Honeywell Groundwater Flow Model, Version 3

S.S. PAPADOPULOS & ASSOCIATES, INC.
Environmental & Water-Resource Consultants

Final - November 2011

7944 Wisconsin Avenue, Bethesda, Maryland 20814-3620 • (301) 718-8900

Honeywell Groundwater Flow Model, Version 3

Prepared by:

S.S. PAPADOPULOS & ASSOCIATES, INC.
Environmental & Water-Resource Consultants

and

O'Brien & Gere
Syracuse, New York

Final - November 2011

7944 Wisconsin Avenue, Bethesda, Maryland 20814-3620 • (301) 718-8900

Table of Contents

Page

List of Figures

List of Tables

Attachment

REPORT

Section 1
Introduction

Honeywell International, Inc. (Honeywell) has developed a groundwater flow computer model to simulate groundwater flow beneath and in the vicinity of Onondaga Lake, Syracuse, New York. The site location and model area are shown in Figure 1. This model was developed to facilitate the understanding of groundwater flow and to provide a working tool to assist in the evaluation of remedial approaches for Onondaga Lake and Honeywell sites adjacent to the lake. The model is a dynamic tool that is continually being revised as additional hydrogeologic data are collected to incorporate the best available information on groundwater and subsurface conditions.

The model that is described in this report is a revision of the groundwater model described in the Draft Feasibility Study Report for Onondaga Lake (Parson 2004, Appendix D). The earlier model version is referred to as Version 1.0 and the model described in this report is referred to as Version 3.01. A revised model prepared in 2006 was referred to as Version 2.0 but this model was never approved by the NYSDEC (SSP&A and O'Brien & Gere 2007). Version 3.0 of the model was described in a November 2009 draft report, which was reviewed by the NYSDEC. Comments from the NYSDEC were received and considered in the revised model, Version 3.01. The comments received from the NYSDEC and comment responses are included in Attachment A to this report. Major changes in the groundwater model between Version 1.0 and Version 3.0 are the following:

- The model area was expanded to include the Onondaga Lake outlet, Settling Basins 9-15, and the Dredge Spoils Area.
- The coordinate system used by the model was converted to the New York State Plane datum, NAD83, feet, which is used on the other Honeywell sites;
- Bathymetric data collected from the Phase I PDI was incorporated;
- The model layer structure in upland areas was simplified by the use of only one active layer to represent the bedrock;
- Selected seeps and wetland discharge areas were explicitly simulated;
- Geologic and hydrogeologic data collected between 2004 and 2009 were incorporated in the model; and
- The model was recalibrated to demonstrate that it provides representative simulations of groundwater flow.

The report includes a description of the hydrogeologic setting of Onondaga Lake, stratigraphic units, model structure, parameter distribution, and model calibration. The report includes all of the tables and figures described in the email from Tim Johnson to Don Hesler dated March 30, 2007. These tables and figures include the following:

Tables

- A table of geologic data listing all borings reviewed and considered in the modeling process with ground surface elevation, and top elevation of the major hydrogeologic units (Table 1).
- Table with differences in interpretation of geologic borings between model Version 1.0 and Version 3.01 (Table 2).
- A table listing all of the borings considered in the modeling process with the differences between observed top elevations of hydrogeologic units and the top elevations of the hydrogeologic units as represented in the groundwater model (Table 4).
- A table with all parameters specified in the groundwater model with comments on parameter values that have changed significantly from Version 1.0 (Table 6).
- A table listing monitoring wells with water level data with the observed water level, calculated water level, and model residual for both model Version 3.0 and model Version 1.0 if appropriate (Table 11).
- Model water balance for entire model domain and water balance for that portion of the model area included in model Version 1.0 (Table 12).

Figures

- Contour maps showing thickness of each model layer as represented in the model (Figures 5-10).
- Maps of model boundary conditions (Figure 11).
- Maps showing distribution of hydraulic conductivity in each model layer (Figures 20-24).
- Contour maps of water levels in each model layer with posted residuals. Only residuals at those monitoring wells used in the model calibration are shown (Figures 27-33).
- Scatter plots and histogram of model residuals (Figures 34-35).
- Contour maps of density distribution in model layers (Figures 13 to 19).
- Map showing model Version 3.01 and model Version 1.0 modeled areas (Figure 1).

The basic model files and pre- and post-processor files accompany this report in electronic format on the accompanying file "Honeywell Model Version 3.01.zip". The model files that are provided include:

- The model files for the graphical user interface program, Groundwater Vistas (ESI 2009), which was used in preparation of the model input files. Groundwater Vistas Version 5.35 was used.
- The input file for the computer program PEST (Doherty 2004, 2009) that was used to aid model calibration. The input file that is included is the file used for the final calibration run.
- The input files required to run SEAWAT-2000 with the calibrated set of model parameters.
- Utility programs used to assist in the calculation of model water budgets and groundwater discharge rates to Onondaga Lake.

Geologic Description of Onondaga Lake Area

Onondaga Lake is a northwest to southeast-trending glacially-scoured bedrock channel, which has been refilled with Pleistocene and Recent age sediments. The shale bedrock is mantled by glacial till, which is overlain by glaciofluvial and lacustrine sediments. The glaciofluvial and lacustrine sediments typically exhibit a fining-upward sequence of sand and gravel overlain by fine sand and silt, and silt/clay. Recent lake deposits, peat, Solvay waste, and fill materials overlie the older sediments. A schematic block diagram of the geology of Onondaga Lake is shown in Figure 2.

The glacial history of Onondaga Lake is complex. The bedrock channel beneath the lake served as a primary drainage route for large continental glaciers that covered the area during several episodes of glacial advance and retreat during the Pleistocene epoch. In addition, a second glaciofluvial drainage valley occurs just to the west of Onondaga Lake and extends into the Ninemile Creek Valley and the Old Erie Canal drainage and beyond. The flow direction of glaciofluvial meltwaters in both of these large valleys reversed a number of times during glacial advance and retreat and a complex history is evident (Fairchild 1909).

The bedrock channel at Onondaga Lake is defined by the upper surface of the bedrock, which roughly defines a T-shaped depression; the top of the "T" is aligned under Onondaga Lake, and the remainder of the "T" extends into the Ninemile Creek/Old Erie Canal drainage to the west. The bedrock is exposed at land surface in the topographically high areas that surround the lake, particularly on the Lake's western and southwestern margin.

Onondaga Lake and Groundwater Flow

Onondaga Lake, oriented along a northwest-southeast axis, is approximately 4.5 miles long and 1 mile wide. The lake has a mean depth of 36 feet and a maximum depth of 65 feet which occurs in the southern part of the lake. The average lake level during the past 20 years was 362.85 feet AMSL,[1] based on records from the USGS gage on Onondaga Lake. The surface area of the lake at this elevation is approximately 4.5 square miles, and the volume is approximately 34,600 million gallons. Surface water inflows and outflows from the lake average about 470 cubic feet per second based on average flows between 1998 and 2002 (Onondaga County 2003). The groundwater component of the lake water budget is small, estimated to be less than 0.5 percent of surface water inflows. Precipitation on the lake and evaporation from the lake are approximately equal; therefore, the net of precipitation and evaporation is small. The average residence time of water in the lake is approximately 100 days.

Regional groundwater flow in both the bedrock and the unconsolidated sediments is towards the valleys of the major tributaries of the lake. Groundwater discharge areas include seven major tributaries: Ninemile Creek, Geddes Brook, Harbor Brook, Bloody Brook, Onondaga Creek, Saw Mill Creek, and Ley Creek (Figure 3). Groundwater flow towards and into the lake originates primarily as precipitation that infiltrates into the unconsolidated sediments bordering the lake. Because the saturated unconsolidated sediments are restricted to a relatively narrow band on either side of the lake, the total recharge area is relatively small, and as a result, recharge to and discharge from the unconsolidated sediments is relatively small. Most of the groundwater in the unconsolidated sediments that flows toward the lake discharges to the tributaries and to drains along the shoreline with the remainder discharging in near-shore areas of the lake. This occurs, in part, because of the thickening wedge of fine-grained, low-permeability materials beneath the lake and because of sodium-chloride brines in the unconsolidated sediments beneath the lake.

Most of the groundwater discharge that occurs to the lake is the result of groundwater flow through the marl and overlying units from the upland areas. These units are typically fine grained, though there are some sand stringers or lenses, as shown on the hydrogeologic cross section. As a result, groundwater flow rates through these units are not large and most of the groundwater discharge occurs near shore in the littoral zone.

In addition, some groundwater discharge to the lake occurs as the result of upward groundwater flow through the silt and clay unit from the deeper permeable units. The sand and gravel unit and the overlying fine sand and silt unit are the primary deeper permeable units. These units are primarily recharged where they subcrop around the perimeter of the lake. Groundwater levels in the sand and gravel along the lakeshore are typically well above the lake level indicating the potential for upward groundwater flow. The vertical hydraulic conductivity

[1] Vertical datum referenced to the North American Vertical Datum of 1988 (NAVD88).

of the silt and clay unit is estimated to be 10^{-7} cm/sec or less, and thus the total upward groundwater flow through this unit is very small. The potential upward groundwater flow through the silt and clay unit is described in detail in a report on upwelling velocities to Onondaga Lake (SSP&A 2009).

The presence of natural sodium-chloride brines in the unconsolidated sediments beneath the lake complicates the understanding of local groundwater flow conditions. These brines according to Yager and others (2007), *"…probably formed through dissolution of halite and gypsum beds that were exposed to the Syracuse Formation through erosion by glacial ice"*. In the past, discharge of brines at salt springs was reported to have occurred around much of the shoreline of the southern basin of the lake (USGS 2000). These discharges likely occurred in areas where the silt and clay unit thinned or disappeared along the shoreline. The natural discharge of brines has ceased due to extraction of brines from wells along the shoreline. From 1797 to 1917, over 11.5 million tons of finished salt were produced from the springs and wells along the southern shoreline of the lake (USGS 2000). This represents the salt content from the constant production of 500 gallons per minute (gpm) of brine with a chloride concentration of 60,000 mg/L over this period. The production of these brines most likely decreased groundwater pressures in the more permeable zones beneath the lake.

In addition to the natural sodium-chloride brines, there are natural mixed cation brines in the bedrock. These brines are enriched in calcium, magnesium, and bromide relative to the sodium-chloride brines. In addition to the natural brines, some brines in groundwater result from seepage from the wastebeds. These brines are comprised primarily of sodium, calcium, and chloride. The wastebeds brines typically have sodium to calcium ratios that are less than 1, whereas the natural sodium-chloride brines have sodium to calcium ratios that are greater than 10. The mixed cation brines typically have sodium to calcium ratios in the range of 1.4 to 4. The mixing of relatively fresh groundwater, natural sodium-chloride brines, natural mixed cation brines, and brines from the wastebeds have created a wide variety of groundwater quality types in the vicinity of Onondaga Lake. The distribution of groundwater quality provides information on groundwater migration and origin.

Section 2
Geologic Framework

A conceptual model of the stratigaphic units in and around Onondaga Lake was developed based on the review of 1,037 geologic logs from the Onondaga Lake area, as well as regional geologic interpretations. The following is a summary of the geology of the Onondaga Lake area and the stratigraphic units identified. The purpose of this discussion is to describe the conceptual geologic model of Onondaga Lake and the surrounding area.

Eleven stratigraphic units are identified at Onondaga Lake and are described below, starting with the oldest and lowermost units. With the exception of the bedrock, not all units are present in all areas and the areal extent of the units is discussed briefly below. A hydrogeologic cross section along the southwestern corner of the lake is shown in Figure 4; the cross-section trace is indicated in Figure 3.

Bedrock – Bedrock of the Silurian age Salina Group underlies Onondaga Lake and the surrounding area. The uppermost bedrock is typically the Vernon shale, which is reported to be 500 to 600 feet thick in Onondaga County. Younger rocks of the Salina Group, consisting primarily of dolostone and shale, are exposed at land surface at elevations greater than about 450 feet (NAVD88) west and southwest of the lake (Winkley 1989). The bedrock surface was encountered in 134 borings reviewed for this project. The top of bedrock surface clearly illustrates the main Onondaga Lake channel, in addition to the secondary channel located to the west of the Lake (Ninemile Creek/Old Erie Canal channel). The elevation of the top of bedrock ranges from about sea level (with a low point of 9' (NAVD88) at the USGS Spencer Street boring), to over 600' (NAVD88) (in the upland bedrock areas located west-southwest of the lake).

Till – A layer of basal or lodgment till was encountered in 252 borings. The till is usually described as a dense, hard clay, or clay and gravel material. In some locations, the till was thin and difficult to distinguish from the overlying sediments. The basal till was encountered in about 75% of the borings that penetrated bedrock; the till surface generally mimics the underlying bedrock.

Sand and Gravel – A sand and gravel unit was identified in 166 boring logs. This unit ranges in thickness from a less than a foot thick along the channel margins to almost 100 feet thick in the Ninemile Creek/Old Erie Canal drainage. The sediments were likely deposited by high-energy glacial meltwaters during the northward retreat of the ice sheet. The sand and gravel unit is thin to absent is some areas and is likely thickest where the initial glaciofluvial deposits filled in low-lying areas following the retreat of the glacier. The Sand and Gravel unit is present across most of the bedrock channel except near the southwest corner of Onondaga Lake. The unit ranges from medium-grained sand with little fines to coarse sand and gravel deposits.

Fine Sand and Silt – A layer of fine sand and silt overlies the sand and gravel unit over most of the area. In places the unit contains minor amounts of clay, sometimes laminated; however, the unit generally has little to no clay.

Silt/Clay – A silt/clay layer was identified in 396 borings and overlies the coarser-grained glaciofluvial sediments. The silt/clay is likely lacustrine in origin with varves and laminations commonly noted in the boring logs. The thickness of the silt/clay unit ranges from less than a foot to almost 100 feet thick. The unit is not present in the upland areas, below parts of Wastebeds 1-8 extending into the Main Plant area, and in a portion of the Harbor Brook area.

Mixed Ninemile Unit – This unit is defined only in the northern part of the Ninemile Creek/Old Erie Canal drainage valley where a mixture of sediments occurs above the sand and gravel unit, rather than a simple fining upward sequence. The Mixed Ninemile unit consists of an interlayered sequence of clay, silt, sand, and gravel that overlies the sand and gravel unit. The Mixed Ninemile unit replaces the Fine Sand and Silt and Silt/Clay units where it is defined. The unit extends to the edge of Onondaga Lake, and ranges from less than 1 foot to about 135 feet thick. The lithology is variable within the unit, and the origin is interpreted to be glaciofluvial melt waters originating from the west, possibly commingling with lacustrine deposits from ancestral lakes.

In the Mixed Ninemile unit, layers of sand and gravel are observed at variable elevations, interlayered with deposits of silt, clay, and fine sand and silt, sometimes occurring with gravel. In the northeastern extent of the unit, near Onondaga Lake, the lower part of the Mixed Ninemile sediments are typically more fine-grained clays overlain by silts and sands, whereas in the southwestern extent of the unit, the sediments are slightly more coarse-grained with sands and gravels interlaying with silt and clay. Overall, the unit is considered fine-grained, but with variable thicknesses and occurrences of sand, and sand and gravel lenses.

Harbor Brook Sand, WB1-8 Sand, and Willis Avenue Sand – In three areas, a sand unit was identified to occur between the underlying silt/clay unit (or Mixed Ninemile unit) and the overlying Marl unit.

Marl – A marl deposit overlies the silt/clay unit along the lake margins and underlying Onondaga Lake. The marl was not consistently encountered in all borings; however, the unit is interpreted to occur throughout the main Onondaga Lake channel with thicknesses ranging from less than a foot to 70 feet thick.

Peat – A layer of organic peat is encountered in a number of borings above the marl along the lake margin at elevations of about 360 feet (NAVD88). The peat was not consistently described in the boring logs, and peat materials likely exist over a wider area than the boring logs indicate.

Solvay and Fill – The uppermost unit in most of the study area is the Solvay waste and miscellaneous fill materials, which occur over a majority of the area. These materials are combined into a single hydrostratigraphic unit.

Onondaga Lake Deposits – Sediments consisting of silt and clay were described in a number of shallow borings in the lake. The sediments generally occur overlying the Solvay wastes and/or the marl.

Stratigraphic "Picks"

The lithologic descriptions in 1,037 boring logs from in and around Onondaga Lake were reviewed and correlated to the stratigraphic units described above. The elevations of the upper surface of the stratigraphic units were calculated based on the ground surface elevations for the borings and the depth to the top of the units as interpreted from the boring logs; the 'top of unit picks' are summarized in Table 1. Borings not listed in the 2004 version of Table 1 in the Onondaga Lake Feasibility Study are identified as 'New' borings in Table 1. Table 1 also indicates where the unit was absent, versus instances where the boring was terminated prior to encountering the unit in the subsurface.

A comparison of the 2004 version of Table 1 with the current version is shown in Table 2. Numeric values indicate differences in the top elevation of the stratigraphic pick (negative values indicate the unit is identified lower in the section than the earlier version of the table). An entry of "No Longer Present" in Table 2 indicates that the unit is currently interpreted to be not present at that location, whereas the unit was interpreted as "present" in the earlier interpretation. For all of the borings correlated to the Mixed Ninemile unit, the Fine Sand/Silt and Silt/Clay units of the earlier table version are indicated as "No Longer Present" in Table 2. The following ten borings, which were included in the 2004 stratigraphy data set, are no longer included in the stratigraphic picks tables: WB18-DW102; HB-GP-12;HB-GP-37; HB-HB-04S; HB-HB-05I; HB-HB-06S; HB-HB-15; W5; W6; and W7.

