

## **An examination of the hydrological, geophysical, geological, and geochemical properties of aquifers at the Morton Centre for Environmental Study, Heckmans Island, Nova Scotia**

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A comprehensive investigation designed to examine and determine the quality of the ground water resources at the Morton Centre for Environmental Education, Heckmans Island, Lunenburg, Nova Scotia, was undertaken during 1998 and 1999.

Results from seismic refraction and soil and exposed bluff cross-sections allow identification of the overburden stratigraphy. Positive bedrock topography in the drumlin underlying the Morton Centre is overlain by the Hartland Till, Clayey Phase Lawrencetown Till, and Sandy Phase Lawrencetown Till, respectively. Water well levels consistent with geophysical observations indicate that a shallow perched water table occurs within the Clayey Phase of the Lawrencetown Till, and an underlying piezometric surface occurs 1.4 m above sea level in fractured bedrock.

Complementary hydrological investigation provides

estimates of hydraulic conductivity of the overburden diamictons, plus constraints on fracture-controlled permeability of bedrock. Local structural mapping identified axial-planar cleavage, bedding, and extension joint orientations responsible for this permeability.

Geochemical concentrations in ground water from five wells indicate that, except for turbidity in the dug wells, the water is acceptable for drinking purposes.

In combination, results indicate that a fresh/saline water diffusion layer occurs 40.8 m below the bottom of the drilled well supplying water to the Morton Centre. Increased use of the property in the future will raise groundwater extraction rates, possibly causing influx of sea water into this well. Further studies are required to determine how much additional water use would be required to cause saltwater influx, and to provide strategies for avoiding this possibility in the future.