Determining the effectiveness of frequency domain electromagnetic and ground penetrating radar surveying techniques in determining the extents and volume of buried waste in small trench-and-fill waste disposal sites.

To properly manage the challenges of small landfill operations in Northern Ontario, it is important to accurately delineate areas of buried waste. A proper delineation of buried waste is required for site life calculations, future development planning and site closure planning. Traditional methods of waste delineation, such as test pitting, can be destructive, expensive and limited by poor site access. In this study, we aim to delineate buried waste at trench-and-fill style landfills in Northern Ontario using electromagnetics (EM) and Ground-Penetrating Radar (GPR). An electromagnetic survey was conducted at each site using an EM-31 MK2, and a GPR survey was conducted using a Noggin 250 SmartCart with a DVL-500 data logger. The EM31-MK2 was successful in accurately determining the lateral extents of buried waste compared to the results of the test-pitting program. The accurate delineation of buried waste, combined with the maneuverability and ease-of-use of the EM-31 MK2 make it an ideal tool for lateral waste delineation in small landfilling sites. The Noggin-250 SmartCart was able to delineate the edges, and top of buried waste in some instances, but not consistently. Additionally, the Noggin-250 SmartCart was difficult to use over rugged terrain.

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Gregory McKay, P.Geo. is the Senior Geomatics Analyst and Team Lead at BluMetric Environmental Inc. A graduate of the University of Carleton with a combined honours in Earth Science and Physical Geography, Mr. McKay worked as a hard rock geologist in gold exploration in Northern Ontario for several years before going back to school for a Post-Graduate Certificate in GIS from Algonquin College. Afterwards, Mr. McKay began his career with BluMetric Environmental on the GIS team. Shortly after, Mr. McKay started managing projects with the MNR on a variety of projects across Northern Ontario involving waste disposal site capacity assessments, design reports, expansion plans and closure plans. in 2024 the MNR approached Mr. McKay about testing and co-authoring an academic paper on useability of non-invasive geophysical methods to determine the extent of buried waste in small trench-and-fill style landfills. The results were very positive spections and investigations. Joanna has appeared before environmental tribunals and boards on behalf of clients to obtain, confirm or dispute environmental permits and approvals, including for certificates of property use, wastewater treatment systems, noise and air emissions, and water permits. Joanna is called to the Bar in the Northwest Territories, Nunavut, Ontario and the Yukon.