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Users of OGS products are encouraged to contact those Aboriginal communities whose traditional territories may be located in the mineral exploration area to discuss their project.

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## Groundwater Resources Studies

The *Groundwater Resources Study* (GRS) series seeks to better the understanding of Ontario's groundwater resources through the collection, evaluation and distribution of geoscience data. The main objective of the series is to provide accurate information on a range of groundwater-related themes, including local- to watershed-scale aquifer characterization and delineation; geologic controls and influences on groundwater quantity and quality; and methods development. Products of the groundwater program include geoscience reports, data sets and protocols for information collection and handling. Geoscience information generated through the series will find application in the protection and sustainable management of the province's groundwater resources.

### Groundwater Resources Study 10

#### **Three-Dimensional Mapping of Surficial Deposits in the Brantford–Woodstock Area, Southwestern Ontario**

by A.F. Bajc and J.E.P. Dodge

Groundwater Resources Study 10 can be downloaded from

[http://www.geologyontario.mndmf.gov.on.ca/mndmaccess/mndm\\_dir.asp?type=pub&id=GRS010](http://www.geologyontario.mndmf.gov.on.ca/mndmaccess/mndm_dir.asp?type=pub&id=GRS010)

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 Brantford–Woodstock area of southwestern Ontario. The data sets are organized into a series of folders, each containing information of varying type and format. These data include 1) a summary report (*.pdf*); 2) ESRI® ArcInfo® grids and comma-delimited (*.csv*) files of modelled surfaces; 3) Google Earth™ mapping service (*.kml*, *.kmz*) files depicting borehole location and stratigraphic information as well as isopach and structural contour maps of modelled units; 4) graphic (*.htm*, *.jpg*, *.tif*) and written (*.doc*, *.htm*) borehole logs, high-resolution (*.jpg*) photographs of core and analytical data (*.xls*) for samples collected, all presented in a hyperlinked *.htm* format; 5) high-resolution plates (*.pdf*) depicting north-south and east-west cross sections and aquifer recharge and vulnerability maps; and 6) an abbreviated version of the subsurface data (*.mdb*) used for the construction of the three-dimensional block model which includes borehole collar and stratigraphic information, picks data, and screen depth and water level information. The data are available on 1 dual-layer DVD.

## Report

This folder contains a geological report (.pdf file) that describes the geology of the Brantford–Woodstock study area, the protocols established for three-dimensional modelling of the aquifers and aquitards and a brief description and interpretation of the main hydrostratigraphic units mapped within the area. 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 using Adobe® Acrobat® Reader® version 7.0 or higher.

## ArcInfo\_Grids

This folder contains 100 m ESRI® ArcInfo® structural contour grids for the 20 hydrostratigraphic units. The grids are presented as discontinuous units (i.e., data exist only where the units have been modelled to occur).

## CSV Files

This folder consists of 2 comma-delimited (.csv) files that contain information describing the elevation of the upper surface of the 20 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 20 hydrostratigraphic units modelled (i.e., elevation information occurs only where the units are present). The “continuous surfaces” file presents the 20 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). These data are most useful for hydrogeologic modelling where continuous surfaces are required.

## Google Earth

This folder contains a Google Earth™ mapping service (“Google Earth™”) file (*Woodstock.kml*) depicting the borehole locations used for the creation of the block model as well as the isopach and structural contour images for the 20 hydrostratigraphic units. Plates 6 and 7 are also included as image overlays in this file. Google Earth™ is a free earth-visualization tool downloadable from the Internet at <http://earth.google.com/>. By left clicking on a point representing a borehole location, a written log of the borehole will appear, which includes its identifier, source and type. Plates 6 and 7 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 9 high-resolution digital (.pdf) versions of Plates 1 to 7 (structural contour maps; isopach maps; west-east cross-sections; north-south 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). These plates are also included at the end of the report.

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

This folder contains the Brantford–Woodstock subsurface database (*Records.mdb*) in a Microsoft® Access® 2000 format. The following tables are present in the database.

### *Collars Table*

The Collars Table contains 15 106 records and includes the following fields:

- BHID a unique MNDMF identifier
- ORIGID the original identifier for the record
- SOURCE source of the record (i.e., MOE<sup>1</sup>, Bajc, etc.)
- TYPE type of record (i.e., roadcut, sand and gravel pit, etc.)

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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.

