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Open-File Report

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GEOLOGIC MAPPING AND DATABASE FOR PORTLAND AREA FAULT STUDIES

FINAL TECHNICAL REPORT

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Introduction

This collection of digital geologic data derives from geologic and interpretive maps prepared by the Oregon Department of Geology and Mineral Industries (DOGAMI) over the last 15 years. Most of the data was collected in the course of preparing digital earthquake hazards maps for all or part of the greater Portland (METRO) urban growth boundary. Table 1 lists sources of geologic mapping and data used in the compilation, and also lists the interpretive maps that were prepared from the data. The collection was prepared as part of a USGS NEHRP-funded project to support geologic mapping of the Portland area in order to better understand earthquake hazards. The project was funded by USGS NEHRP under award #03HQAG0013. The views and conclusions contained in this document are those of the author, and should not be interpreted as necessarily representing the official policies , either express or implied, of the U.S. Government. The goal of this project is to bring together several datasets in modern digital format, and make them readily available for public use. This version of the data compilation is preliminary, and has not undergone peer review.

The collection consists of three parts. First, we have compiled all of DOGAMI's recent published and unpublished geologic mapping for the greater Portland area into a single seamless digital geologic map. Second, we have prepared a water well and engineering borehole database which provides boring locations and in some instances interpretations. Finally, we include gridded geologic thickness models for the METRO UGB that was developed for earthquake hazard mapping purposes.

Geologic Map

The geologic map was prepared by compiling published and unpublished mapping (Figure 1) covering all or part of the Hillsboro, Scholls, Linnton, Beaverton, Portland, Lake Oswego, Mt. Tabor, Gladstone, Damascus, Sandy, Redlands and Estacada quadrangles. Portland, Redlands, Estacada, Sandy and Lake Oswego were digitized heads up off of scanned and georeferenced copies of published maps or unpublished mylar originals. The remaining maps were tablet digitized off of original mylars. Geologic unit polygons were matched across quad boundaries where possible to produce as seamless a map as is practical. However, in many instances adjacent quads have significantly different resolution of units, particularly in the Members and flow units of the Columbia River Basalt Group rocks, so many quadrangle boundary faults are evident. Geologic unit polygons are simply attributed with a map unit symbol, which ties each polygon to a unit description below. Faults were similarly digitized and matched across boundaries, and are attributed with name (where applicable), sense (side down), style (unknown or thrust), and class (approximately located, buried).

Although older mapping is available to cover many of the gaps in the overall greater Portland urban area, we have only included recent 1:24,000 scale mapping in this project. Many of the quads in the area are currently being mapped by the USGS or will be mapped by USGS or DOGAMI in the next few years.

Digital map elements include:

1. Colored geology map on a shaded relief basemap with legend, .pdf format
2. Colored geology map on a 1:24,000 scale USGS DRG (digital raster graphic) basemap, with legend, .pdf format
3. Description of units, text in MS Word, .pdf format.
4. Geology polygons with attributes, in MapInfo .tab and Arc .shp format.
5. Fault lines with attributes, in MapInfo .tab and Arc .shp format

Borehole Database

The borehole database contains a mix of information about engineering boreholes and water wells gleaned from a variety of sources. The borehole data has been brought together here in a single database, and every effort has been made to eliminate duplication. The

Source Database Field PDX_Borehole_NEHRP Table	Reference/Source	Data Available in database	Link to original
DOGAMI	Holes drilled by DOGAMI for Portland Area Hazard maps, data in Mabey and Madin 1995	location, lithology, SPT, Velocity	Borehole_Name links to Mabey and Madin 1995
IPM Canby Fault	unpublished data from Ian Madin investigations of Canby Fault	location	Link to GRID via Borehole Name
IPM Mt. Angel	unpublished data from Ian Madin investigations of Mt. Angel Fault	location	Link to GRID via Borehole Name
METRO	Engineering boring logs collected to make Portland Metro region hazard map	location, lithology, SPT, Velocity, waterlevel	no link to original, data for Mabey and others, 1997
0-90-2	Engineering and water well logs collected for early Portland area hazard maps	location, stratigraphy, SPT, Velocity	original database included (0-90-2.mdb)
OWRD	unpublished collection of water well logs from Karl Wozniak, Oregon Water Resources Department	location	Link to GRID via Borehole Name
USGS	water well logs from USGS Portland and Willamette valley studies Orzol and others, 1999	location, some lithology, some waterlevel	Link to GRID via Borehole Name, some wells not in GRID, link to scanned logs included here via Borehole Name
Wilson	water well logs from Wilson, 1997.	location, TD	link to strat calls from Wilson, 1997 via database included .