Section 3
Model Domain and Model Structure

The groundwater model domain encompasses an area of approximately 31 square miles surrounding Onondaga Lake and the Ninemile Creek/Erie Canal drainage area southwest of the lake (Figures 1 and 3). The model grid dimensions are 34,500 feet in the northwest-southeast direction and 24,800 feet in the northeast-southwest direction. The model grid is rectilinear in plan view and rotated with respect to the geographical coordinates, such that the columns are oriented northeast to southwest and the rows are oriented northwest to southeast (Figure 3). The grid is rotated so that the rows are approximately parallel to the southwest shoreline of Onondaga Lake and groundwater flow along the shoreline is approximately parallel to the grid columns.

The rectilinear, 3-D, block-centered finite difference model grid consists of 150 non-uniformly spaced rows and 291 non-uniformly spaced columns (43,650 cells per layer). In the central portion of the model domain the grid size is approximately 40 feet by 40 feet and at the periphery of the model, the grid cell size coarsens to approximately 400 feet by 930 feet in plan view. The model grid coordinate system is UTM Zone 18N (in feet) NAD83, and the elevation datum is NAVD88 feet.

The ground surface elevation within the model domain is based on elevations developed for the Honeywell projects and from the National Elevation Dataset[2] where detailed topographic data developed by for the Honeywell projects were not available. The lake bottom elevations were developed by subtracting the lake bathymetry developed in the Onondaga Lake Pre-Design Investigations from a specified lake level elevation of 363 feet. The top of layer 1 was defined as the ground surface outside of Onondaga Lake and the lake bottom under the lake. The top of the model is Layer 9 outside of the Onondaga Lake valley.

Model Layers

Within the model domain, nine individual model layers are defined in Version 3.0 of the Onondaga Lake Groundwater model

The layers are further defined, as follows:

Layer 1 – Layer 1 includes the upper half of the total thickness of the Fill, Solvay, and Onondaga Lake Deposits.

Layer 2 – Layer 2 includes the lower half of the total thickness of the Fill, Solvay, and Onondaga Lake Deposits.

[2] www.ned.usgs.gov.

Layer 3 – Includes the marl, peat, and sand units that occur immediately beneath the marl (in the area of Harbor Brook, Willis Ave., and Wastebeds 1-8 at Ninemile Creek).

Layer 4 – Includes the Silt/Clay unit, combined with the upper half of the Mixed Ninemile unit, where it is defined.

Layer 5 – Includes the Fine Sand/Silt unit, combined with the lower half of the Mixed Ninemile unit, where it is defined.

Layer 6 – Includes the Sand and Gravel unit.

Layer 7 – Includes the Till unit.

Layer 8 – Includes the upper 10 feet of bedrock in areas where the Sand and Gravel unit is defined.

Layer 9 – Includes 100' of bedrock throughout the model domain

Thickness of Model Layers

The thickness of each model layer was developed based on the stratigraphic unit 'picks' for 928 borings located throughout the model domain. Of the initial 1037 borings reported in Table 1, 109 borings were eliminated from the dataset due to co-located borings as described below.

Initially, the data were reviewed to identify model grid cells that contained more than one boring, as shown in Table 3. Due to the nature of the glacial sediments combined with the variable quality of boring logs, these co-located borings often exhibited variable thicknesses of the hydrogeologic units. For the purpose of developing the model layer thicknesses, one of these borings was selected to represent the model layer thickness in these grid cells[3]; the selected boring is indicated in the 1st column of Table 3 (as a blank field). The remaining 109 borings were eliminated from the dataset.

The top elevation of the model was based on a kriged ground surface, which incorporated the borehole ground surface elevations, wastebed topography, lake bathymetry, and the surface topography for the area. For model Layers 1 through 7, where they are represented by a hydrogeologic unit, the layer thickness was developed by kriging the thickness of the unit in each of the 928 borings. The thickness for layers 1 and 2 are the same, and were determined by kriging the total thickness of the Fill, Solvay and Onondaga Lake deposits based on the borehole data; the upper half of this thickness was assigned to Layer 1, and the lower half assigned to Layer 2. Maps depicting the model layer thickness, and the extent of the hydrogeologic units are

[3] The deepest boring was selected; however, if no deeper boring was available, the boring with the most consistent lithology as compared to surrounding borings was selected.

shown in Figures 5 to 10 (for model layers 1 to 7). Model layer 8 has a uniform thickness of 10 feet where it is defined and model layer 9 has a uniform thickness of 100 feet[4].

A summary of the top of model layer elevation and the elevation of the stratigraphic 'pick' at that location is provided as Table 4. Table 4 indicates the column/row location for 928 borings and the difference between the observed top elevation of the hydrogeologic units and the top elevation of model layers 1 through 8 at those boring locations.

Table 4 also indicates where a model layer is not defined at a boring location[5], where there is no comparable hydrogeologic unit pick to the defined model layer[6], and instances where the layer is defined at a boring location, but the unit was not observed in the borehole description[7]. Boring locations that were added since the April 2004 version of Table 4, are indicated as such in the "New Boring" column.

Boundary Conditions

Boundary conditions in the model include the major surface water features within the model domain and the I-690 underdrains. Surface water features represented in the model include Onondaga Lake, Ninemile Creek, unnamed tributaries of Ninemile Creek, Geddes Brook, Harbor Brook, Onondaga Creek (Barge Canal), Tributary 5A, the West Flume, the East Flume, Ditch A, Railroad Ditches, seeps on the perimeter of Wastebeds 1-8, and wetlands at mouths of Harbor Brook and Ninemile Creek, and wetlands along the northwest shoreline of Onondaga Lake. All of the surface water features are represented as "drain" conditions in the model with the exception of Onondaga Lake and Ninemile Creek which are represented as "river" conditions. The elevations of all surface water boundary conditions were specified on the basis of the best available topographic data as described above. The elevation of Onondaga Lake was specified as 362.95 feet (NAVD88) which is the average long-term water level for the period 1992 through 2008 based on daily data from the USGS gage. A map view of the boundary conditions is shown in Figure 11.

---

[4] In the Groundwater Vistas files model layer 9 is represented graphically as having a variable thickness. In developing the model data sets, though, the layer was specified as having a constant transmissivity equal to 100 feet multiplied by the bedrock hydraulic conductivity.

[5] Indicated by a blank field in Table 2. For example, where a boring is located outside the areal extent of a hydrogeologic unit, e.g., the Marl, Peat and Sand units at a distance away from the Onondaga Lake channel.

[6] Indicated by "-" in Table 2. For example in the area of the Mixed Ninemile unit, the top of the unit is compared to the top of Layer 4, but since the thickness of the unit is split evenly between Layers 4 and 5; the top elevation of Layer 5 is not correlated to a stratigraphic 'pick' in the boring log.

[7] Indicated with a "- -" in Table 2. For example, where a boring is located within the defined areal extent of a hydrogeologic unit, but the unit was not encountered in the boring log, either because the unit was very thin/not present, or the boring terminated above the elevation of the unit.

The exterior of the model domain was specified as a no-flow boundary. Groundwater inflow to the model domain in the Ninemile Creek Valley was simulated by constant-head cells in the alluvium underlying the creek valley at the edge of the model domain. In the previous model version groundwater inflow into the model domain from the extension of the glacial trough to the southeast of Onondaga Lake was simulated with constant heads at the edge of the model domain. In this version flow into the model domain from the glacial trough was not simulated due to a lack of information to reliably specify the magnitude of the flux.

Recharge was specified on the upper layer of the model. Several recharge zones were specified based on land use and topography as shown on Figure 12 and recharge rates were calculated in the model calibration process. The average annual precipitation in Syracuse is about 40 inches per year based on the 30-year period 1971 to 2000. Calibrated recharge rates ranged from 1-inch per year in the lowland along the south shore of the lake to 16.5 inches/year in the upper valley of Ninemile Creek where the surface soils are coarse grained.

Density Distribution in Model Layers

Groundwater total dissolved solids (TDS) concentrations in the model domain vary widely due to the presence of both naturally-occurring brines and leachate from the Solvay waste deposits. The density distribution in the model layers was generated based on chloride concentrations measured in groundwater monitoring wells and pore water samples[8]. Chloride data from monitoring wells and pore water samples were compiled and converted to groundwater density according to the following formula (based on a NaCl brine-to-density conversion):

$$\text{Groundwater Density} = 0.999293214 + 1.085 \times 10^{-6} * \text{Chloride concentration (mg/L)}$$

The depth of the mid-point of the screen interval or pore water sample depth at each sampling location was compared with the stratigraphic 'picks' from the borehole logs to assign each chloride measurement to a stratigraphic unit and model layer. For monitoring wells with multiple chloride analyses of groundwater from the same screen interval, or multiple depths for pore water samples within the same stratigraphic unit, the average chloride values were used to represent the groundwater density in the stratigraphic unit (and model layer) at that location. These point data were then plotted in map view to generate density distribution maps for each model layer. Contour maps of groundwater density in each model layer were created by hand contouring the point data in combination with the conceptual geologic model for Onondaga Lake. The density data used to generate the model layers is included as Table 5 and the density distribution within each model layer is shown in Figures 13 through 19.

[8] Pore water data were available for selected USGS borings (Saddle, Parkway, West Trail, Onondaga Lake Outlet, Spenser Street, Ley Creek, and Midway) in a thesis by Epps, 2005.

Sources and Sinks

No active pumping wells were incorporated in the model; and no pumping was simulated for the steady state simulation of existing conditions.

Section 4
Model Calibration

Model calibration is the process in which a computer model is adjusted to improve the accuracy of the model and to demonstrate that the model is reasonably representative of observed site conditions. The overall purpose for model calibration is to increase the reliability of the model. The calibration process adjusts the model input parameters such that the model output reasonably correlates with the existing site data. A model that reasonably correlates with site data can be considered to provide a good representation of actual site conditions. The extent of calibration necessary for a model is guided by the objectives of the modeling effort, the complexity of the site, and the level of understanding of the site hydrogeology.

The groundwater model was calibrated using the automated computer program "PEST – Model Independent Parameter Estimation" (Doherty, 2004 and 2009). A groundwater model is deemed calibrated when the difference between model outputs and field observations, referred to as calibration targets, has been reduced to a minimum in the weighted least squares sense (i.e., the sum of squared differences between model outputs and measurements, termed the objective function or phi [Φ]). Model calibration is an iterative process that seeks to reduce phi by determining the sensitivity of the model parameters to the calibration data. When the calibration process can no longer reduce phi (i.e., $\Phi = \Phi_{min}$), the parameters are considered optimal with respect to the measured data set and may be used to make predictions under conditions comparable to the calibration conditions. The computer program PEST automates the procedure of determining the minimum value of phi.

The first step in the model calibration process is the identification of measured hydrologic data that can be used as calibration targets. Two sets of formal calibration targets were identified: water levels in monitoring wells and drain and creek flows. These targets are described in the following section.

The second step in the model calibration process is the selection of model parameters that can be varied in the model calibration process. The parameter zones defined in Version 3.0 of the groundwater model are based on areas (or subareas) within each model layer with similar geologic properties[9]. These areas are shown on Figures 20 to 24 for model layers one through seven and are listed on Table 6. In total, 40 areas are defined. In twenty-nine of these areas, the hydraulic conductivity is specified as a uniform value. In the other eleven areas, the model was setup to specify the hydraulic conductivity as a continuous distribution using the pilot point

[9] The current convention within the groundwater modeling community is to use the term "area" or "volume" rather than "zone" to define the spatial domain in which a model parameter is specified.

method[10]. During the model calibration process, the values of hydraulic conductivity in each area are estimated. In the areas in which hydraulic conductivity is specified as a continuous distribution, the hydraulic conductivity is estimated at a finite number of pilot points and a kriging procedure was used to develop the continuous distribution as appropriate.

A separate parameter area was specified for each of the major wastebed areas because the hydraulic properties of the Solvay waste are potentially a function of the time period in which the materials were deposited. As a result, separate areas are defined for the Solvay deposits in Wastebed B, Wastebeds 1-6, Wastebeds 7-8, Settling Basins 9-10, Settling Basin 11, and Settling Basins 12-15.

The hydraulic properties of the geologic materials within the model area have been estimated from a large number of slug tests and aquifer tests. The values that have been estimated from the various tests are summarized on Table 7 and are listed by individual test on Table 8. An evaluation of the estimated values was used to develop an acceptable range for horizontal hydraulic conductivity and the ratio of horizontal to vertical hydraulic conductivity in each parameter area. These ranges, though consistent with the data, are quite large. The acceptable ranges are listed on Table 6. In areas where a model layer was less than two feet thick, the layer was assigned the hydraulic properties of the underlying layer.

The third step in the model calibration process is the identification of conditioning information on model parameters. Two types of conditioning information were identified: estimates of aquifer hydraulic conductivity from aquifer tests and slug-tests and geologic information. The aquifer test and slug test estimates of hydraulic conductivity were incorporated in the calibration process as a constraint on the estimated hydraulic conductivities. The known geologic information was incorporated into the calibration processes by the use of the geologic zones.

The fourth step in the calibration process is calibration using the computer program PEST to assist the analyst in the evaluation of model parameters and in modifications to the model structure. The result of this step is the calibrated groundwater model.

Calibration Targets

This section describes the groundwater calibration targets that were used in the calibration process for Version 3.0 of the Honeywell Groundwater Model. The calibration targets include groundwater levels and surface-water flows. Because the groundwater model is a steady

[10] John Doherty, 2003. Ground Water Model Calibration Using Pilot Points and Regularization. Ground Water, Vol. 41(2), pp 170-177.

state model the calibration targets represent average long-term conditions. The calibration targets are discussed below.

Groundwater Levels

Water-level data from 403 monitoring wells in the model area from 1991 to present were assembled for evaluation (Table 9). The period of record for each well and the number of measurements, as well as the groundwater zone[11] in which the well is completed, are also listed on Table 9. The number of measurements varies greatly from well to well as does the period of record.

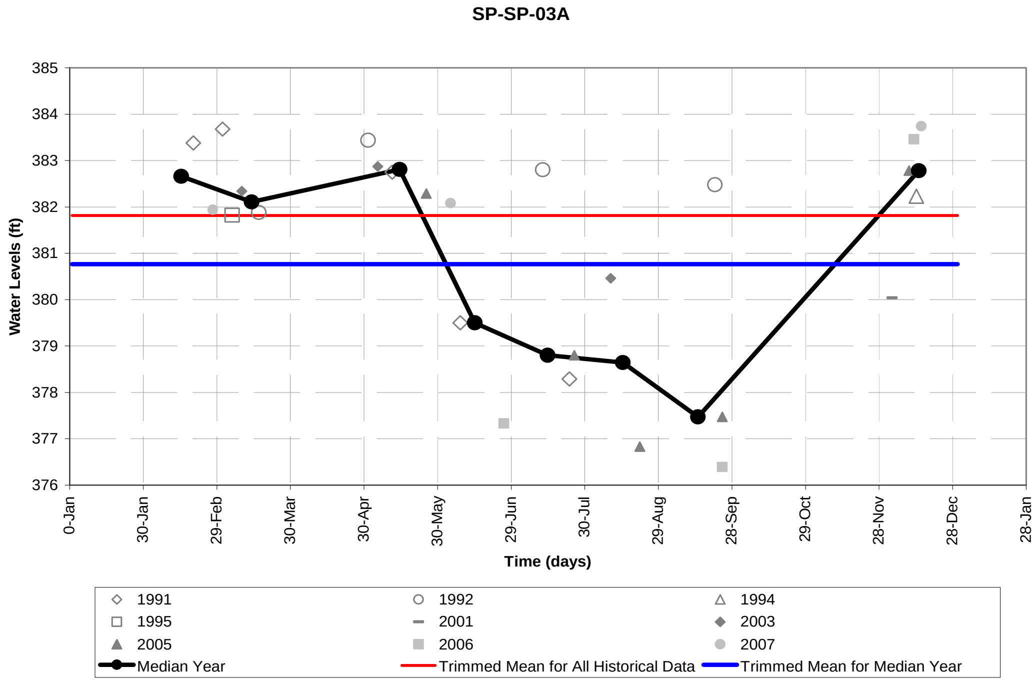
A rigorous analysis of the water-level data from the 403 monitoring wells was conducted to determine a single representative measure to be used as the model calibration target. Each of the wells was analyzed independently. Initially, an analysis was conducted to evaluate any possible historic trends in water-level measurements, especially since precipitation for the last few years was above normal. It was determined there was no consistent trend (either increasing or decreasing) in the water levels for many of the wells over time; therefore, the value used as a calibration target for each well incorporated all of the historical data.

This analysis indicated, as expected, that a number of wells have seasonal variability, where the winter and spring months have higher water levels than the summer months. For some wells, the range in water levels for a given month was large (from year to year), as reflected in unusually high or low measurements, which made use of a target value based on an arithmetic average value unsuitable. It is common practice to use a median measure in these instances to mitigate the influence of these abnormal values; however, water levels in the winter and summer months were not measured with the same frequency; with some wells measured more frequently in the winter season or vice-versa. A median value would reflect the season that was measured more frequently, making it difficult for parameter estimation, as this process would be calibrating different areas of the model to different seasons or to both seasons simultaneously. For wells at which a seasonal pattern was not observed, either the water-level measurements were not taken as frequently, making the pattern difficult to discern, or the presence of unusually high or low values disrupted the pattern (or a seasonal trend is not observable).

To mitigate the influence of water-level measurement frequency and timing, and the presence of abnormal measurements, a “median” year was constructed for each well listed in Table 9. The “median” year was calculated as the median of the historical data for each month. An example of a “median” year is presented on the figure below. The “median” year reduces each month to a single representative water level thereby normalizing each month’s contribution

[11] The groundwater zones are assigned on the basis of well completion intervals: S (shallow); I (intermediate); D (deep); BR (bedrock); and G (Ninemile Creek sand and gravel).

to a target value. In addition, the influence of any outlier measurement is reduced provided at least one other measurement was taken in the same month during another year. In this manner the number of wells with a range in water levels greater than 10 feet was reduced by over 60%.



