


Iqaluit's Sustainable Subdivision

This example illustrates the benefits of collaboration between municipal governments and the scientific community.

Building Iqaluit's climate change resiliency will require careful evaluation of how the community currently deals with climate and environmental hazards, and whether these mechanisms will be adequate in the future.

Iqaluit is the capital city of Canada's newest territory, Nunavut. This Arctic city has a relatively low mean annual temperature of minus 10°C. Although the region has experienced changes in snow and sea ice conditions and weather variability in recent years, air temperatures have not yet changed appreciably. Climate models project that temperatures will be 1.5 - 4°C warmer by the 2050s, which will lead to even more significant changes to the land and the sea. In addition, it is projected that average annual precipitation may increase by up to 15 per cent.

A small city by Canadian standards, Iqaluit is developing fast. In 2001, the population was just over 5,000, a 24 per cent increase from 1996. By 2022, municipal planners estimate that 1,600 new housing units will be required to accommodate the growing population. In response, Iqaluit initiated planning in 2003 for a new subdivision to accommodate 370 new residential units on a large undeveloped plateau.

CLIMATE OBSERVATIONS BY THE INUIT

Inuit from Iqaluit have reported a range of changes in local climate and environmental conditions:

- Snowfall amounts and accumulation are declining, and changes in the characteristics of snow have been noted
- Permanent snow patches, an important source of drinking water for hunters and travellers, are disappearing
- Wind is increasingly variable and unpredictable
- Sea ice is thinner, forms later, and melts earlier and faster in spring

Collectively, these changes have significantly affected the productivity, timing, and safety of traditional hunting and other land-based activities, which are integral to Inuit identity, health and well-being.

The plateau subdivision was designed with specific targets for environmental sustainability (especially greenhouse gas reduction), and a focus on minimizing the environmental footprint of new buildings and services. Sustainability criteria included special consideration of the site's physical conditions and local microclimate to help design resilient, safe and energy-efficient structures. The City also considered new and creative measures to address potential impacts of current and future climate variability on the subdivision's infrastructure and services.

Planners are implementing innovative approaches in defining and reducing the new subdivision's exposure to wind. Wind conditions in Iqaluit are strongly affected by channelling effects and variability of the local topography. As a result, wind data from the local Environment Canada weather station (the only source of wind data for development planning) are not reflective of conditions at the site of the subdivision. To collect more accurate site-specific data, municipal planners collaborated with a local research institute, installed an automated weather station on-site, and collected wind-speed and wind-direction data. The information is being used to align roads and buildings in the direction of prevailing winds to minimize snowdrifts and help reduce a building's heat loss to wind. This adaptive strategy is in accordance with the energy-efficiency objectives of the development plan.

Potential future impacts of climate change on terrain stability were also considered in deciding whether the sewer and water lines servicing the subdivision would be placed above ground or below. City officials acknowledged that average surface and ground temperatures in Iqaluit will likely increase in future, which could increase the depth of the permafrost active layer. Buried water and sewer lines in ice-rich clay soils would then become more susceptible to buckling. It was determined that the known benefits of burying the sewer and water pipelines outweighed the unknown potential risks associated with future climate change impacts. Burying the lines would protect them from large inter-annual temperature fluctuations above ground, while minimizing wear and tear.

Further, municipal officials acknowledged the need for more in-depth information on how local climate conditions are changing at present and what changes are expected in the future. This will help define how and to what extent the community may be vulnerable. For example, city engineers are interested in obtaining active-layer monitoring data from a local ground-temperature station to determine how permafrost conditions are changing relative to surface air temperature.

Building Iqaluit's climate change resiliency will require careful evaluation of how the community currently deals with climate and environmental hazards, and whether these mechanisms will be adequate in the future. Tools to incorporate future climate scenarios in engineering design and municipal development planning processes are especially important. It is also important to acknowledge that climate-related hazards represent one piece in a puzzle of many stresses: socio-economic, demographic, climate and other environmental stressors. The challenge will be in effectively integrating climate change adaptation needs in a range of development initiatives, many of which may not seem to pertain directly to climate or the environment.

City officials look forward to continuing their collaboration with the scientific community in assessing Iqaluit's adaptive capacity and to deal with climate-related hazards, today and in the future.

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