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Burt, A.K. and Dodge, J.E.P. 2016. Three-dimensional modelling of surficial deposits in the Orangeville–Fergus area of southern Ontario; Ontario Geological Survey, Groundwater Resources Study 15.

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Groundwater Resources Study 15

Three-Dimensional Modelling of Surficial Deposits in the Orangeville–Fergus Area of Southern Ontario

by A.K. Burt¹ and J.E.P. Dodge¹

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This publication can be downloaded from

http://www.geologyontario.mndm.gov.on.ca/mndmaccess/mndm_dir.asp?type=pub&id=GRS015

This digital release contains comprehensive information regarding the three-dimensional (3-D) distribution and character of surficial materials that form groundwater aquifers and aquitards within a 1550 km² area in the Orangeville–Fergus area of southwestern Ontario. The results of 43 new continuously cored boreholes, together with new geophysical surveying, surface sampling and analysis of legacy data sets, were the basis for the creation of a 3-D model which subdivides the Quaternary sediments into a regional-scale aquifer–aquitard sequence consisting of 16 hydrostratigraphic units. Undifferentiated Paleozoic bedrock forms the basal hydrostratigraphic unit across the map area.

The report contains extensive appendixes which describe in detail the data sources, the methodology, the results of the field work and analyses, the products of the study and how to extract and use them.

The data are organized into a series of folders, each folder containing information of varying type and format. A summary of the prime outputs is outlined in the table below, and details of all the outputs and products, their file structure, product descriptions and instructions are contained in Appendix 4 of the report. In addition, within the appendix, previously released data sets and summary reports have been tabulated with internet links.

Comma-separated value (.csv) files depicting the elevation of each hydrostratigraphic unit generated from the block model are the primary outputs of this study. Printable (.pdf) structural contour maps depicting the surface topography, isopach maps indicating the thickness of each hydrostratigraphic unit, colour-coded maps of the digitized picks that were used to generate the surfaces and a series of west-east and north-south cross-sections and graphic borehole logs are designed as reference guides. The structural contour maps, isopach maps and standardized subsurface database are also viewable using Google Earth™ mapping service (keyhole markup (.kml, .kmz) and portable network graphic (.png)). A movie file (.avi) from the Waterloo Region 3-D project, showing the use of Google Earth™ mapping service compressed keyhole markup (.kmz) files, is also included. The release contains analytical data files (Microsoft® Access® database (.mdb) and Microsoft® Excel® (.xlsx)), ArcInfo® grids (ESRI® ArcInfo® raster data sets) and a subsurface database (Microsoft® Access® database (.mdb)). Many of the data files have been designed so that they may be used as inputs to other software packages; for example for hydrogeological modelling, or visualisation.

Summary—and folder structure—of this study’s model outputs and derivative products.

Folder	Description	Format
Analytical Data	Laboratory grain size and carbonate analysis results coded according to hydrostratigraphic unit and depositional environment.	Microsoft® Access® database (.mdb), Microsoft® Excel® (.xls)
ArcInfo Grids	ESRI® ArcInfo® structural contour and isopach grids of modelled surfaces. Hillshade (25 m cell size) of the bedrock surface.	ESRI® ArcInfo® raster datasets
Google Earth	Isopach (thickness) and structural contour maps of hydrostratigraphic units, subsurface database and excerpts from seamless geology maps viewable using Google Earth™ mapping service.	Google Earth™ (.kml, .kmz) and portable network graphic (.png)
Graphic Borehole Logs	Graphic borehole logs depicting geological information, hydrostratigraphic units and select analytical results.	Graphic (.pdf)
Modelled Surfaces	Comma-separated value files of x and y co-ordinates of 100 model cells and the elevation (z) and thickness of each hydrostratigraphic unit. Includes continuous and discontinuous surfaces.	Comma-separated values (.csv)
Movie	Movie from the Waterloo Region 3-D project showing the use of the Google Earth™ mapping service (.kmz).	Movie (.avi)
Plates	High-resolution plates depicting borehole logs, unit distribution maps, isopach (thickness) maps, structural contour maps, bird’s-eye-view maps, cross-sections (hydrostratigraphic units and aquifer–aquitard class legends and aquifer vulnerability maps.	Graphic (.pdf)
Report	Report detailing the results of this study.	Text and graphics (.pdf)
Subsurface Data	Data set used to construct the 3-D block model including location, formation and picks tables.	Microsoft® Access® database