Table 1. Source codes for data in borehole database. GRID refers to the Oregon Water Resources Department online water well log database. Links listed as included are on the accompanying data CD.

database and format were originally developed by Dr. Matthew Mabey, and have been added to and modified for this project. The data from different sources carries different attributes, and the characteristics of each source are described in Table 1. Figure 2 shows the various tables in the database and the relations between tables. Individual field attributes are annotated in the database tables themselves and not described here. Tables and their contents are briefly described below.

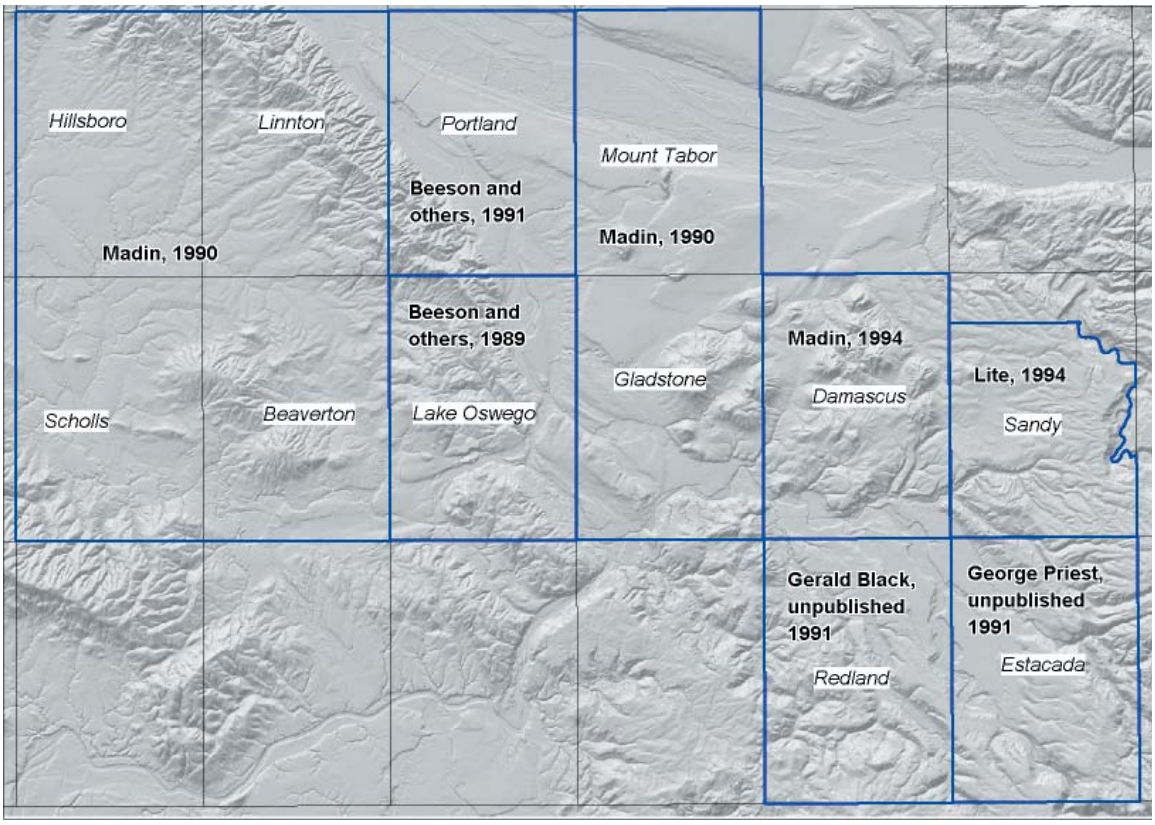

Figure 1. Location map showing the area of geologic map compilation and compilation data sources. Quadrangle boundaries in light black line, quadrangle names in italics. Blue boxes are geologic map sources, labeled with reference.

The primary data table in the database **PDX_Borehole_NEHRP**, which contains information about each boring such as location, data source, coordinates (UTM Zone 10, NAD 27) and a unique identifier number, BoreholeNumber which links to the other tables that carry borehole specific data. Those tables include;

- **SampleTest** miscellaneous engineering data, e.g. unit weight, liquid limit
- **CPTData** Cone Penetrometer data
- **SPTData** Statndard Penetration Tests
- **Waterlevel** Static water levels encountered
- **Velocity** Shear and P-wave velocity mea sured downhole
- **Lithology_nehrp** Coded lithology data for borehole intervals

An additional Table **ProfileType**, relates to the primary table and describes the type of each borehole (water well, anode, etc).

