

## Soil geochemistry of urban soils in Fredericton, New Brunswick, Canada

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The City of Fredericton, New Brunswick, overlies an aquifer that supplies potable water to ~95% of the city residents. The supply aquifer is confined by a discontinuous clay-silt aquitard which underlies fluvial/floodplain deposits situated between the Saint John River and higher terrain to the west. The aquitard contains erosion scours or 'windows', that can serve as pathways allowing surface water into the aquifer.

A total of 101 locations were sampled as part of a soil geochemical survey of the city of Fredericton, with a focus on the geochemical content of surface sediments in the areas of known and suspected 'windows'. An 'A' sample was collected at a depth of ~10 centimetres, primarily in the A soil horizon and, where possible, a 'B' sample was collected at a depth of ~30 cm, primarily in the B - C soil horizons. Sixty seven samples were collected in the downtown urban centre consisting of reworked and fluvial floodplain sediments. Samples of till were collected from areas of higher elevation at locations undisturbed by anthropogenic activity. All organic fragments were removed during sampling. Sample splits of <63 microns were analyzed by INAA or TD-ICP in order to determine concentrations for 50 elements.

Topography and elemental mobility are interpreted to have played a major role in the dispersion of elements. The till 'B' samples often displayed higher elemental concentrations than the 'A' samples, interpreted as due to weathering and element mobility. Samples from the downtown area demonstrated much higher elemental concentrations in the 'A' samples in comparison to the underlying 'B' samples. The concentration of eight elements including, As, Ba, Cr, Cu, Ni, Pb, V, and Zn were found to surpass the Canadian Council of Ministers of the Environment (CCME) soil content guidelines for samples collected in the downtown area. These concentrations are attributed to anthropological contributions at ground surface after two hundred years of occupation in the city. The 'A' samples for one specific downtown area exhibited anomalous concentrations of all 8 elements and the exact cause remains to be identified.