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Bajc A.F. and Shirota, J. 2007. Three-dimensional mapping of surficial deposits in the Regional Municipality of Waterloo, southwestern Ontario; Ontario Geological Survey, Groundwater Resources Study 3.

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### Groundwater Resources Study 3

#### Three-Dimensional Mapping of Surficial Deposits in the Regional Municipality of Waterloo, Southwestern Ontario

by A.F. Bajc and J. Shiota

This publication can be downloaded from

[http://www.geologyontario.mndm.gov.on.ca/mndmaccess/mndm\\_dir.asp?type=pub&id=GRS003](http://www.geologyontario.mndm.gov.on.ca/mndmaccess/mndm_dir.asp?type=pub&id=GRS003)

This digital data release contains information regarding the three-dimensional distribution and character of surficial materials that may form groundwater aquifers and aquitards within the Regional Municipality of Waterloo in southwestern Ontario. The data sets are organized into a series of folders, each containing information of varying type and format. These include 1) a summary report; 2) ArcInfo® grids and comma-delimited (.csv) files of modelled surfaces; 3) Google Earth™ (.kmz) files depicting borehole location and stratigraphic information as well as isopach and structural contour maps of modelled units; 4) high-resolution plates depicting cross-sections and aquifer recharge and vulnerability maps; 5) the subsurface data set used for the construction of the three-dimensional block model. A movie file (*Waterloo.avi*) showing the use of the Google Earth™ mapping service (.kmz) is also included. The data are available on 1 CD.

#### Report

This folder contains a PDF version of the geological report that describes the geology of Waterloo Region, the protocols established for three-dimensional modelling of aquifers and aquitards and a brief description and interpretation of the main hydrostratigraphic units mapped within the region. Applications of the model are highlighted using examples that illustrate aquifer recharge areas and areas where aquifers are more vulnerable to sources of surface contamination. The report is best viewed in Adobe® Acrobat® Reader® version 7.0 or higher.

#### ArcInfo Grids

This folder contains 100 m ESRI® ArcInfo® structural contour grids for the 19 hydrostratigraphic units. The grids are presented as discontinuous units (i.e., data exist only where the units have been modelled to occur).

#### CSVs

This folder consists of 2 comma-delimited files that contain information describing the elevation of the upper surface of the 19 hydrostratigraphic units on a 100 m grid. The “Discontinuous Surfaces” file can be used to produce surfaces that are a true representation of the distribution of the 19 hydrostratigraphic units modelled (i.e., elevation information occurs only where the units are present). The “Continuous Surfaces” file presents the 19 units as continuous surfaces across the entire region (i.e., where a particular unit is not present, it is assigned the elevation of the next older unit). This data set is most useful for hydrogeologic modelling where continuous surfaces are required.

#### Google Earth

Google Earth™ mapping service (“Google Earth”) is a free geographic viewing tool from Google Inc. (download from <http://earth.google.com/>). Google Earth offers very useful features for viewing and publishing geoscience data. Most of these features are exposed through an extensible markup language called keyhole markup language (.kml) or its compressed format (keyhole markup language-zipped (.kmz)). This folder contains a Google Earth file (*Waterloo.kmz*) depicting the borehole locations used for the creation of the block

model as well as the isopach and structural contour images for the 19 hydrostratigraphic units. Plates 5 and 6 are also included as image overlays in this file. By left clicking on a point representing a borehole location, a written log of the borehole including its source and type appears. Plates 5 and 6 and the isopach and structural contour maps are represented as overlays with adjustable transparency allowing one to determine the spatial relationship of the various modelled units to other layers of information, such as bedrock and surficial geology.

### **Plates**

This folder contains high-resolution digital versions (*.pdf*) of Plates 1 to 6 (structural contour maps; isopach maps; west-east cross-sections; south-north cross-sections; depth to first aquifer with a thickness of greater than 3 m; and depth to water table in areas where a significant aquifer occurs within 5 m of ground surface).

### **Subsurface Data<sup>1</sup>**

This folder contains the Waterloo Region subsurface database in a Microsoft® Access® 2000 format. The database consists of a “Location” table that contains a unique MNDM identifier and information regarding the record source, its original identification, location of the borehole collar and boring type. A “formation” table contains standardized descriptive and depth information regarding the sediment layers present in each of the boreholes. The original source description of each layer is recorded in an “OldTerms” attribute as concatenated items. Stratigraphic interpretation, colour and hardpan fields are populated if information is available.

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<sup>1</sup>The Ministry of the Environment (MOE) Water Well information contained in the subsurface database is offered to the User on an “as is basis” and the MOE makes no guarantees, representations or warranties respecting the Well Information, either express or implied, arising by law or otherwise, including but not limited to effectiveness, completeness, accuracy or fitness for any purpose. The User hereby acknowledges that the Ministry of the Environment has advised the User that the Well Information may be incomplete or inaccurate.