Three additional tables relate to the Lithology_nehrp;

- **Lithotypes** explains the lithology codes
- **Units** lists the stratigraphic unit of the interval
- **USCS** standard USCS soil codes

Thickness models

Gridded thickness models were developed by DOGAMI in order to prepare earthquake hazard maps for the Portland area (Mabey and others, 1997). The geology of the area was divided into a simple group of units above the Columbia River Basalt or Waverly Basalt basement, and the top and bottom of each unit was structure contoured using surface geologic maps and borehole data. The resultant structure contours were then gridded at 30m cells using IDRISI and thickness grids were prepared by subtracting the contact surfaces from topography and each other. The grids are

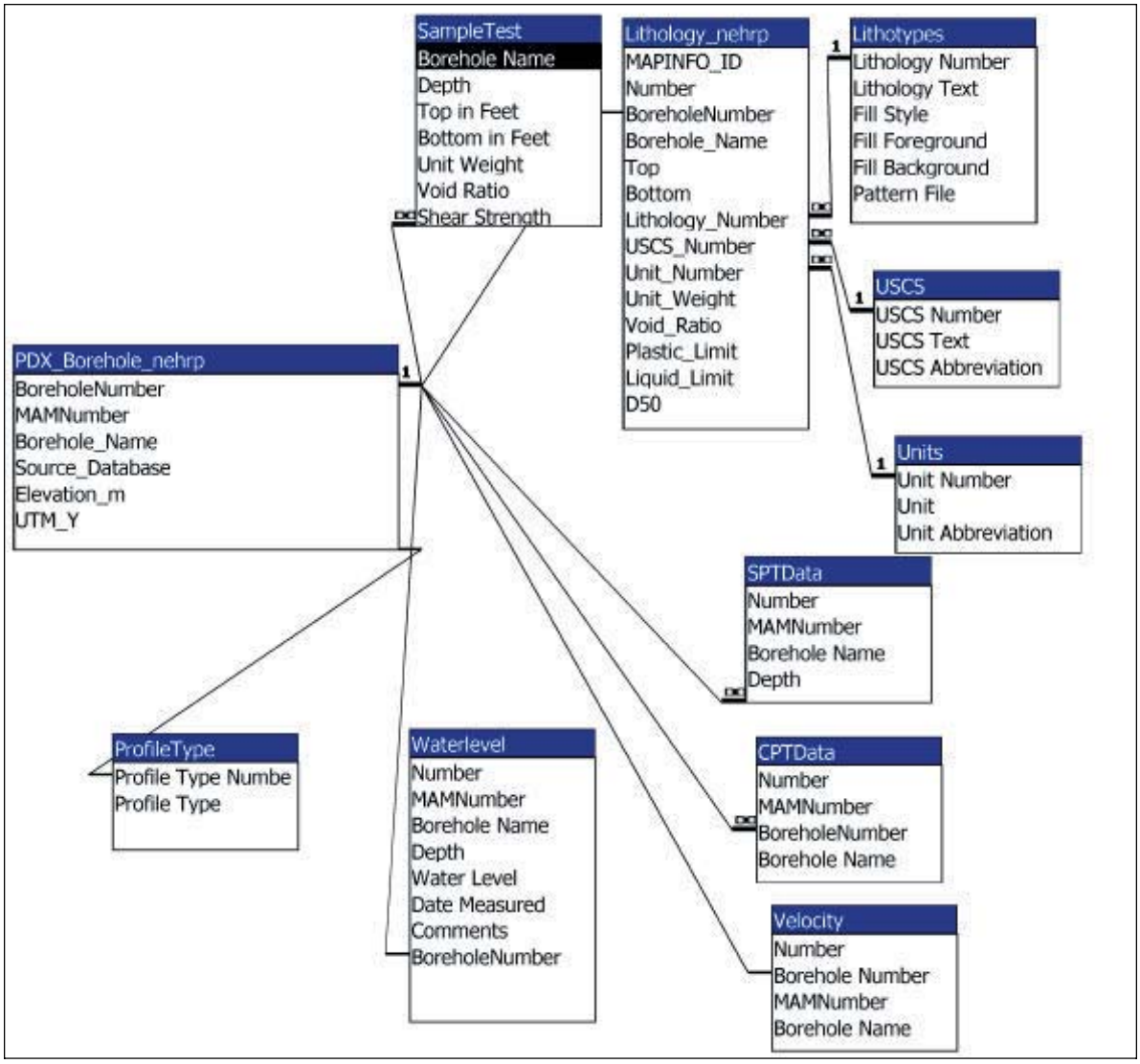

Figure 2. Structure of Borehole Database.

