An assessment of groundwater vulnerability of the Annapolis-Cornwallis Valley, Nova Scotia, using GIS modelling

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Current groundwater vulnerability assessment methods are often based on index and overlay techniques, such as those employed in Geographic Information Systems (GIS). In our study of groundwater vulnerability in the Annapolis-Cornwallis Valley, Nova Scotia, the primary assessment method is the DRASTIC model. DRASTIC is an acronym for the seven hydrogeological parameters including Depth to groundwater, net Recharge by rainfall, Aquifer media, Soil media, Topography, Impact of the vadose zone, and hydraulic Conductivity of the aquifer.

Preliminary groundwater depth data has been processed using piezometric survey data obtained by the Geological Survey of Canada, Quebec (GSC) and the Applied Geomatics Research Group (AGRG/COGS/NSCC) during 2003 and 2004. Net recharge data incorporates interpolated climate normal precipitation and temperature data from Environment Canada stations as well as land use and land cover information derived from classification and available coverage datasets. Both bedrock and Quaternary deposits are being considered

for the aquifer media parameter. Soil data have been processed to soil series and composition using the 1960's N.S. Soil Survey reports. Topography data for the model includes slope data, which has been processed to percent slope from a 20-metre Digital Elevation Model (DEM), and classified. Surficial and bedrock geology, soil data, and depth to groundwater, will be important considerations for developing data for the impact of the vadose zone parameter. When the aquifer media data layers are processed, they will also be rated for the model according to relative hydraulic conductivity of the aquifer media, for the final parameter of the DRASTIC model. While not part of the original DRASTIC model, it is suspected that other factors important to modeling groundwater vulnerability may include depth-to-bedrock and land use, particularly in the case of the agricultural activities along the valley floor.

The groundwater vulnerability model produced will assist in prioritizing specific regions for detailed study as well as providing information critical for effective management of groundwater in the Annapolis-Cornwallis Valley region.