The target value used for each well was then calculated from the "median" year. A trimmed mean (Helsel and Hirsch 2002) was used to establish this value. The trimmed mean effectively removes data points from the high and low ends of the ordered distribution based on a fixed percentage of "trimming'. Several "trimming" percentiles were used initially - the 5th, 10th and 25th, from which it was concluded that trimming at the 25th percentile yielded an appropriate target value for the majority of wells. The target value for each well, including statistical summaries of the observed values and "median" year, is presented on Table 9[12]. In the model calibration process, the wells were assigned to the model layers listed on Table 9.

Surface-Water Flow Targets

The surface-water flows that were used as calibration targets are listed below. The location of the surface water features, gaging stations, and watershed areas within the model area are shown in Figure 25.

[12] All Elevations in Table 1 are referenced to NAVD88.

1) Harbor Brook – The USGS maintains two gaging stations on Harbor Brook, one located 0.5 miles upstream from Onondaga Lake (USGS 4240105 Hiawatha Blvd.) one located 2.6 miles upstream of the lake (USGS 4240100 Holden St.). Under base flow conditions of between 3 cubic-feet-per-second (CFS) and 5 CFS, the median difference between the two gaging stations is 0.2 CFS. This estimate of base flow was used as a calibration target for model calibration.

2) Geddes Brook – The base flow of Geddes Brook is estimated to be about 5 CFS based on Figure 3-13 of the Ninemile Creek RI report (TAMS 2003). This flow, adjusted for the percentage of the Geddes Brook watershed in the model domain was used as a calibration target. The Geddes Brook watershed has a total area of 8.4 square miles of which 5.1 square miles are in the model domain. Therefore, the calibration target is 3 CFS.

3) I-690 Underdrain (Semet/Willis) – The base flow of the I-690 underdrain at Semet/Willis is estimated to be 5.1 gallons per minute (GPM) based on measured flow data in the period December 2000 through March 2003.

4) West Flume – The base flow of the West Flume is estimate to be about 0.4 CFS based on August 1994 measured flow at station WFSW-6. This station is located about 50 feet above the confluence of the West Flume with Geddes Brook.

5) Ninemile Creek – The total base flow of Ninemile Creek within the model domain is estimated to be 10 CFS. The base flow gain on Ninemile Creek between the Camillus gage and the Lakeland gage was calculated using the last consecutive 10-year period with data from both gages; 1989 through 1998. The base flow gain was calculated using the U.S. Bureau of Reclamation base-flow index procedure (U.S. Bureau of Reclamation, 2009). The average base flow gain during this period was 24 CFS. The basin area between the two gaging stations is about 30.7 square miles of which 12.9 square miles is within the model domain. Thus the gain within the model reach, assuming the gain occurs equally throughout the basin area between the two gages, is about 10 CFS. This base flow gain was used as a calibration target. *In using this estimate of base flow as the basis for a calibration target, we will be cognizant of the limitations of this base flow estimate related to the reliability of the Lakeland gage (backwater effects from Onondaga Lake affect reliability of reported flows).*

No other reliable flow data are available for defining calibration targets. A portion of the Semet/Willis collection trench is in operation; however, data are inadequate for estimating long-term inflow rate. Currently the water level in the trench is maintained 0.5 feet below lake level. During April and May 2008 the average inflow rate to the trench was 16 GPM. The nature of Tributary 5A and the East Flume are such that it is not possible to developed data-based estimates of base flow.

Calibration Results

The model calibration process was difficult and not straightforward because of the complexity of groundwater environment in the vicinity of Onondaga Lake. The largest variations in water levels occur within and in the vicinity of the man-made wastebeds and in addition there are large lateral and vertical variations in groundwater density. Efforts to calibrate the groundwater model using the pilot-point method in selected parameter zones was not fruitful; variations in parameter values within the zones did not produce a better calibration than a uniform value within the zone. As a result, a single parameter value was specified in each of the parameter zones as the result of model calibration. The calibrated model parameters are listed on Table 6 and the model parameter zones with calibrated values of hydraulic conductivity are shown by layer on Figures 20 through 24.

A measure of the acceptability of the calibrated groundwater model is the correspondence between model calculated water levels and the observed average water levels. An analysis of model residuals, which are the difference between observed water levels and calculated water levels at monitoring wells, provides a means of assessing model acceptability. A summary of residual calibration statistics is tabulated on Table 10 and a graphic representation of residuals for the entire model domain are shown on Figure 26.

To assist in the evaluation of residuals, the model residuals are displayed in several formats; tabulation of residuals for all monitoring locations, maps of each model layer showing the areal distribution of residuals, plots of calculated versus observed water levels (scatter plots) for each of the model layers and histograms of model residuals by layer. The calculated model residuals for the steady-state simulation are listed on Table 11 and plots of residuals by layer are shown on Figures 27 through 33. Scatter plots of model residuals by layer are shown on Figures 34 to 35 and histograms of model residuals by layer are shown on Figures 36 and 37.

Another measure of the acceptability of the calibrated model is the correspondence between model calculated groundwater discharges and observed flows in surface-water bodies. Unfortunately, the reliability of observed flows in the model domain as an accurate representation of average conditions is poor. The calculated groundwater discharges are tabulated on Table 12. Model calculated groundwater discharges are generally less than the estimates of base flow conditions. For instance, the model calculated discharge to Harbor Brook between the two USGS gaging stations is about 45 gpm versus the estimated base flow of about 90 gpm; the model calculated discharge to the I-690 underdrain is 8 gpm versus measured discharge of 5.1 gpm; and the model calculated discharge to the Ninemile Creek drainage is about 5 cfs versus the estimated base flow gain in the model domain of 10 cfs.

The calibration sensitivity of selected horizontal hydraulic conductivity parameters and selected ratios of horizontal to vertical hydraulic conductivity are shown on Figures 38 and 39, respectively. On these figures are shown plots of parameter values versus the calibration objective function. If parameters were not correlated with each other, the parameter value that minimizes the objective function is the calibrated value; in fact, because of cross correlation between parameters, the calibrated value does not always correspond with the minimum objective function as shown on these figures. Sensitive model parameters are those for which the objective function changes rapidly in either direction from the calibrated value; insensitive model parameters are those for which the objective function does not change markedly with large changes in parameter values. The relative sensitivity of all the model parameters is tabulated on Table 6.

Section 5
Summary

Honeywell developed a groundwater flow computer model to simulate groundwater flow beneath and in the vicinity of Onondaga Lake. This model was developed to facilitate the understanding of groundwater flow and to assist in the evaluation of remedial approaches for Onondaga Lake and other Honeywell sites adjacent to the lake. The successful calibration of this model demonstrates that the model provides a reasonable representation of site groundwater flow and that the model is capable of addressing the model objectives.

The model that was developed accurately depicts the structure of the hydrogelogic units within the model domain. Parameter values, though, were chosen to represent average conditions over broad areas are incorporated in the model. As a result, the model provides an excellent framework for addressing localized issues but parameter values should be checked to insure consistency with site-specific conditions.

Section 6
References

Doherty, J., 2004. PEST – Model-Independent Parameter Estimation, User Manual: 5th Edition. Watermark Numerical Consulting. Brisbane, Australia.

Doherty, J., 2009. Addendum to the Pest Manual. Watermark Numerical Consulting. Brisbane, Australia.

Environmental Simulations, Inc. (ESI) 2009,Groundwater Vistas Version 5.35. Reinholds, PA.

Epps, E.G., 2005. The Sources of Distribution of Brines in Sediment Pore Waters, Onondaga Valley, New York. M.S. Thesis, Syracuse University.

Fairchild, H. L., 1909. Glacial Waters of New York, New York State Museum Bulletin No. 127, 66 pages.

Helsel, D., and R. Hirsch (2002), Statistical Methods in Water Resources, Techniques of Water-Resources Investigations of the U.S. Geological Survey, Book 4, Hydrologic Analysis and Interpretation, Chapter A3.

Onondaga County, 2003. Annual Report Onondaga Lake Ambient Monitoring Program.

Parsons, 2004. Draft Feasibility Study for Onondaga Lake. Prepared for Honeywell, Morristown, New York, November.

S.S. Papadopulos & Associates, Inc., 2009. Groundwater Upwelling Velocities in Remediation Areas, Onondaga Lake Bottom Subsites. Prepared for Parsons, Syracuse, New York.

S.S. Papadopulos & Associates, Inc. and O'Brien & Gere, 2007. Onondaga Lake Pre-Design Investigation Groundwater Discharge Evaluation – Groundwater Model, Version 2.0. Prepared for Honeywell, Morristown, New Jersey, April.

TAMS, 2003. Geddes Brook/Ninemile Creek Remedial Investigation Report, Onondaga County, New York. Prepared for New York State Department of Environmental Conservation. July.

U.S. Bureau of Reclamation 2009, http://www.usbr.gov/pmts/hydraulics_lab/twahl/bfi/.

U.S. Geological Survey, 2000. Salt Production in Syracuse, New York ("The Salt City") and the Hydrogeology of the Onondaga Creek Valley. Fact Sheet FS 139-00, November.

Winkley, S. J., 1989. The Hydrogeology of Onondaga County, New York. Thesis, Syracuse University, Syracuse, New York.

Yager, R., W. Kappel, and L. Plummer, 2007. Halite Brine in the Onondaga Trough Near Syracuse, New York: Characterization and Simulation of Variable-Density Flow. U.S. Geological Survey, Scientific Investigation Report 2007-5058.

