Photo Credit

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1. Look beyond the obvious
2. Be proactive instead of reactive
3. Challenge conventional thought
4. Use multiple data types to render a comprehensive view
5. Seek out expert advice

Permafrost refers to earth materials at or below 0°C (32°F) for at least two consecutive years (see end of article for more details). Understanding the characteristics and behavior of permafrost can benefit all stages of resource development in cold regions. New innovations in the fields of permafrost science and engineering are continuing as industry gains a better appreciation for the dynamic nature of permafrost and the need to minimize environmental impact and stabilize northern infrastructure. Site-specific permafrost evaluations are key to the engineering design, surface and groundwater management, and infrastructure operation aspects of resource development projects.

Here are five ways to improve the understanding of permafrost at your project site:

1. **Look beyond the obvious** – the root causes of your permafrost-related challenges may lie where others have been afraid to look. New discoveries are often made by taking the extra effort to look beyond the footpath carved by others.

Differential thaw-settlement of a highway caused by degrading permafrost.

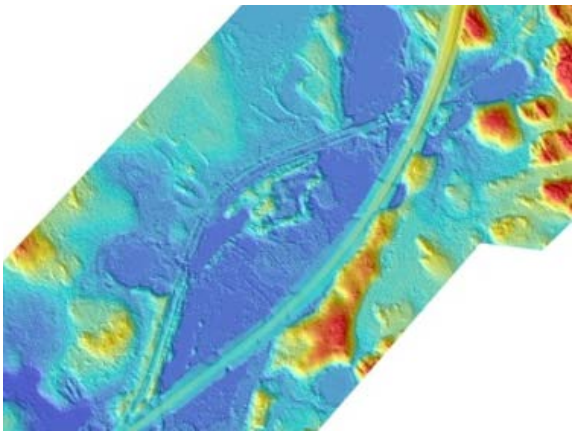
2. **Be proactive instead of reactive** – characterize permafrost early on and continue to build upon your initial findings as you advance your project. Permafrost is transient and all changes should be documented and, in some cases, monitored to allow for timely responses when required to minimize impacts on your operation.

Data loggers and cables used to monitor ground temperature changes beneath critical infrastructure constructed in permafrost environments.

3. **Challenge conventional thought** – the conceptual understanding of permafrost may not apply to every site and should be challenged to enable you to tailor appropriate solutions to your project's unique problems.

Ground ice in permafrost core.

4. **Use multiple data types to render a comprehensive view** – a more detailed understanding of permafrost and its interactions with the surrounding environment may be gained by analyzing different pieces of information and datasets. Information from historical, archived data may be just as important as data acquired recently using the latest technology.



LiDAR data used to identify ice-rich permafrost terrain.

5. **Seek out expert advice** – experience is priceless! Geocryologists who specialize in permafrost are passionate about their work will be eager to share what they know and learn about your project.

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More details about permafrost

Permafrost is thermally defined as earth materials that are at, or below, 0°C (32°F) for at least two consecutive years, including the intervening thaw season. Permafrost forms where the net heat loss from the ground exceeds the net input during the thaw period. Simply put, the ground cools sufficiently in the winter for relatively cold ground temperatures to persist throughout the following thaw season.

In practice, permafrost is often regarded as “frozen ground” because of the associated ground ice and thawing challenges. However, as the above definition indicates, permafrost does not have to be frozen—it must just meet the specified thermal criteria over the defined period of time. In fact, some water in permafrost soils retain liquid water due to material characteristics, applied pressure, or dissolved solids within the pore water that depress the freezing point.