

## **Resistivity of buried valley aquifers in the Edmonton region using near surface geophysics**

Brielle Andersen, Allison Rubin, Duane Froese, Benjamin Rostron

Department of Earth and Atmospheric Sciences, University of Alberta, Edmonton, Canada

Buried valley aquifers underlying the Edmonton region are a potential source of potable groundwater in the area. The general location of the valleys have been mapped previously, however the sedimentology of the valley fills and hydraulic properties are less known and are vital for assessing the buried valley groundwater flow systems.

This study builds on previous work by more closely examining the valley network extent, depth, and geometry via water well reports, and identifying electrical resistivity tomography (ERT) sites for further valley characterization. Areas of hydrogeological interest, considerable sediment thickness and convergence of valleys were a priority. ERT resistivity values ranged from lower resistivity, indicating finer fill at 15-30  $\Omega\text{m}$  to higher resistivity possibly indicating coarser sediment at 70-230  $\Omega\text{m}$ . We found that varying sediment moisture content did not appear to have a strong effect on resistivity. ERT surveys done over the proposed mapped extent as well as the main thalwegs provided an understanding of geometry and further definition of the actual extent of the buried valleys with thalweg depths up to 80 m. Comparisons of geophysics results and surface outcrops in addition to well log data has confirmed that buried valleys can be composed of finer sand to coarse gravel, where coarser sediment with higher resistivities are indicated in the larger valleys originating from the west.

This improved understanding of buried valley sedimentology and extent has aided groundwater modelling to better assess the valley network flow systems within the Edmonton region. The ERT data combined with well logs and outcrop identification has provided better characterization of buried valleys in the Edmonton area; these results can be used to make informed decisions regarding the water security of central Alberta.