FIGURES

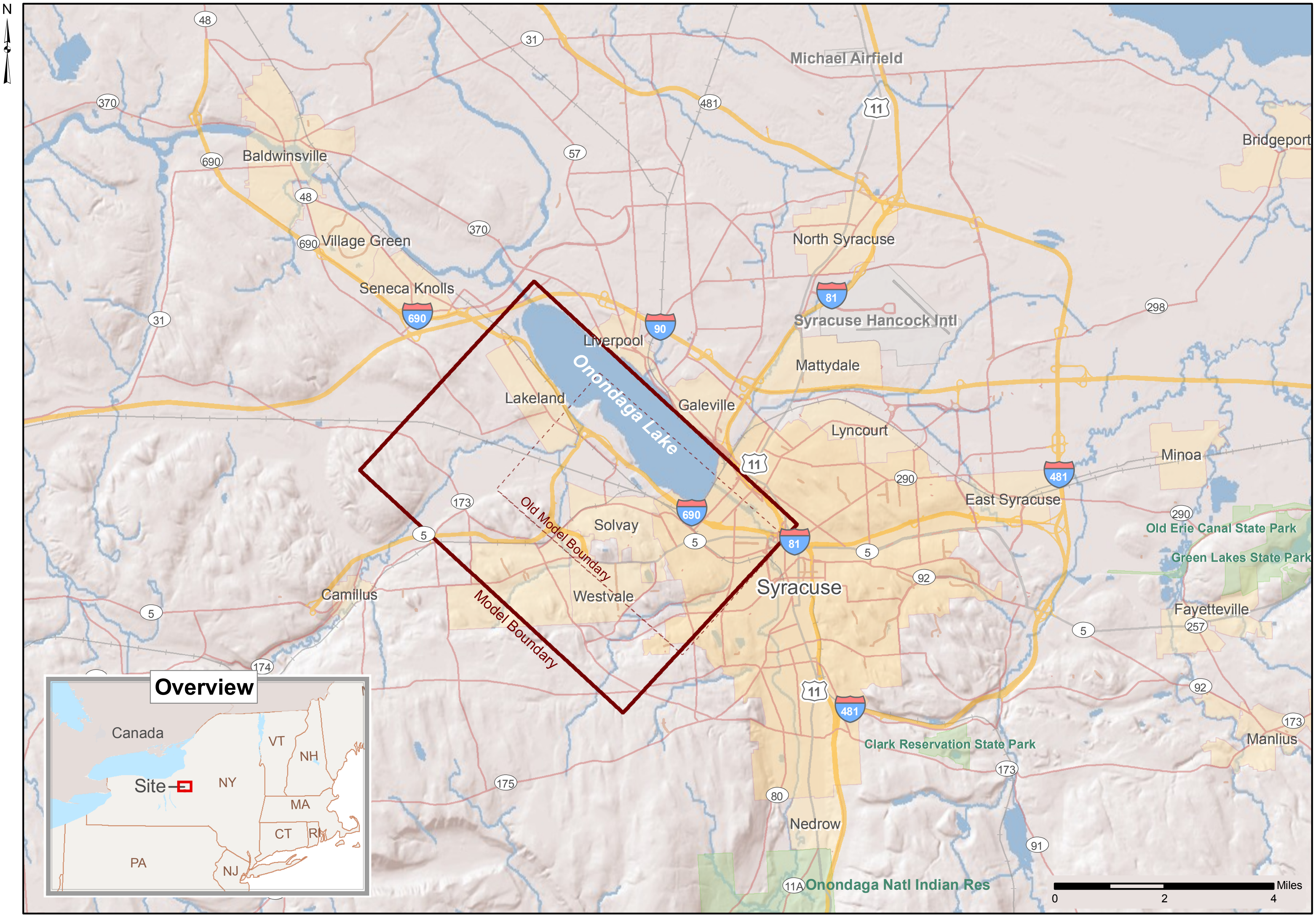


Figure 1 Location Map of Model Area and Onondaga Lake

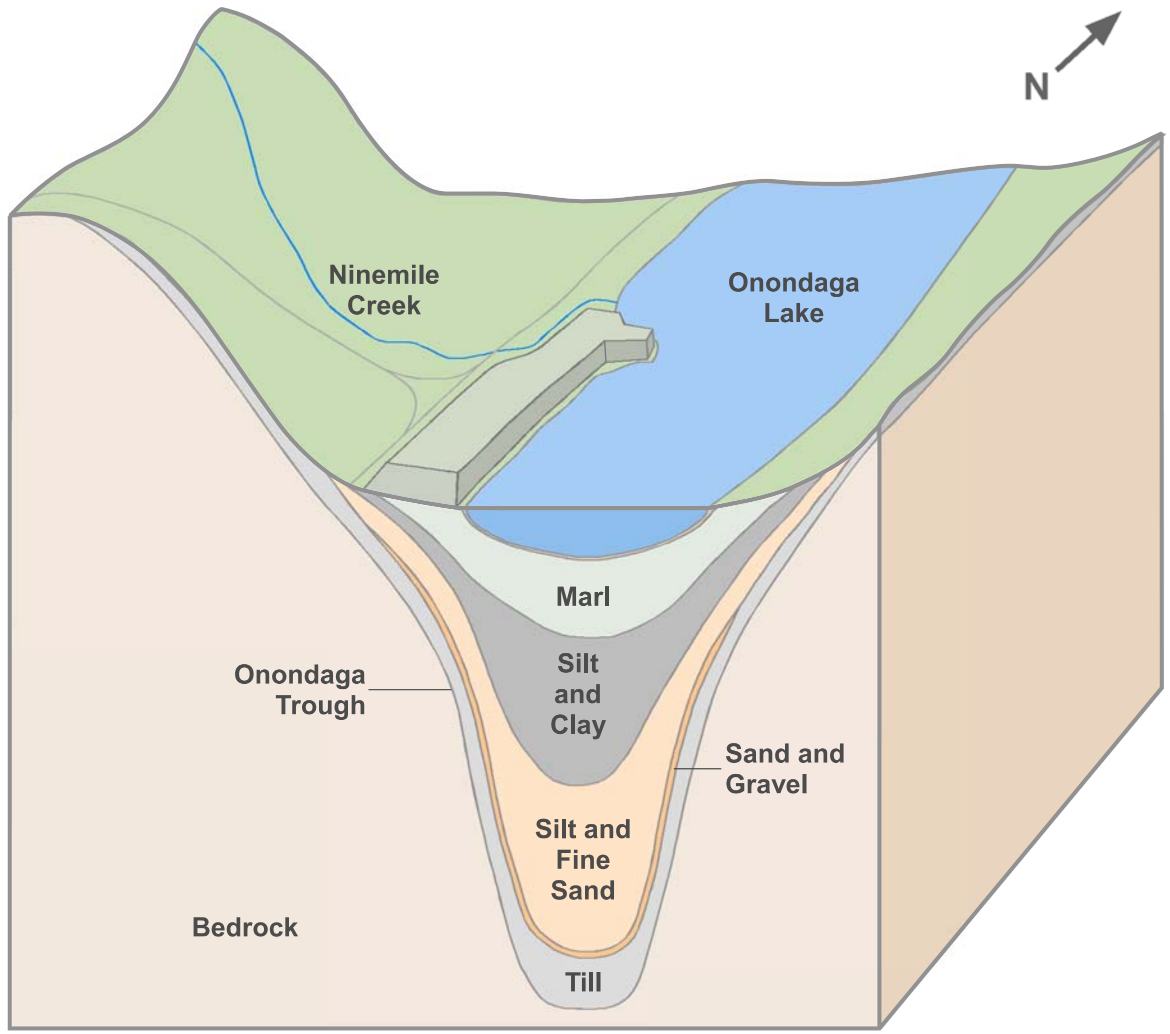


Figure 2 Geologic Block Diagram of Onondaga Lake

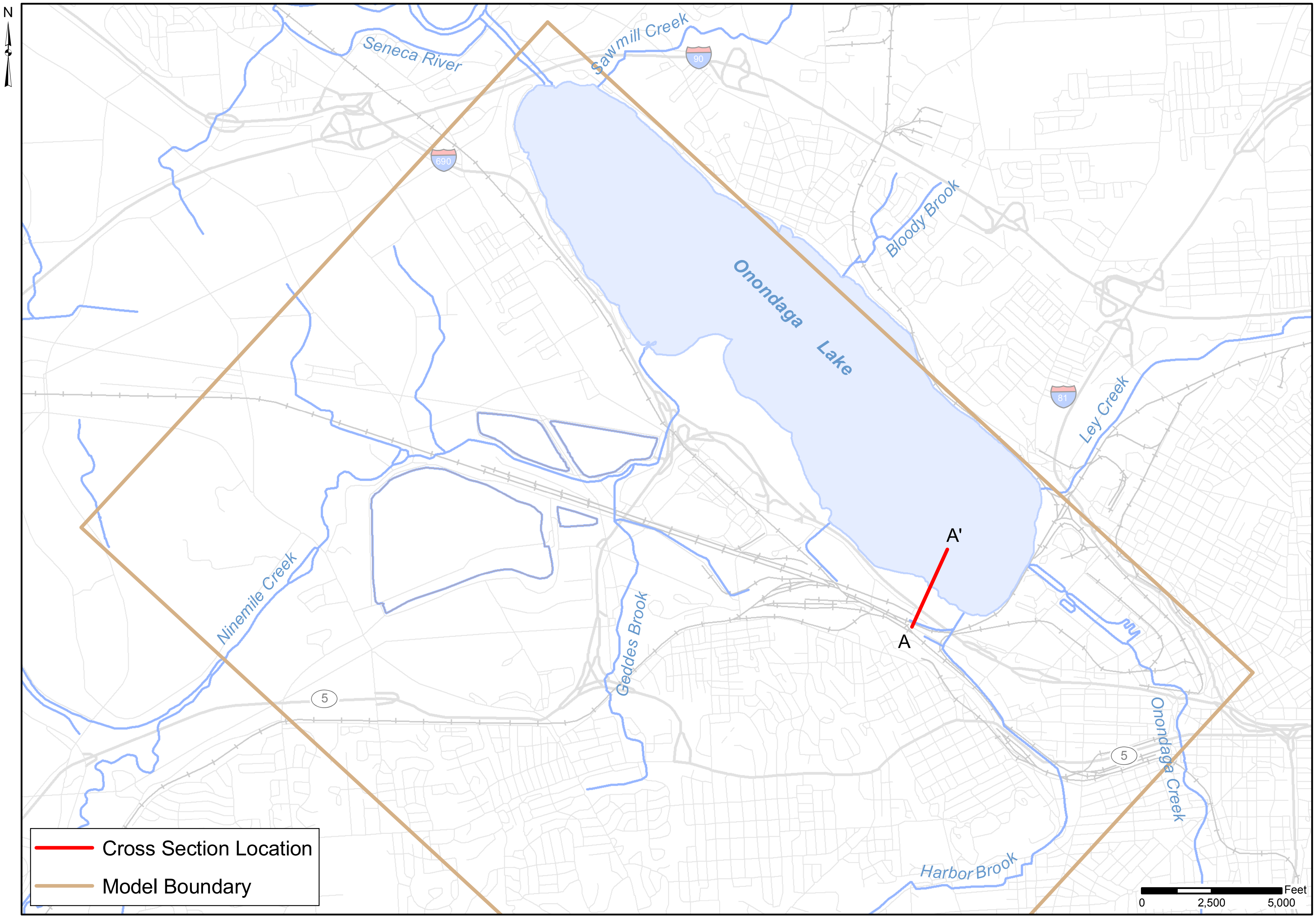


Figure 3 Map of Onondaga Lake and Nearby Surface Water Features

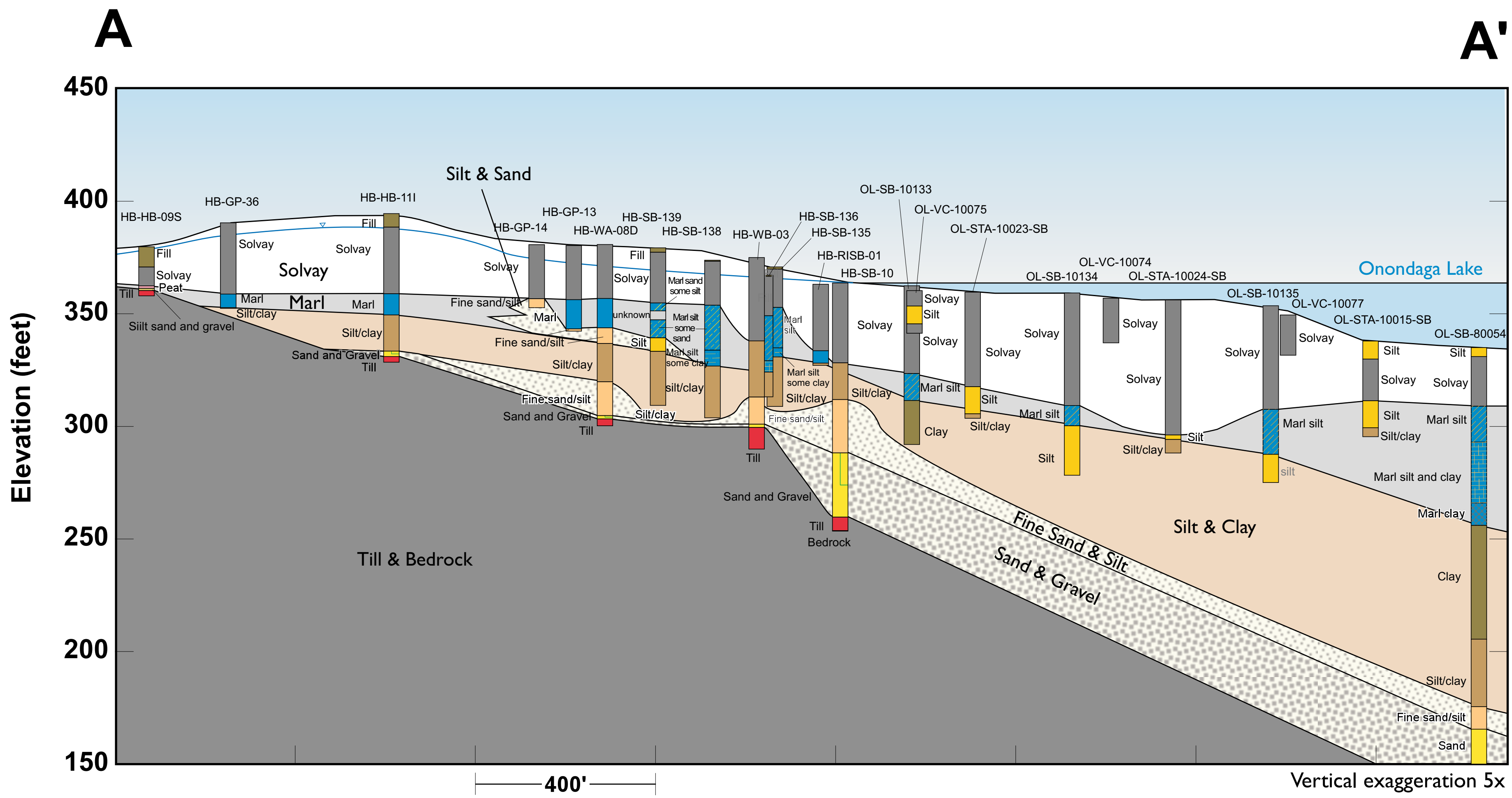


Figure 4 Hydrogeologic Cross Section A-A'

