant earthwork (slope between 7.5 and 15°).
- Terrain unsuitable for construction (slope > 15°).

1b Layered sand and gravel deposits. Contains pore ice and occasional ice lenses in fine sand and silty layers.

Northern foundations on adjustable post and pad or on piles. Buildings with slab-on-grade foundations might need elaborated techniques to retain permafrost in its frozen state (ex.: thermosyphons).

- Terrain manageable for construction (slope < 5°).
- Terrain manageable for construction but may require significant earthwork (slope between 5 and 10°).
- Terrain unsuitable for construction (slope > 10°).

Thaw-unstable ground: Ice-rich permafrost in superficial deposits

2a Thin cover of sand, gravel and boulders over bedrock. The thickness of the deposits is generally less than 2 m. Topography is controlled by bedrock. Scattered rock outcrops. Active layer depth varies across terrain from 1.5 to 2.5 m. Thaw settlement of permafrost restricted to the superficial cover. Volumetric ice contents in the surface sediments vary from 15 to 70%.

Deep northern foundations on the underlying bedrock applicable (ex.: pile foundations). Adjustable post and pad foundations also feasible. Buildings with slab-on-grade foundations need elaborated techniques of terrain preparation (ex.: removal or pre-thaw of frozen sediments and consolidation).

- Terrain manageable for construction (slope < 4°).
- Terrain manageable for construction but may require significant earthwork (slope between 4 and 8°).
- Terrain unsuitable for construction (slope > 8°).

2b Thick cover of sand, gravel and boulders (till) over bedrock. The thickness of the deposits is generally more than 2 m with occasional bedrock outcrops. Estimated maximum depth to bedrock is about 8 m. Frost boils are present and gelifluction lobes occur on slopes. Subject to thaw settlement. Active layer depth varies from 1.5 to 2.5 m across the terrain. Volumetric ice contents vary from 15 to 70%.

Pile foundations feasible but require deeper drill-holes for pile driving. Adjustable post and pad foundations also feasible. Buildings with slab-on-grade foundations need elaborated techniques to retain permafrost in its frozen state (ex.: thermosyphons). Steeper slope sections may be affected by gelifluction and may require specific foundation design.

- Terrain manageable for construction (slope < 4°).
- Terrain manageable for construction but may require significant earthwork (slope between 4 and 8°).
- Terrain unsuitable for construction (slope > 8°).

2c Thick cover of Quaternary sediments, poorly drained with a peat cover. Thickness is more than 2 m and can be as much as 6 m. The deposits are ice rich and a polygonal network of ice wedges is present. Active layer depth varies from 0.5 to 2.5 m.

Problematic terrain to be avoided.

- Problematic terrain unsuitable for construction.

2d Fine-grained sediments of marine origin. Occasionally covered by a thin layer of sand or gravel. Subject to differential thaw settlement and to active layer failures on slopes. Often surface is pitted with frost boils. Active layer thickness varies in the terrain from 0.5 to 1.2 m. Volumetric ice content in the permafrost is constantly above 30% and may be as high as 100%.

Adjustable post and pad foundations. Buildings with slab-on-grade foundations need elaborated techniques to retain permafrost in its frozen state (ex.: thermosyphons).

- Terrain manageable for construction (slope < 1°).
- Terrain manageable for construction (slope between 1 and 2°).
- Terrain unsuitable for construction (slope > 2°).

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Université Laval

Image en relief ombragé dérivée des données LIDAR 2010 (MRNF 2010, gouvernement du Québec) préparée par L'Hérault,E.

Illumination : azimuth 315°, altitude 45°, exagération verticale 1x

Hillshade created by L'Hérault, E. from LIDAR data (MRNF 2010, gouvernement du Québec).

Illumination: azimuth 315°, altitude 45°, vertical exaggeration 1x

Projection : MTM zone 9, NAD83

Construction potential and foundation design adapted to permafrost conditions and slopes

SALLUIT

Québec, Nunavik

1 : 8 000

0 125 250 500 750 1 000 1 250 1 500 Meters

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