Application Spotlight

MAVERICK INSPECTION LTD.

Peat Depth Investigation

Key Words: ground-penetrating radar, peat depth, dredging, muskeg

FIGURE 1: ATV used to transport GPR system with GPR antenna in tow

It's no secret that there is an abundance of muskeg and wetland environments in Alberta, and therefore there are many work sites that require a general knowledge of peat depth in the area. Knowing the depth to the bottom of a peat layer can be the difference between getting your foot stuck in the mud or fully submerging your expensive heavy equipment in thick, boggy muskeg. It is somewhat easier to work in these environments in winter when muskeg freezes over and ice roads can be constructed, but a lot of water and manpower is needed to generate an ice road in deeper peat layers. Conducting a peat depth investigation prior to working in a muskeg rich area can save countless hours in the field and associated costs.

The most effective way to conduct a peat depth investigation is to use Ground-penetrating Radar (GPR). This technology sends a radar signal into the ground, and the time it takes to travel back to the sensor is related to the material in the subsurface. Maverick Inspection collects, processes, and interprets GPR data to provide a client with estimates of layer thickness, identification of the presence of anomalies, and depths to objects in the subsurface (such as pipelines or storage tanks). These results can be used in league with advanced geographical software to provide high quality deliverables.

CASE STUDY: An ecological restoration company was interested in constructing ice roads on a forested work site for safe transport of personnel and heavy equipment. They needed to know the approximate depth to the peat layer in the area in order to use the least amount of water possible – a deeper peat layer will require more water to create an ice road. Maverick Inspection was able to conduct a peat depth investigation using low frequency GPR.

A GPR system equipped with a Rough Terrain Antenna (RTA) with a center frequency of 50 MHz was selected for this survey for two reasons:

1. A low center frequency GPR system can penetrate deeper into the subsurface, which is ideal for deep investigation studies such as peat depth investigation
2. An RTA uses an inline transmitter-receiver configuration, which is intrinsically the best solution for detecting plane features, such as the interface of a lithological layer

To collect the data, the GPR equipment was towed behind an ATV (figure 1, above) operated at a speed of around 20 km/hr, which allowed for high speed data acquisition with sufficient horizontal resolution.

CONCLUSION: Once collected, the data was transferred to the data analysis and interpretation team at Maverick. With decades of experience analyzing/filtering GPR data, and using sophisticated proprietary data processing software, Maverick was able to produce a series of high quality radargrams, as pictured in figure 2 (right).

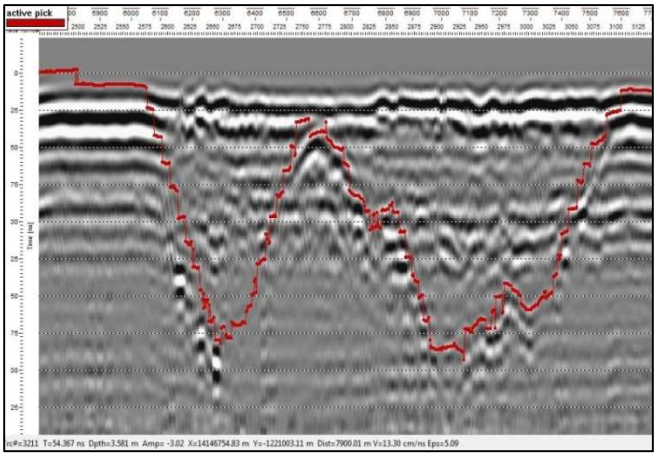

FIGURE 2: Highly processed radargram depicting a profile in one section of the data; bottom of the peat selected in red.

In each radargram, the depth to the peat layer was identified, marked, and recorded in a software program. This process was done over the entire dataset in order to display the depth value over the entire survey area, as pictured in figure 3 (below). Layer picking is a difficult and time-consuming procedure, as most areas also have other subsurface features such as boreholes or layered lithology, which can be confused with the bottom of the peat layer. Maverick data analysts are expertly trained to accurately spot the difference between each element.

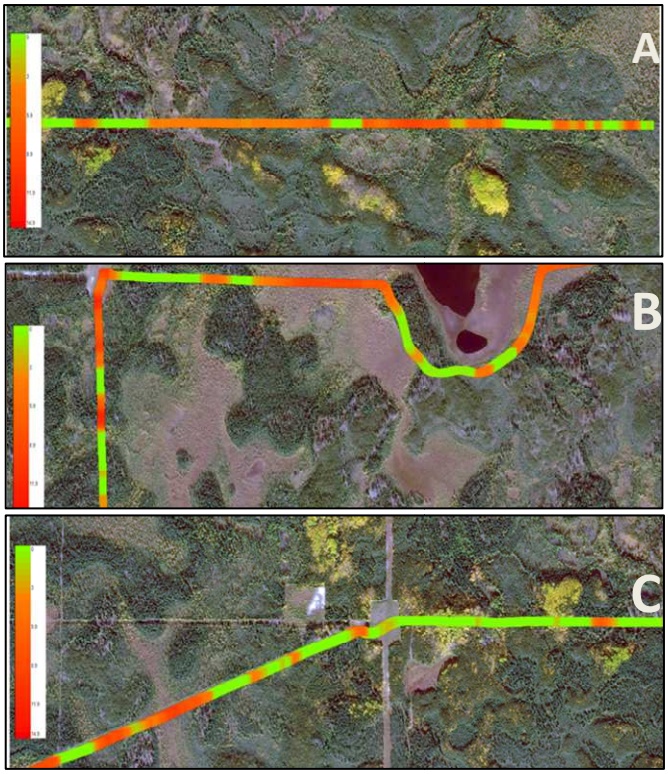

FIGURE 3: Three satellite images of the work site with GPR survey data superimposed. The color scale varies from green (0 meters to bottom of peat) to red (9 meters to bottom of peat).

APPLICATIONS: Peat depth determination is a vital step when planning to work in any sort of muskeg environment. It can help in planning safe and cost-effective ice road construction, or be an effective tool in planning reclamations.

Our wide range of experience and available technologies makes Maverick Inspection the best equipped to tackle any scope of peat depth inspection. Maverick Inspection houses one of the widest ranges of subsurface inspection technologies available in the country, which means we can accommodate a larger variety of subsurface conditions and depth-to-target requirements. With the full force of services that Maverick provides, we can find a solution to any of your subsurface investigation needs.

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