- QUALITY assigned quality of the borehole record
- XCOLLAR easting of the collar in UTM co-ordinates, NAD83, Zone 17
- YCOLLAR northing of the collar in UTM co-ordinates, NAD83, Zone 17
- ZCOLLAR elevation of the collar derived from the provincial DEM (metres asl)

### ***Formation Table***

The Formation Table contains 67 763 records and includes the following fields:

- BHID a unique MNDMF identifier
- ORIGID the original identifier for the record
- SOURCE source of the record (i.e., MOE<sup>1</sup>, Bajc, etc.)
- TYPE type of record (i.e., roadcut, sand and gravel pit, etc.)
- FROM depth from for a particular horizon
- TO depth to for a particular horizon
- PMAT the single primary material that best describes that layer
- MATCODE an integer that represents the PMAT value
- CLASS a classification of the PMAT value as one of aquifer (AQF), supraquifer (SAQF), aquitard (AQT), supraaquitard (SAQT), bedrock (BED) or unknown (UNKWN)
- FORMATION assigned formation for the layer (i.e., Catfish Creek Till)
- COLOUR reported colour of the sediment
- OLDTERMS a concatenation of the MAT1, MAT2 and MAT3 terms in the MOE database

### ***Picks Table***

The Picks Table contains 42 026 records and includes the following fields:

- XPT the UTM easting co-ordinate in NAD83, Zone 17
- YPT the UTM northing co-ordinate in NAD83, Zone 17
- ZPT the ground surface elevation in metres asl obtained from the provincial DEM
- STRATUM the code name of the hydrostratigraphic unit the pick corresponds to (i.e., AFB1)
- SEQNUM the stratigraphic order of hydrostratigraphic unit where 1 is the youngest (AFA0) unit and 21 is the oldest unit (bedrock)
- CLASS the simple aquifer (AQF), aquitard (AQT) or bedrock (BED) classification of the hydrostratigraphic unit the pick corresponds to
- BHID the unique MNDMF identifier of the borehole trace that the pick lies along
- QUALITY assigned quality of the pick as designated by the borehole record
- TYPE type of borehole record that the pick is associated to
- SOURCE source of the borehole record that the pick is associated to
- QUALITYPICK more specific information regarding the quality of the pick (i.e., DEFINITIVE means the pick is located on a cored borehole; OFF TRACE means the pick is digitized off of a borehole trace; the remaining picks are attributed with a value of HIGH, MEDIUM or LOW according to what is located in the "QUALITY" field)

### ***Screen Depth and Static Level***

This table contains 14 454 records and includes the following fields:

- BHID a unique MNDMF identifier
- ORIGID the original identifier for the record
- FROM depth to the top of screen or static water level
- TO depth to the bottom of screen or static water level
- GRADE a value representing whether the record is a screen depth (5), static water level below ground surface (10) or static water level above ground surface (15)

## **New Boreholes**

This folder contains borehole information resulting from overburden drilling programs conducted within the Brantford–Woodstock study area during the 2007 and 2008 field seasons. A total of 36 PQ (8 to 9 cm) diameter continuous cores were obtained using a Christensen mud rotary drill.

A visual representation of this information is included in a hyperlinked format accessible using Microsoft® Internet Explorer®. For optimal viewing, a monitor resolution of 1280 × 1024 is recommended. To improve performance of the data release on your computer, it is recommended that the entire folder be copied onto your computer's hard drive. It is imperative that the folder structure and file–folder naming convention be maintained.

The pages are navigated via clickable images and the browser's **Back** button. Opening the file titled ***IndexMap.htm*** will launch the browser and open a clickable image map of borehole locations within the Brantford–Woodstock study area. Clicking on the borehole name will open a graphic log for that borehole. By clicking on the various depth segments of the **Descriptive Log** field, one is taken to the respective depth of the detailed, written log for that borehole. Using the **Back** button takes the user back to the graphic log. Similarly, by clicking anywhere within either the **Grain Size**, **% Carbonate** or **Ca:Do Ratio** logs, the pertinent data table is opened in Microsoft® Excel®. Once again, the **Back** button takes the user back to the graphic log. By clicking on the area labelled “**Click here for photographs of core**”, a folder is opened with files viewable in thumbnail form. Double clicking on any particular photo will open the photo in the user's photo viewing software of choice. Core depths are clearly indicated on the individual photos. Clicking the **Back** button takes the user back to the graphic log. By clicking on the area labelled “**Back to Index Map**”, the user is taken back to the map of borehole locations where the details of another borehole can be viewed.

The raster versions of the 36 graphic logs (*.tif*), 37 grain size and 37 carbonate data (*.xls*) files, 7926 photos (*.jpg*) and 72 written logs (*.doc*) are stored in the nested folders within the **New Boreholes** root folder.

#### **Abbreviations used in this document:**

API	application programming interface
AQF	aquifer
AQT	aquitard
asl	above sea level
BED	bedrock
.csv	comma separated variable (comma-delimited) file
DEM	digital elevation model
.doc	Microsoft® Word document file
.htm	HyperText Markup file
.jpeg, .jpg	lossy compressed colour image file developed by the Joint Photographic Experts Group
.kml	keyhole markup language file
.kmz	keyhole markup language files zipped
MNDMF	Ministry of Northern Development, Mines and Forestry
MOE	Ministry of the Environment
NAD83	North American Datum 1983
.pdf	portable document format file
PMAT	primary material
SAQF	superaquifer
SAQT	superaquitard
.tif	tagged image format file
UNKWN	unknown
UTM	Universal Transverse Mercator (co-ordinate system)
.xls	Microsoft® Excel® spreadsheet file