

Unmapped and Untapped: Preliminary Surficial Aquifer Mapping in HRM Growth Areas

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Extensive development of subdivisions with on-site services over the past number of years in the Halifax Regional Municipality (HRM) has resulted in large demands on available groundwater resources from bedrock aquifers. Environmental and public health risks are created by development with insufficient quantity and/or unsatisfactory quality of water, along with public dissatisfaction when expectations of quantity and quality are not met. This creates public pressure for unplanned extension of central water or sewer services in these areas at a significant cost to rate payers.

Bedrock aquifers in HRM can be generally characterized as having limited groundwater supply potential. The presence of surficial aquifers (buried sand and gravel deposits) has been noted in the vicinity of HRM growth areas (e.g. Cross, 1976), and wells installed in these aquifers are associated with greater yields compared to bedrock wells (Kennedy and Drage, 2009). Homeowners and developers, however, typically choose to drill wells into bedrock because the distribution and potential of surficial aquifers is not well understood.

Remapping of surficial materials in the area covered by LiDAR surveys in HRM was completed from 2008-2010 (Utting, in prep). During this work, a zone of continuous surficial cover (i.e. where no bedrock is present even between drumlins) was identified, and numerous areas were located where the depth to bedrock measurements indicate that the thickness of surficial material exceeds the relief of surficial landforms, suggesting material filled a pre-glacial topographic low or paleovalley. A preliminary review of well log data in these areas showed that a number of the water wells intercepted buried sand and gravel.

To improve our understanding of the surficial deposits, water well logs in the vicinity of the zone of continuous surficial cover were located by cross-checking lot numbers, civic numbers, or owner names on logs with the Nova Scotia property registration database. Wells intercepting buried (>12 m depth) sand and/or gravel were identified and high potential surficial aquifer areas were mapped using the well log information.

Test drilling was conducted within a high potential surficial aquifer area mapped in Fall River and in Beaver Bank. Aquifer materials were not encountered at the Fall River site, whereas a deposit of fine sand, medium sand, and gravel lenses (minimum thickness of 5 m) was encountered at the Beaver Bank site at a depth of 25-30 m. A screened 50 mm diameter monitoring well was completed and a short-term pumping test and groundwater chemistry sampling were conducted. A long-term yield of greater than 20 Litres per minute was interpreted from the monitoring well, although the groundwater chemistry appeared to be influenced by a nearby occurrence of Windsor Group rocks, resulting in elevated hardness, sulphate, iron and manganese.

Additional test drilling and surficial aquifer characterization is recommended in the identified high potential surficial aquifer areas to refine the mapping and develop a more comprehensive understanding of the distribution and potential of these aquifers.

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