presented here as comma delimited ASCII files (index, UTM X, UTM N, thickness in meters). Grids are for geologic units with stratigraphic order as follows:

- PDXMQAL Quaternary Alluvium
- PDXMQPH Loess
- PDXMQFF Catastrophic Flood Sediments, fine
- PDXMQFC Catastrophic Flood Sediments, coarse
- PDXMQTB Boring Lava
- PDXMQTG Conglomerate, including Trout dale and Springwater Forma tions
- PDXMTSR mudstone, including Troutdale, Hillsboro Formations

The geologic models were developed in stages, first for a series of individual quadrangle hazard maps for the core Portland area, then for the entire METRO Urban Growth Boundary (Figure 3). Some layers of the model have thickness anomalies that are obvious artifacts, either along quad boundaries, or along E_W lines that span parts of quads. After an initial attempt to remove these artifacts, we decided that it would make more sense to build a new geologic model in the future using the much more extensive set of borings

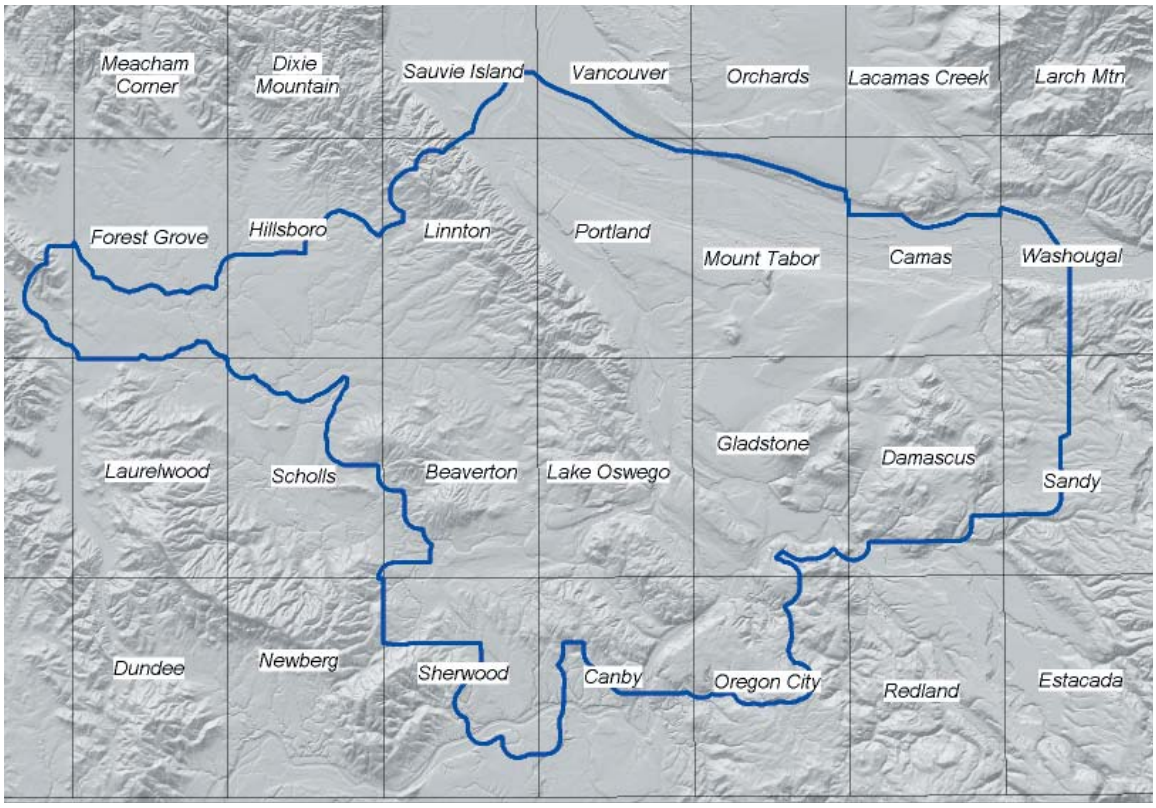

Figure 3. Extent of Geologic models shown in heavy blue lines. Quadrangle boundaries shown in light black line, labeled in italics.

now available. Since these models were made, the Oregon Water Resources Department GRID database has added some 10,000 online logs covering the Portland area, most of which are easily locatable. Locating many of those wells is the subject of a pending NEHRP proposal, and it makes sense to wait for that rich new dataset to update these models and remover artifacts.

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