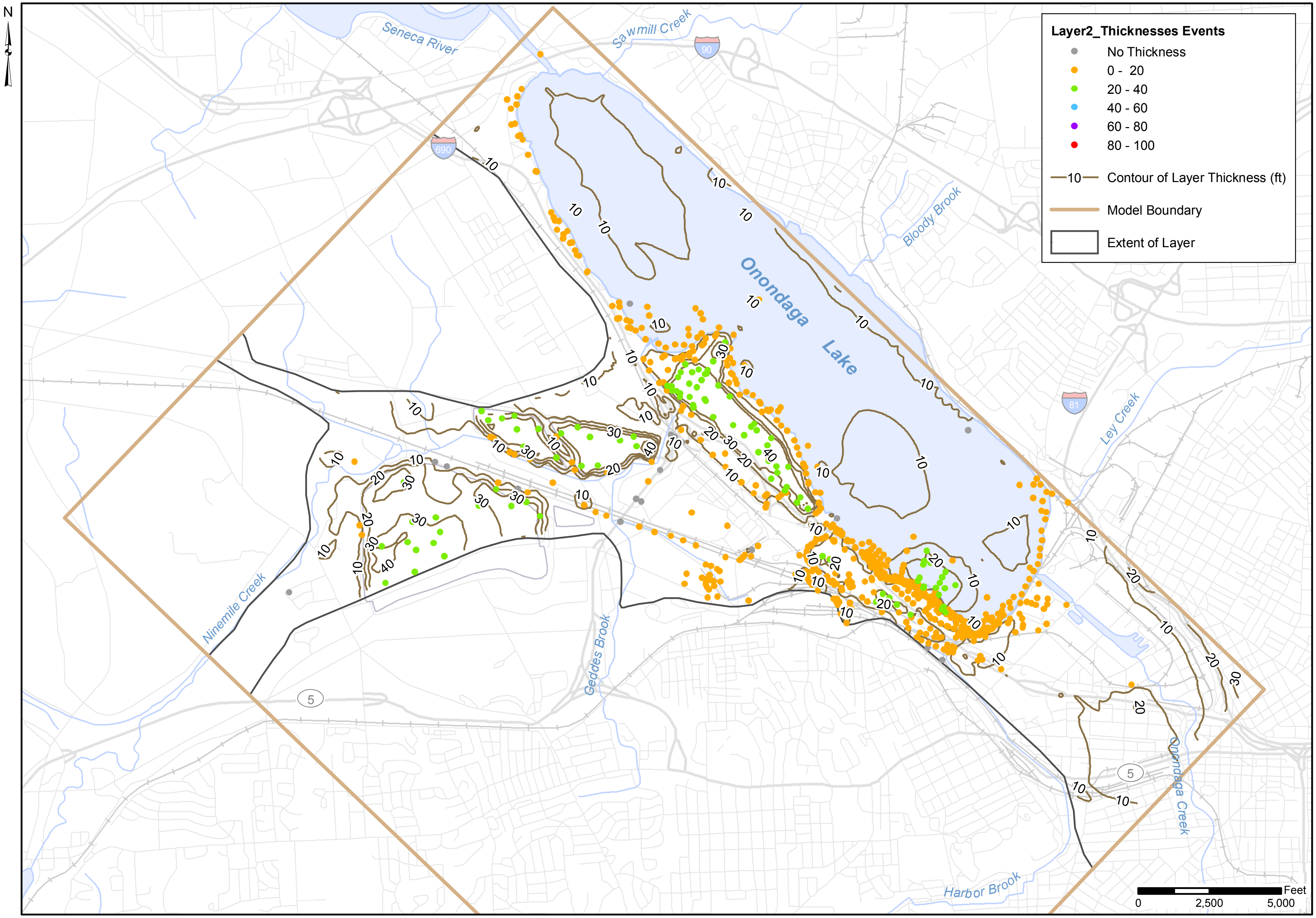


Figure 5 Model Thickness of Layer 1 and Layer 2

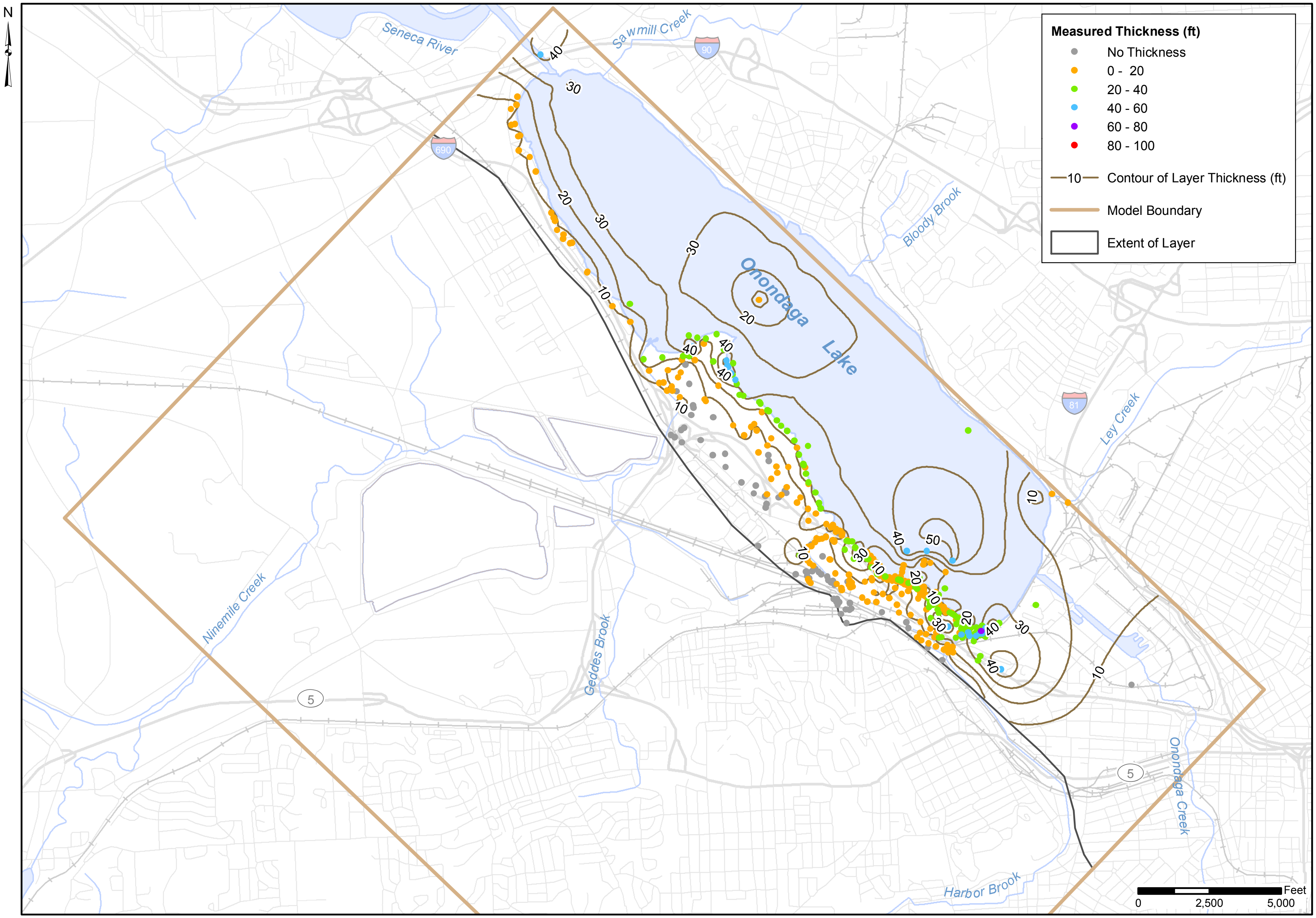


Figure 6 Model Thickness of Layer 3

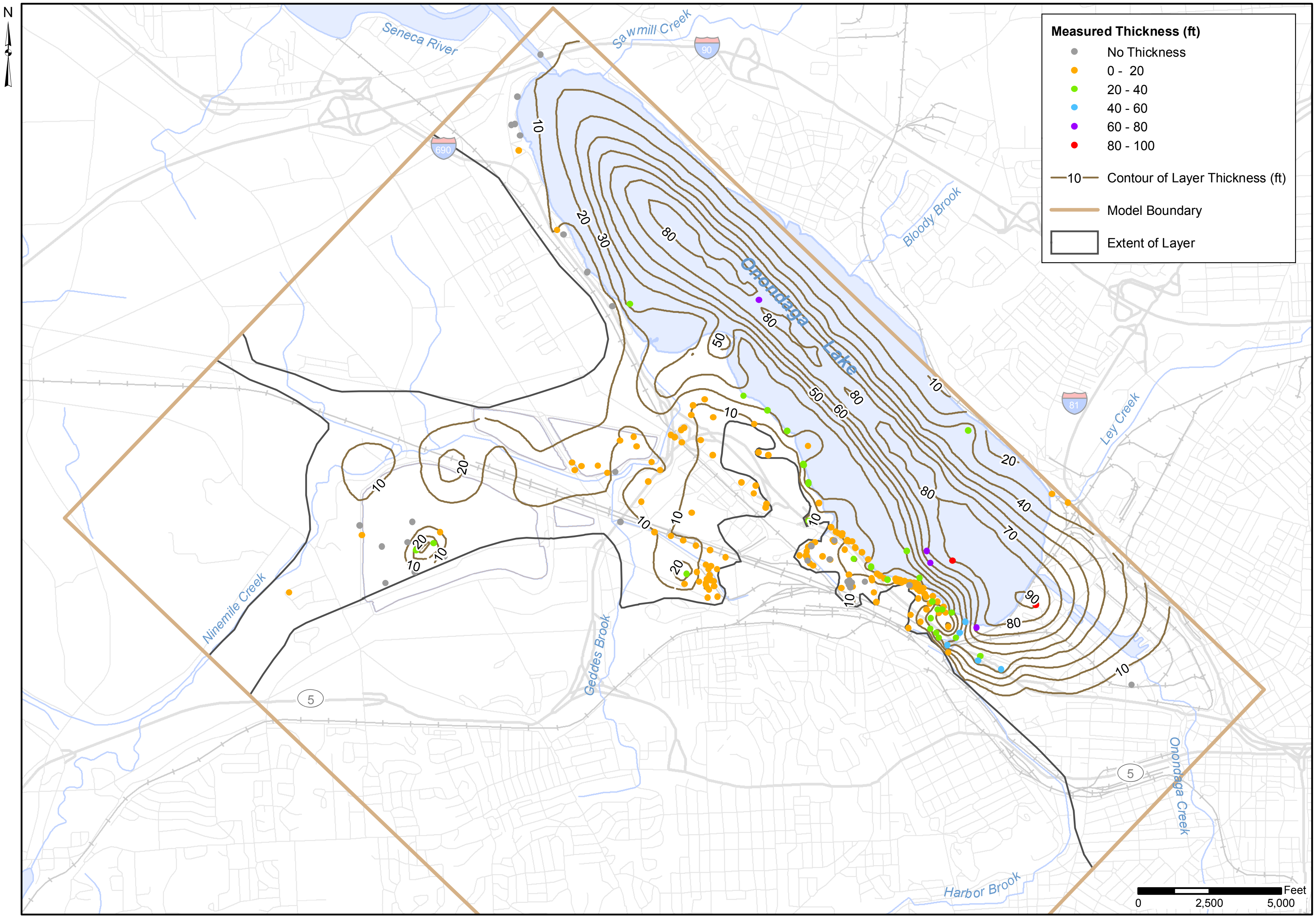


Figure 7 Model Thickness of Layer 4

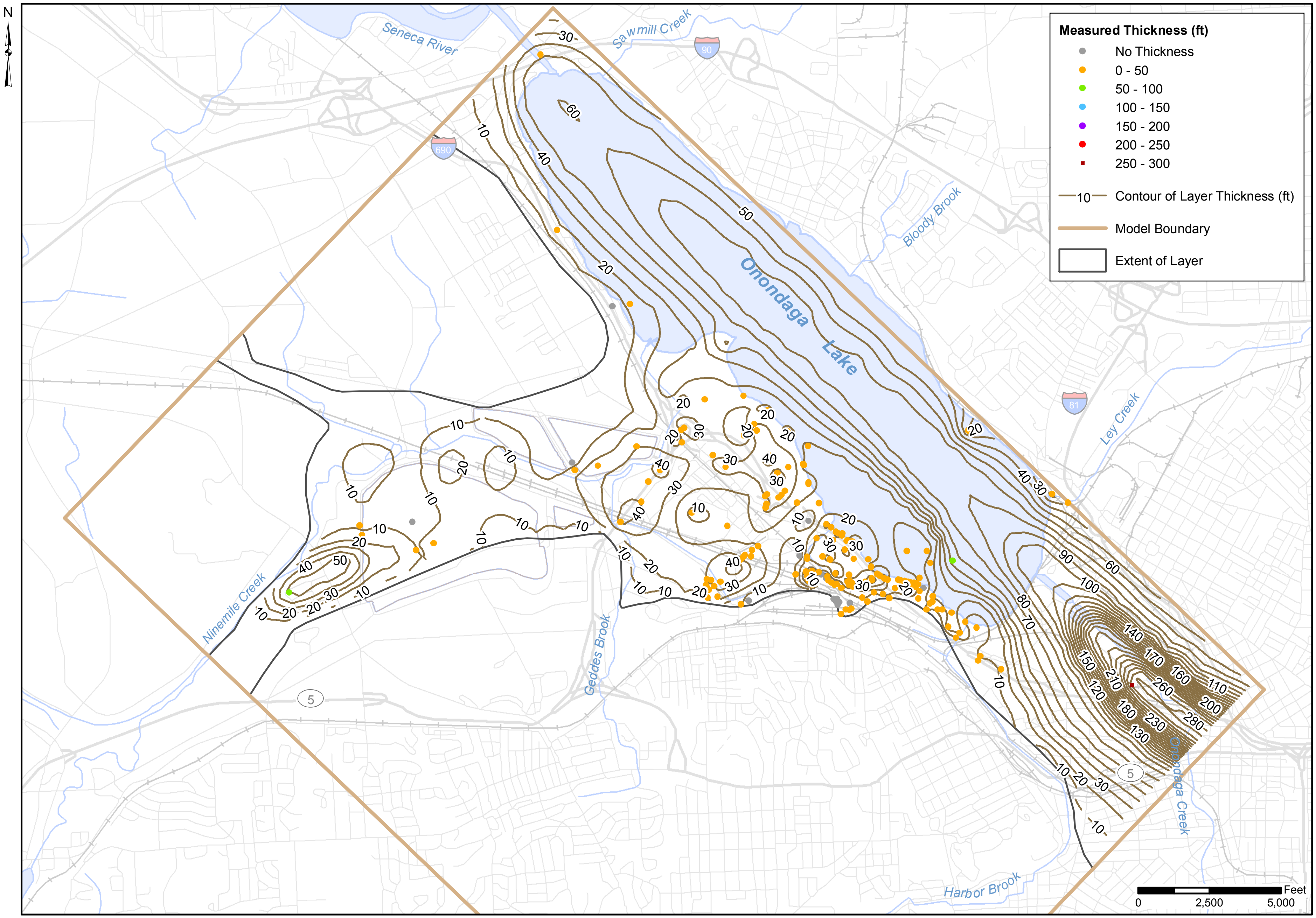


Figure 8 Model Thickness of Layer 5

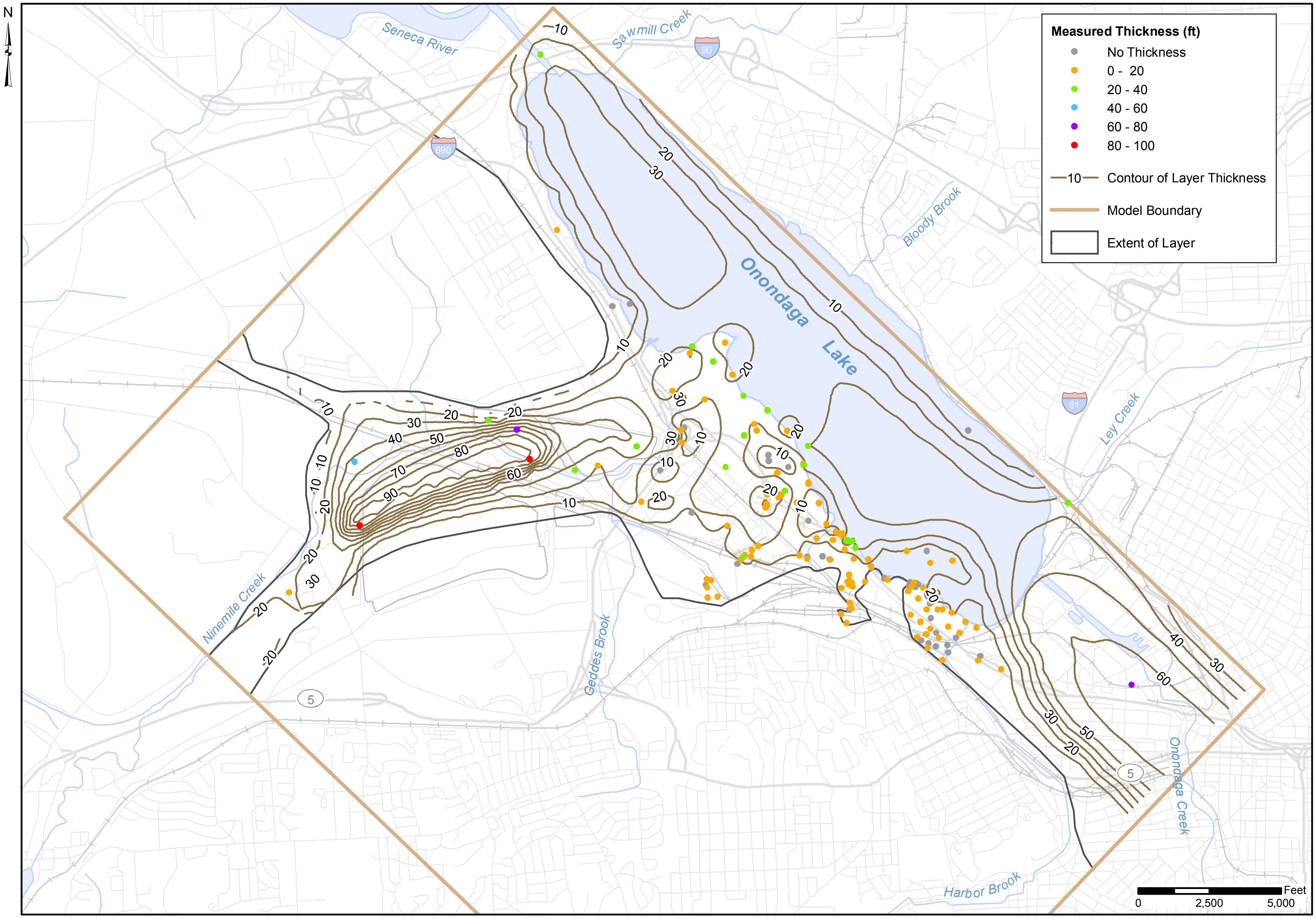


Figure 9 Model Thickness of Layer 6

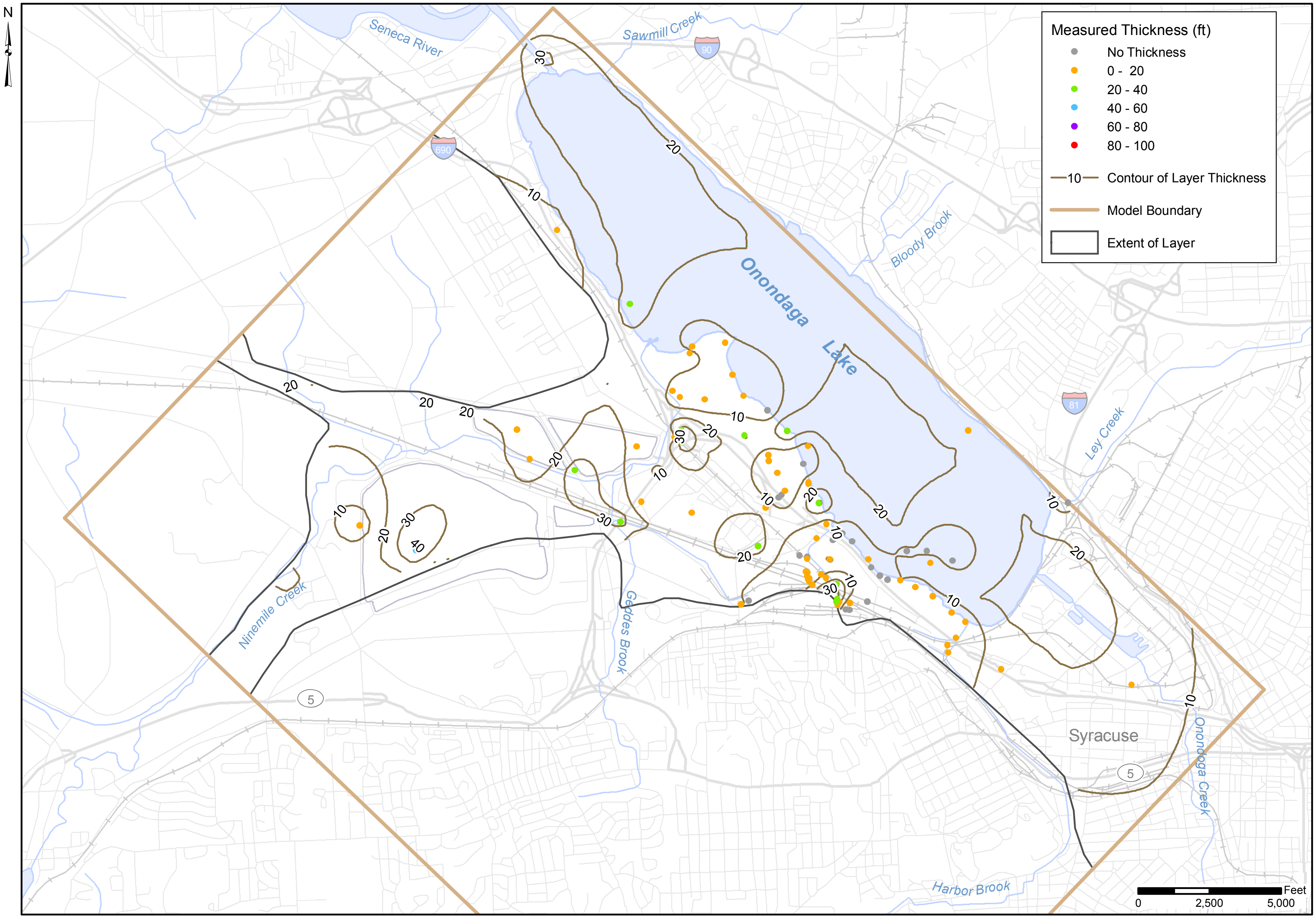


Figure 10 Model Thickness of Layer 7

