



Permafrost Characterization Using Ground Penetrating Radar (GPR) for Territorial Development, Inukjuak, Nunavik

Arianne B. St-Amour and Michel Allard

Laval, Center of Northern Studies, Geography, Canada (arianne.b-st-amour.1@ulaval.ca)

With climate warming affecting the high latitudes, there is a growing need of knowledge concerning the cryostratigraphy and the stability of permafrost for land use planning in the inhabited environments. Since a strong demographic growth is occurring in the community of Inukjuak, there is an increasing need for housing development and municipal infrastructure. It is therefore essential to proceed to high resolution permafrost characterization (about 100 m²) to support urban land use planning and to select foundation designs for buildings in accordance with local permafrost conditions.

The main objective of this project is to map the depth to bedrock, the distribution of surface geological units and strata and the zones of ice-rich permafrost zones in the community area and to provide necessary information for selecting the best choices of foundation designs such as pads, piles to bedrock, adjustable studs and thermosiphons throughout the urban area.

To achieve this goal, a total of 21 km of GPR profiles surveyed in the summers of 2015 and 2017 were interpreted with the help of other sources of information such as analysis of aerial photographs, surficial geology maps, excavations, drill holes and field observations. Although some sectors of the Inukjuak area are underlain by thaw sensitive permafrost, some other ones such as the southern sector of the community on marine sands have bedrock at rather shallow depths, i.e. between 3,5 and 6,5 m below the surface.

The compilation of permafrost data and the map of depth to bedrock shall help decision making for the community and the supporting regional government and will be a tool to develop an adaptation strategy to climate change.