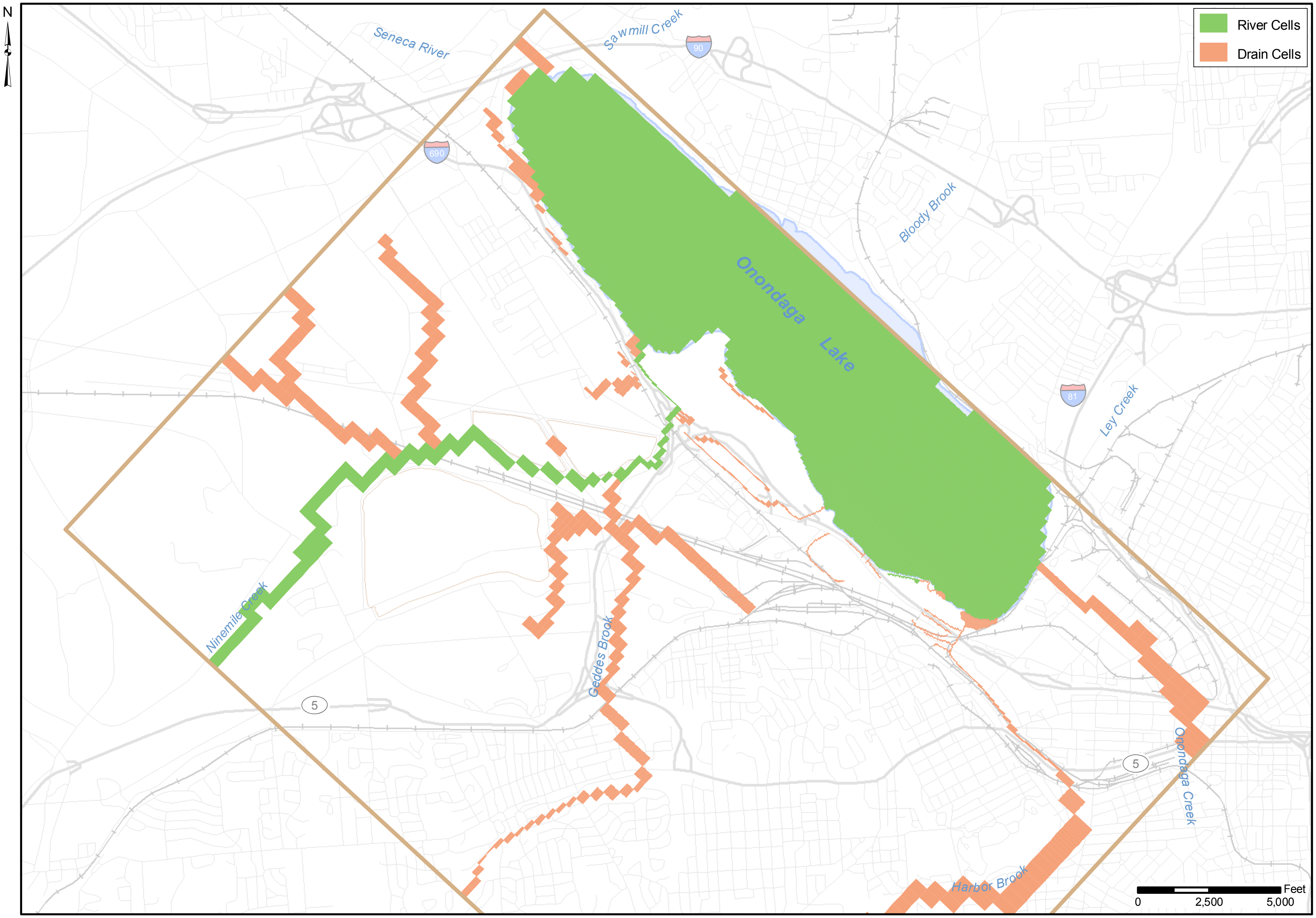


Figure 11 Boundary Conditions in Model Area

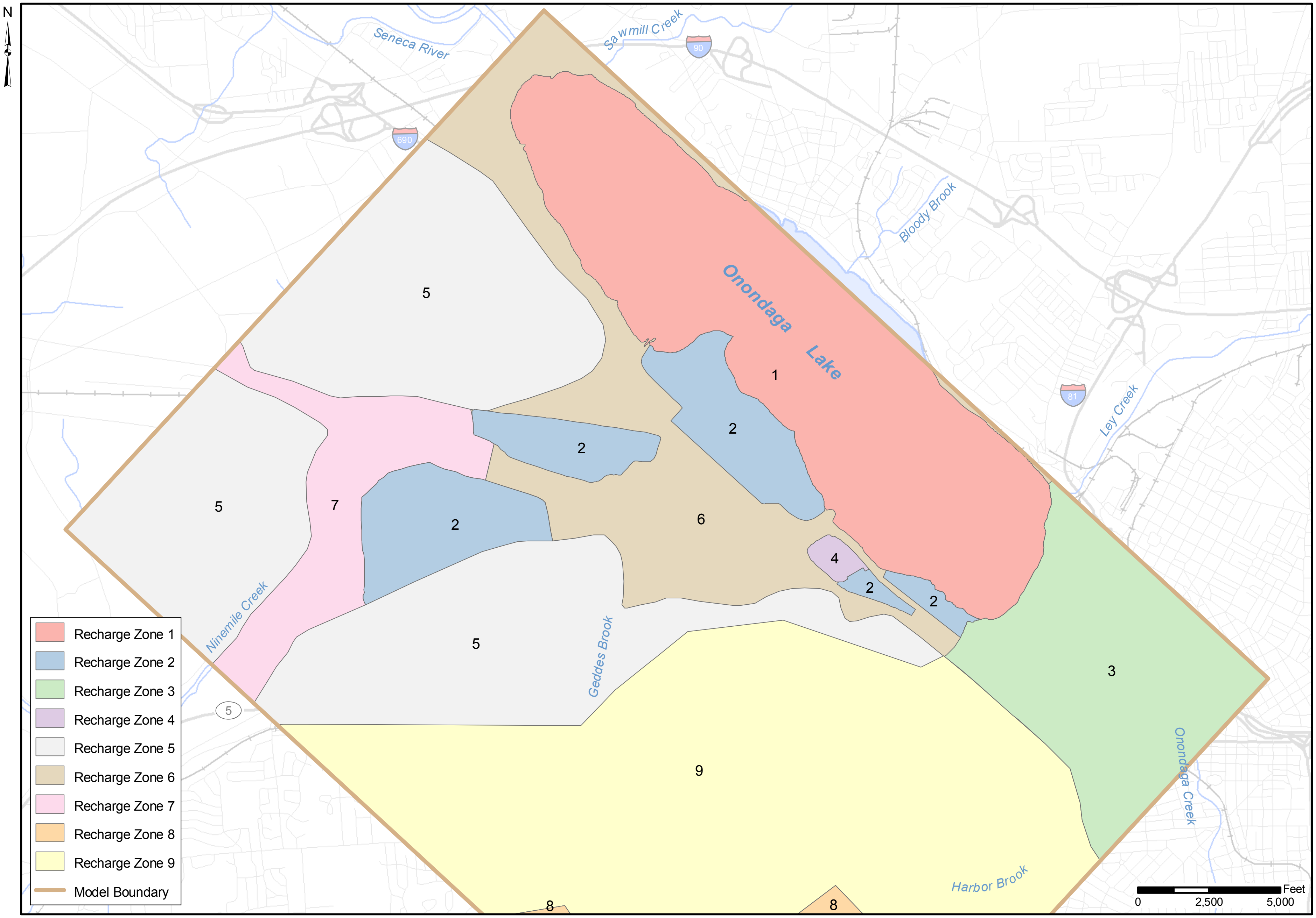


Figure 12 Recharge Rates in Model Area

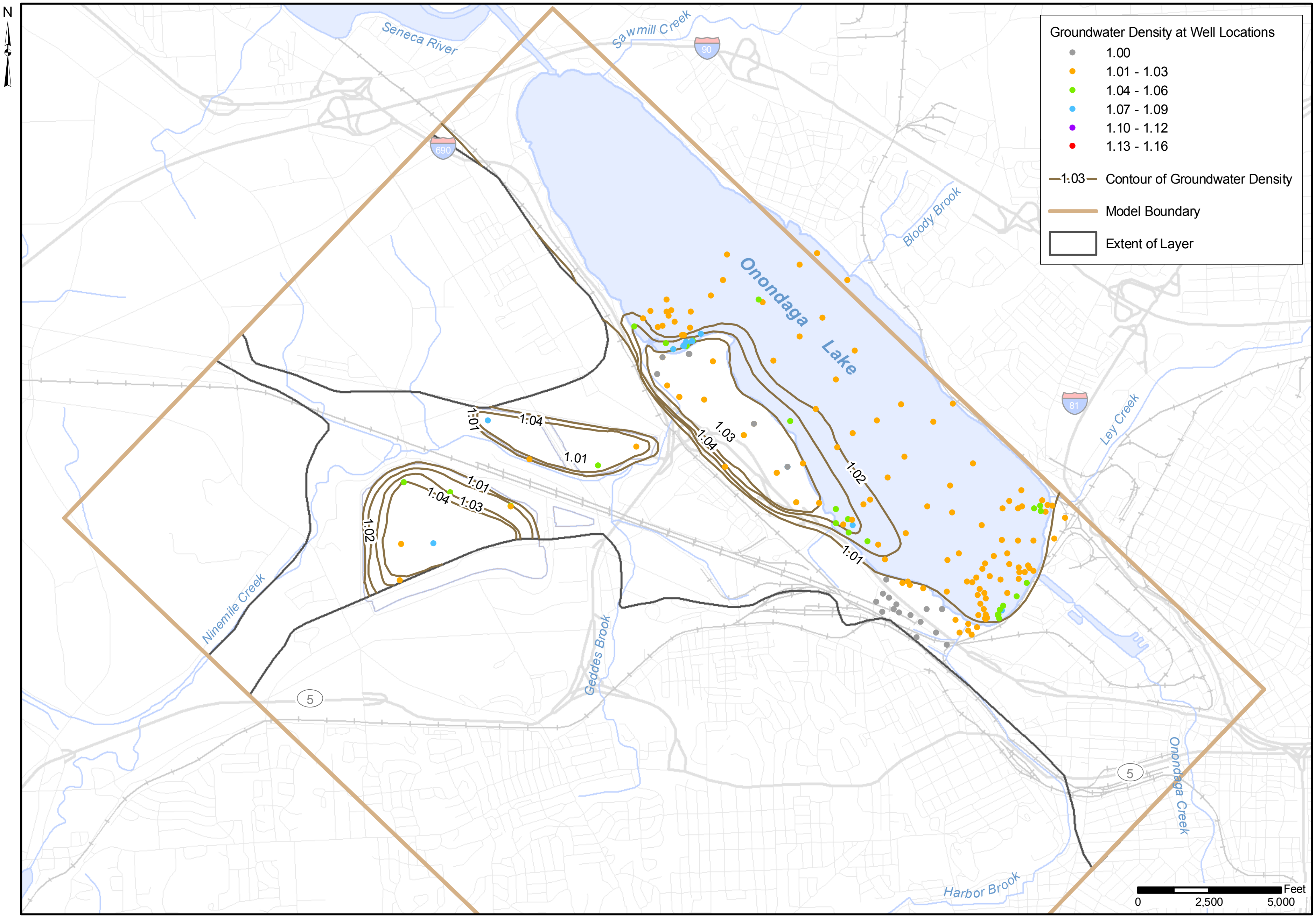


Figure 13 Groundwater Density Distribution in Layer 1 and 2

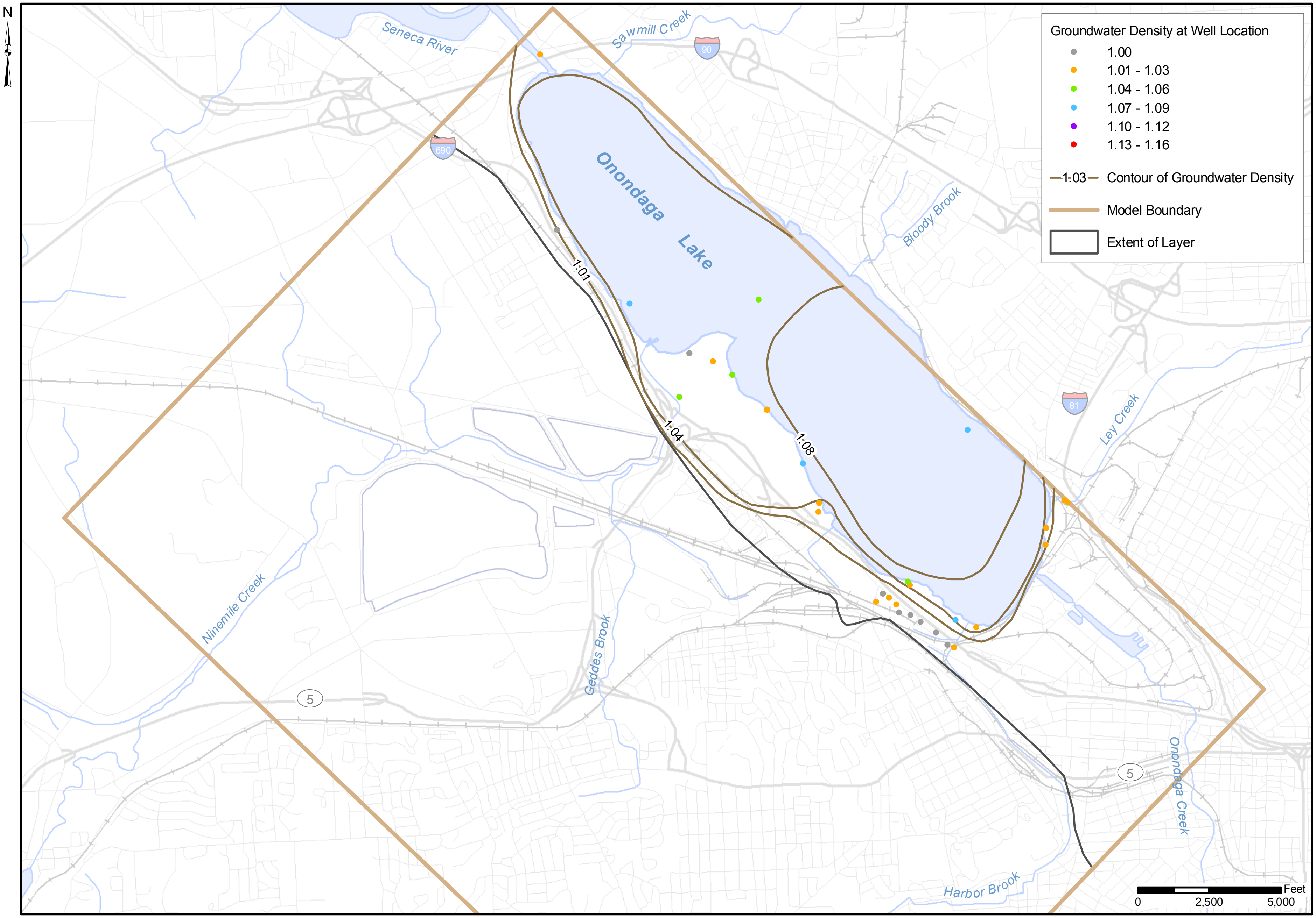


Figure 14 Groundwater Density Distribution in Layer 3

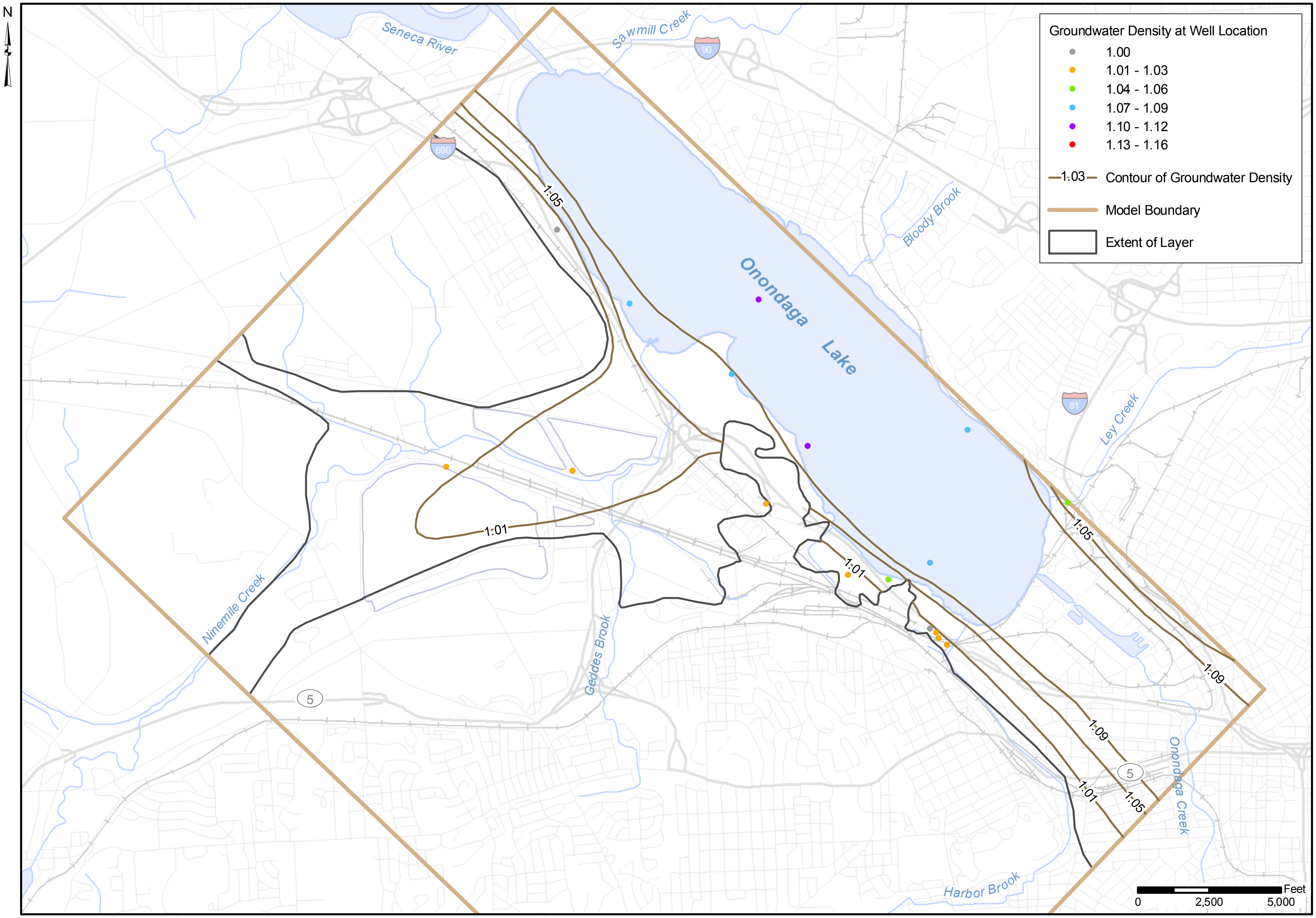


Figure 15 Groundwater Density Distribution in Layer 4

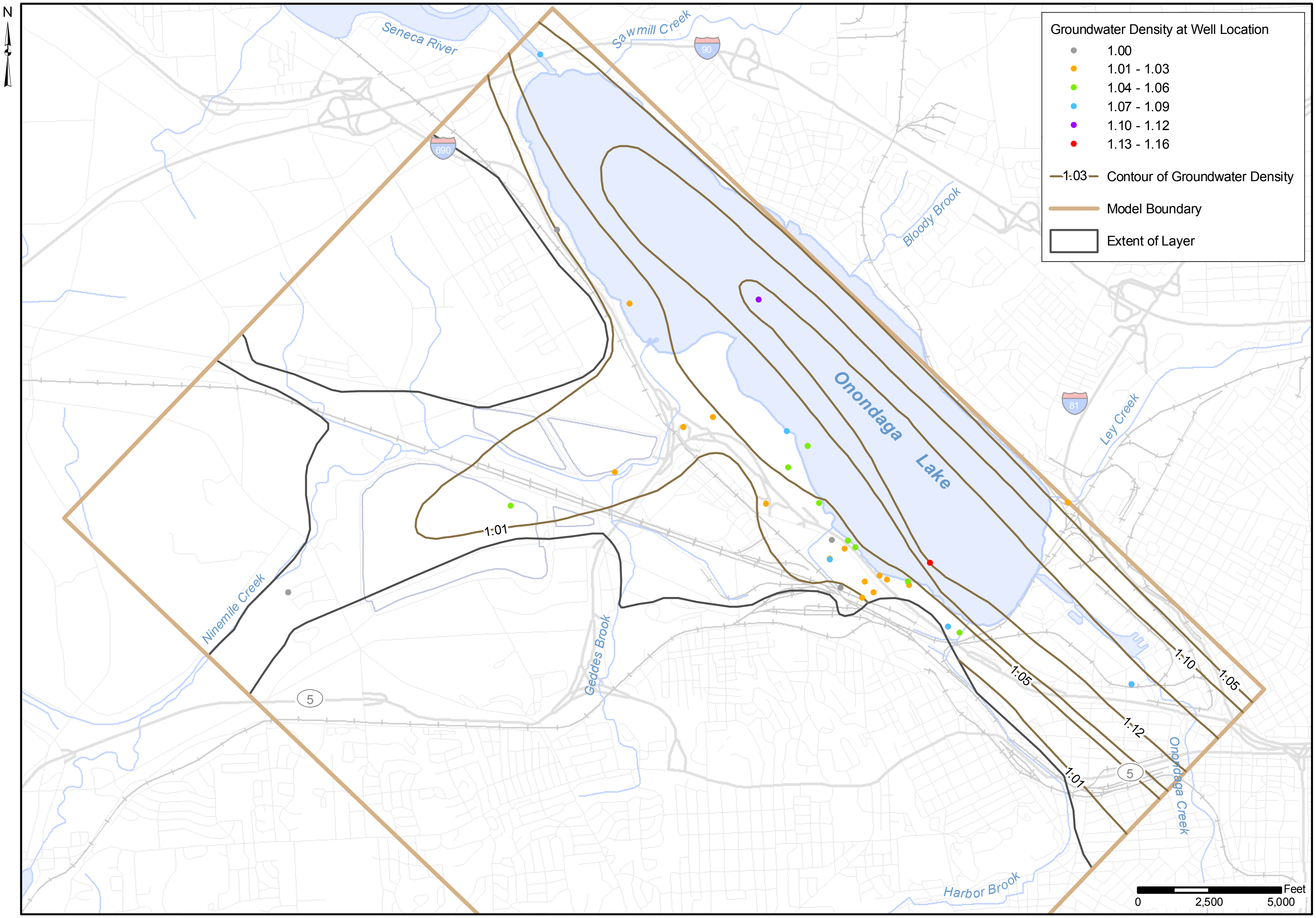


Figure 16 Groundwater Density Distribution in Layer 5

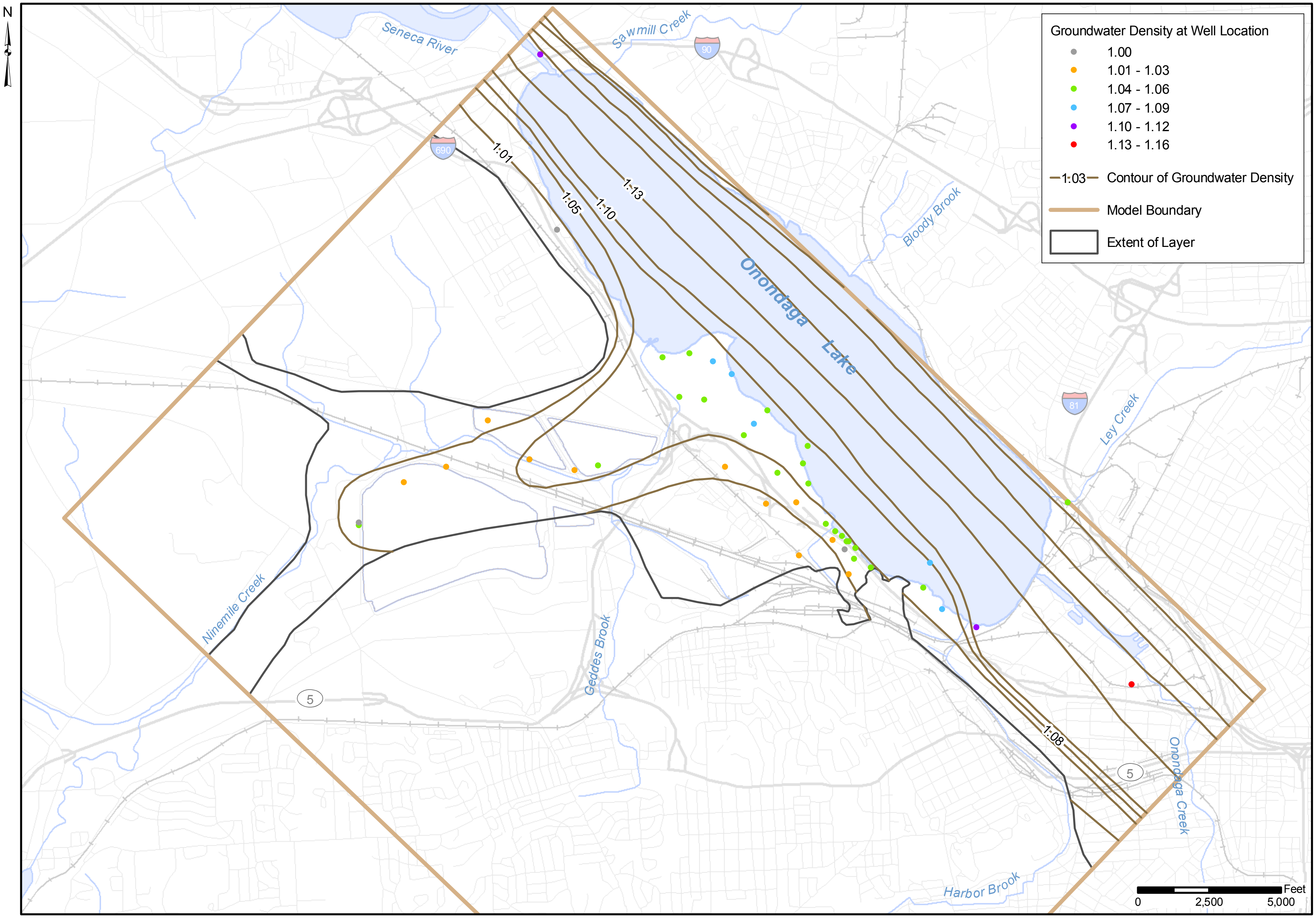


Figure 17 Groundwater Density Distribution in Layer 6

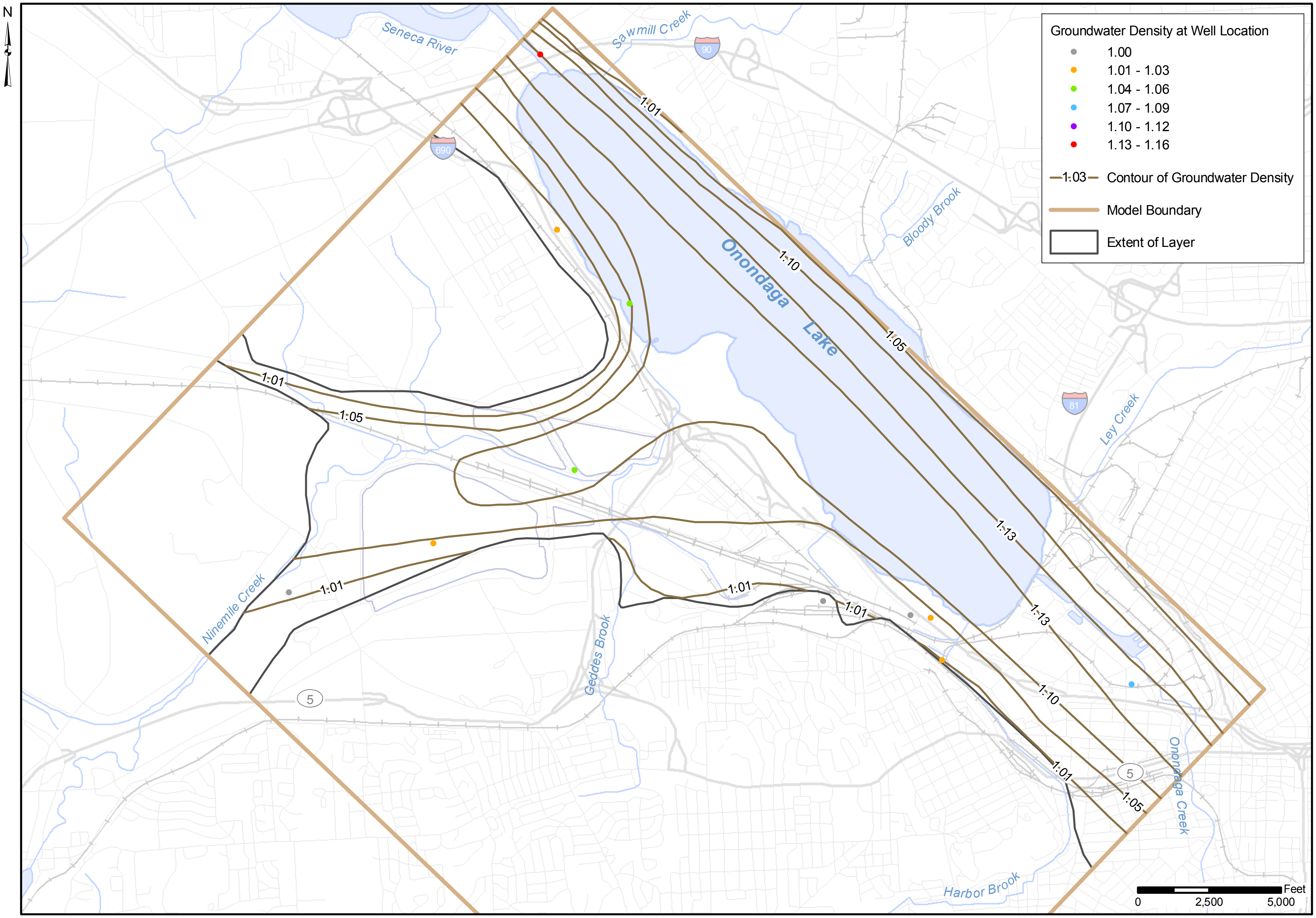


Figure 18 Groundwater Density Distribution in Layer 7

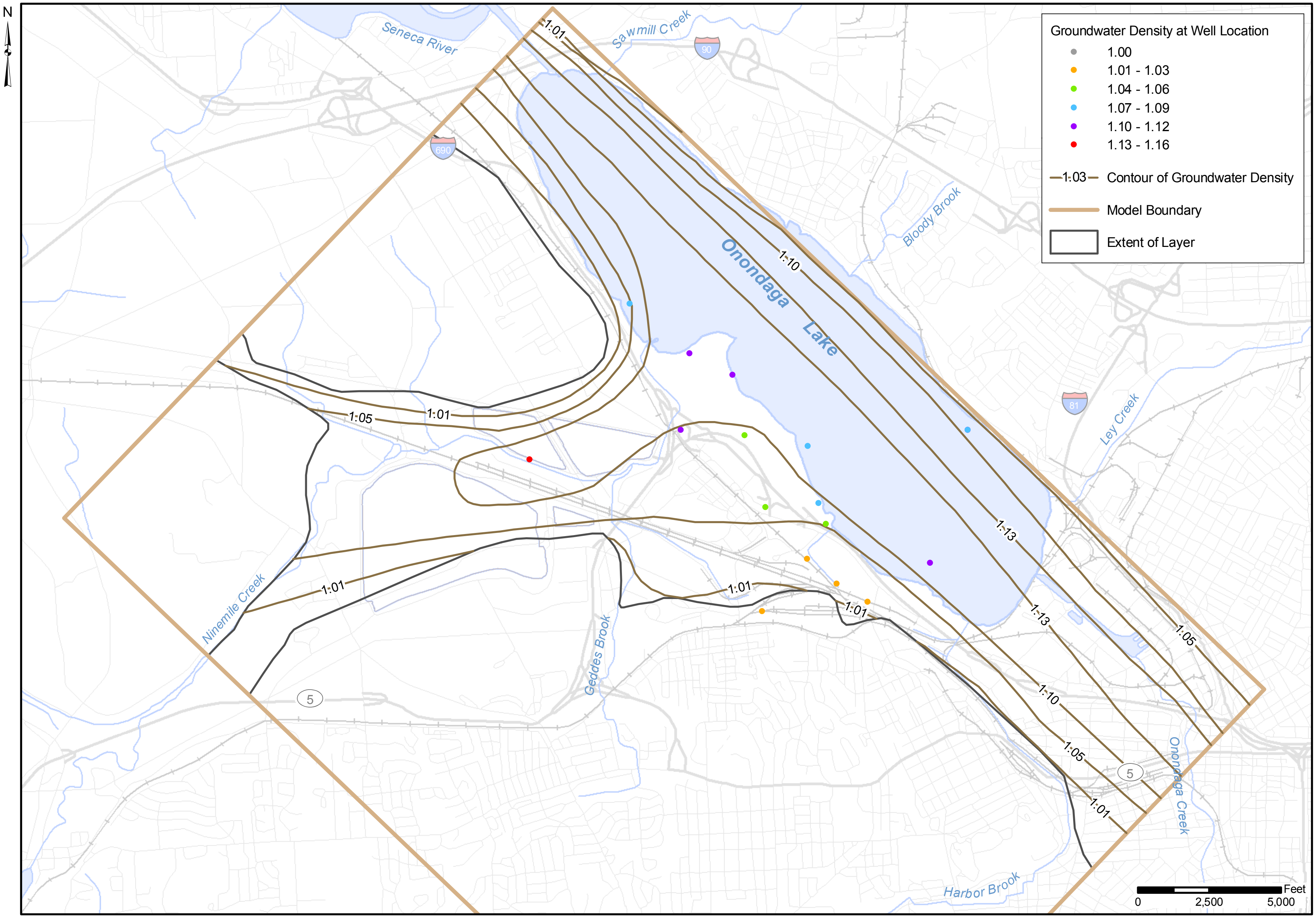


Figure 19 Groundwater Density Distribution in Layer 8 and 9

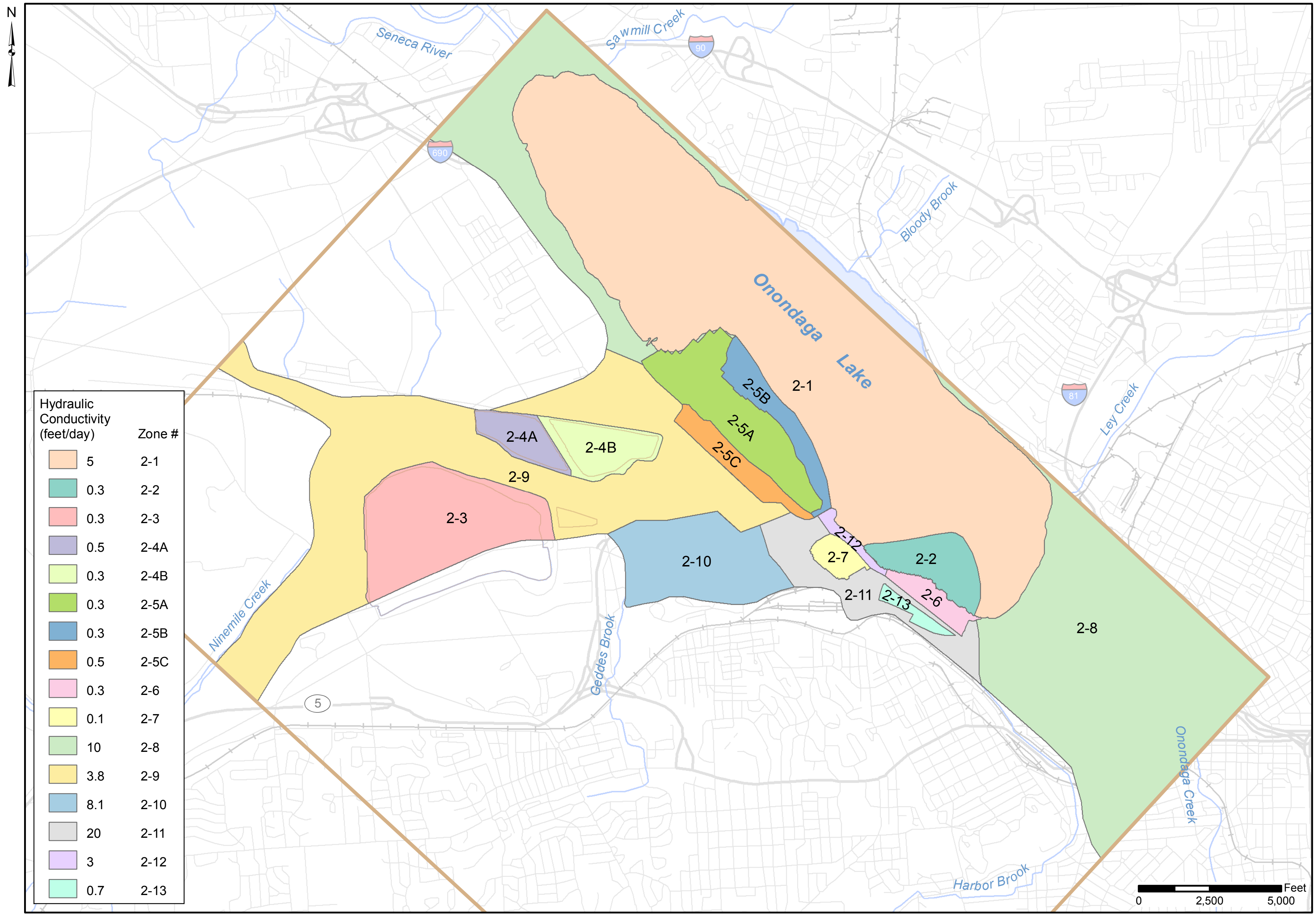


Figure 20 Hydraulic Conductivity Zones in Layers 1 and 2

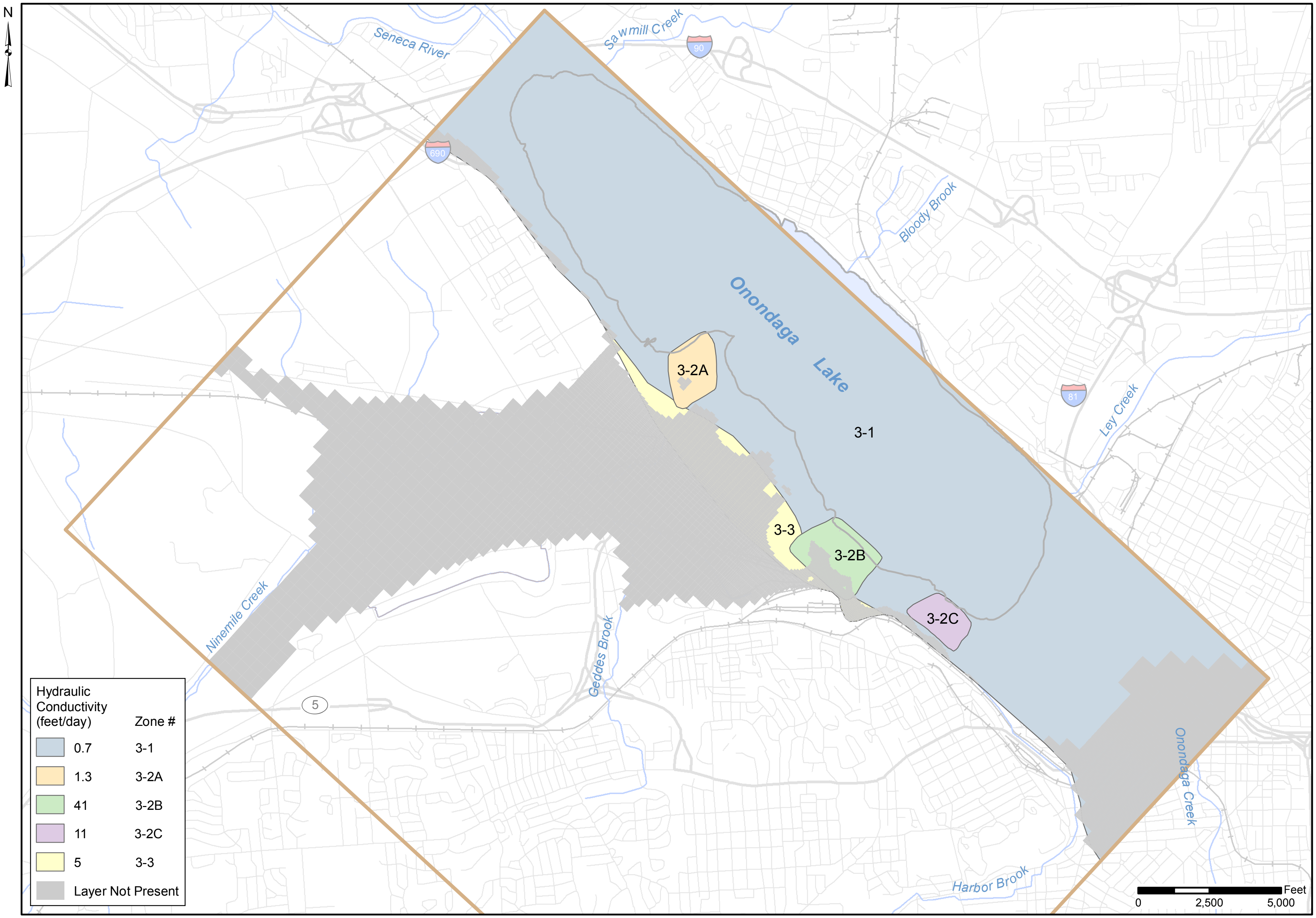


Figure 21 Hydraulic Conductivity Zones in Layer 3

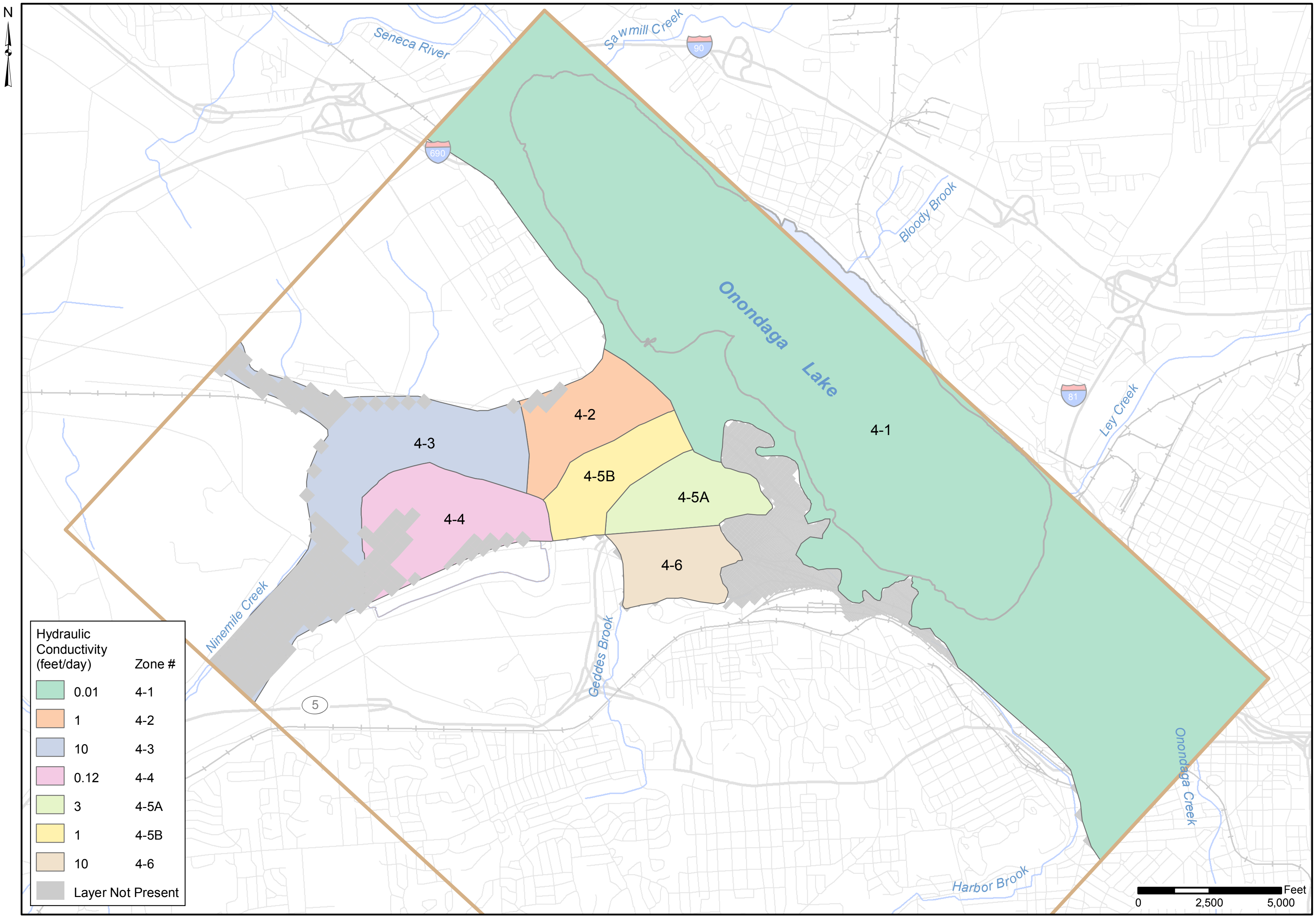


Figure 22 Hydraulic Conductivity Zones in Layer 4

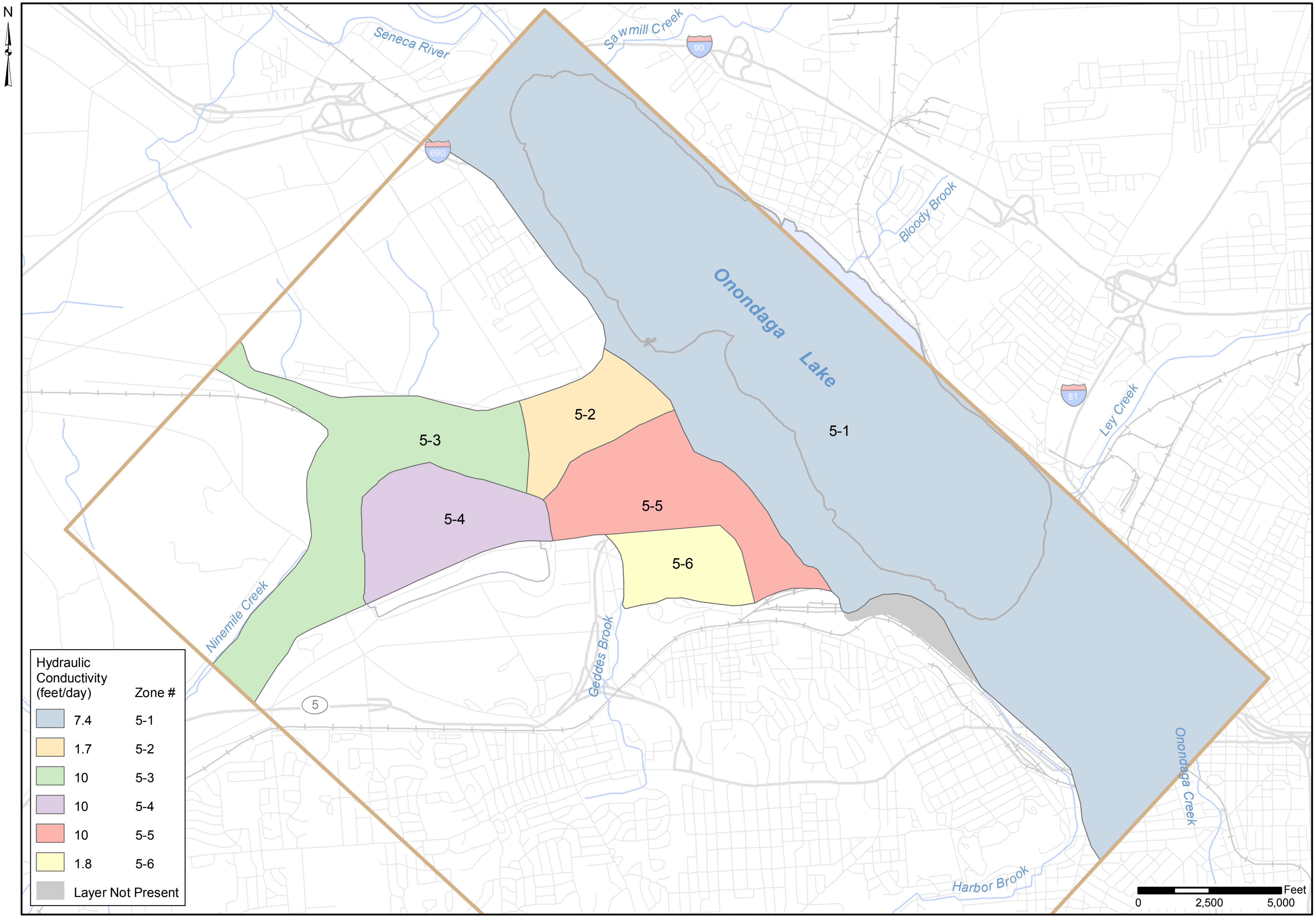


Figure 23 Hydraulic Conductivity Zones in Layer 5

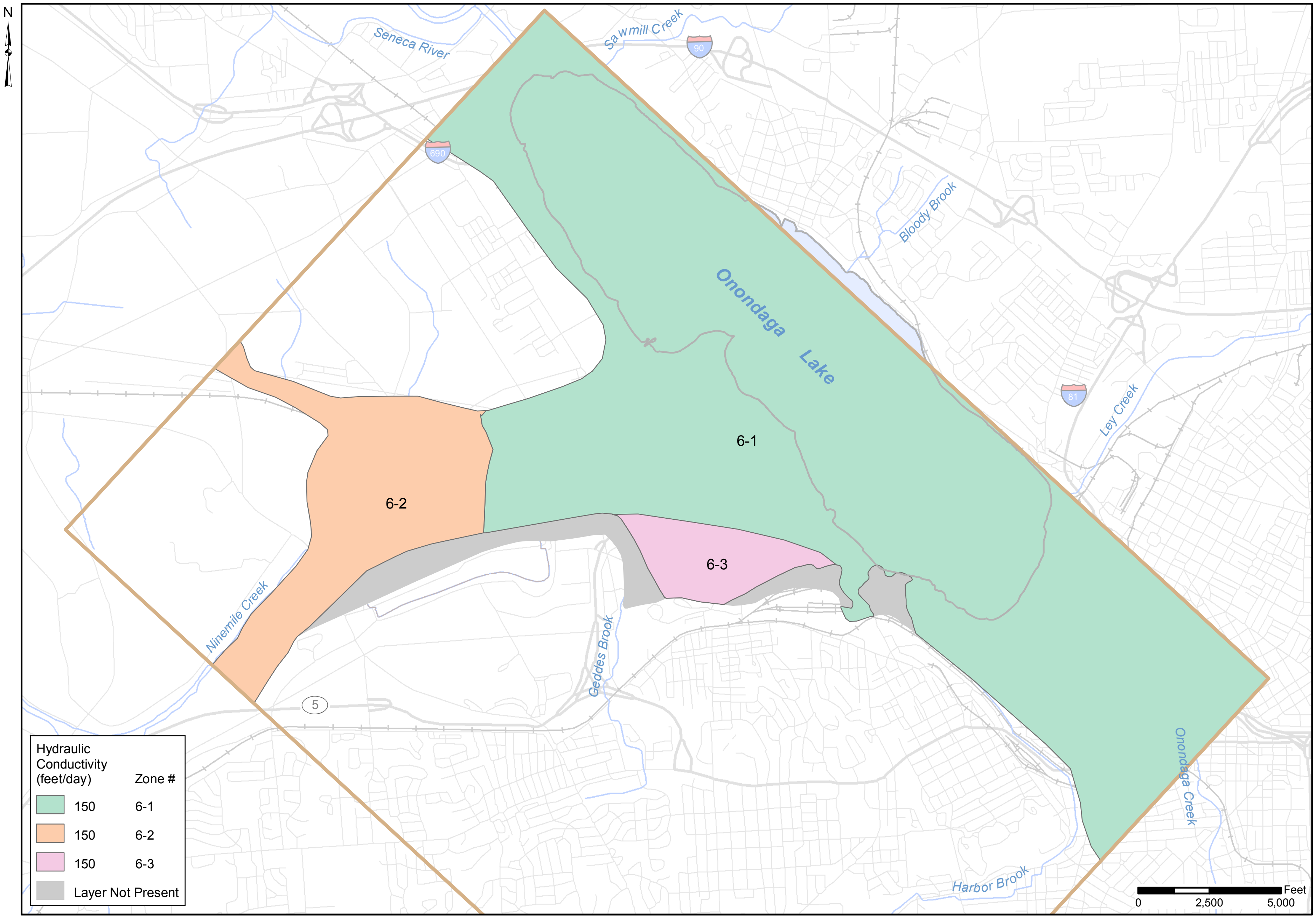


Figure 24 Hydraulic Conductivity Zones in Layer 6

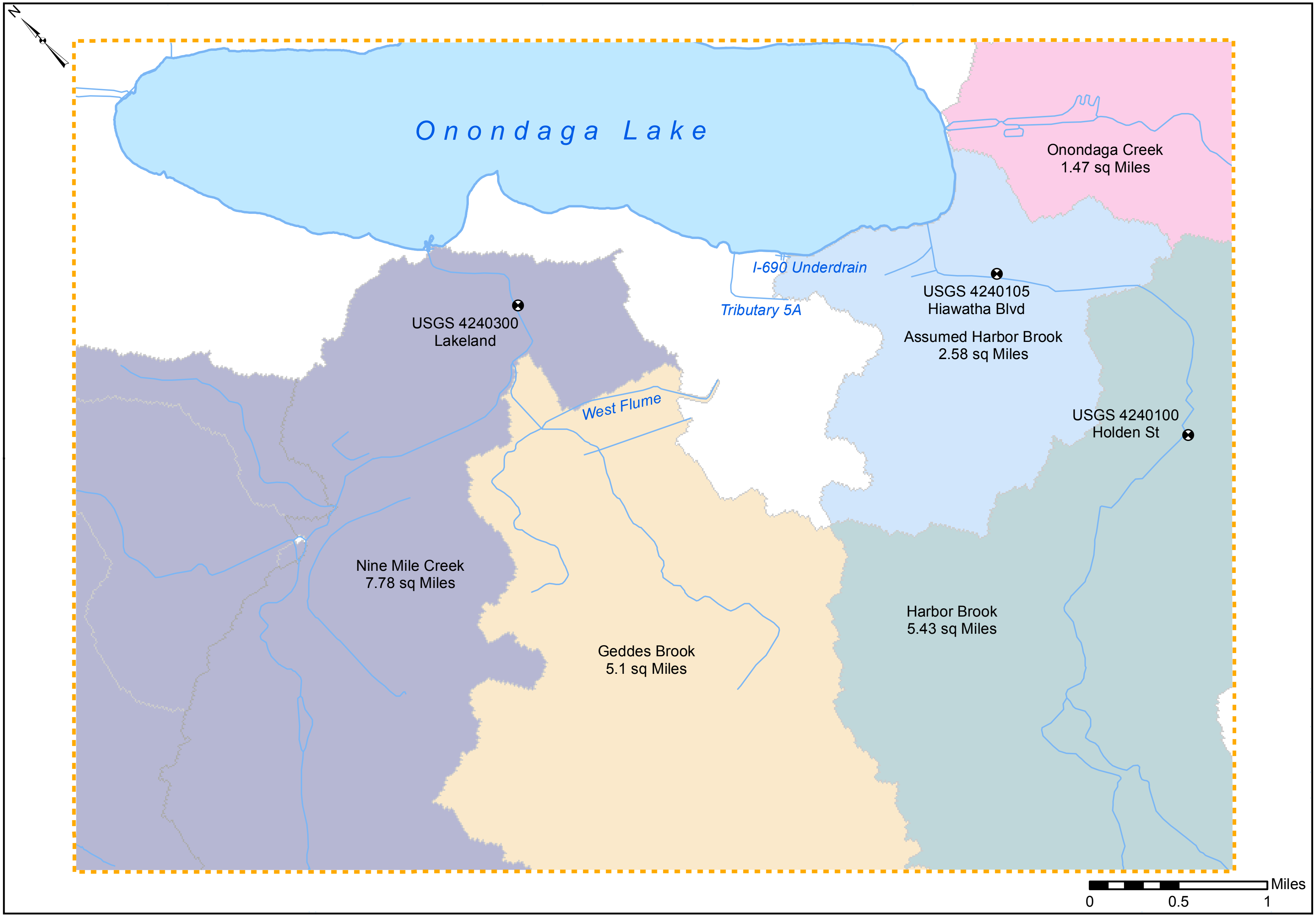
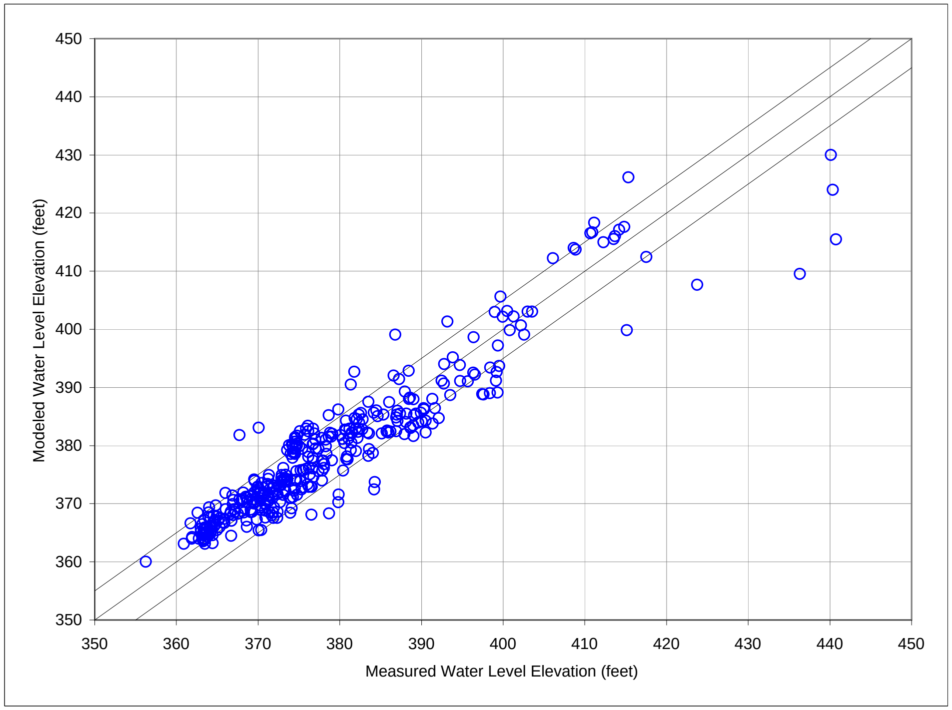


Figure 25 Stream Gaging Locations and Surface Watersheds in the Model Area



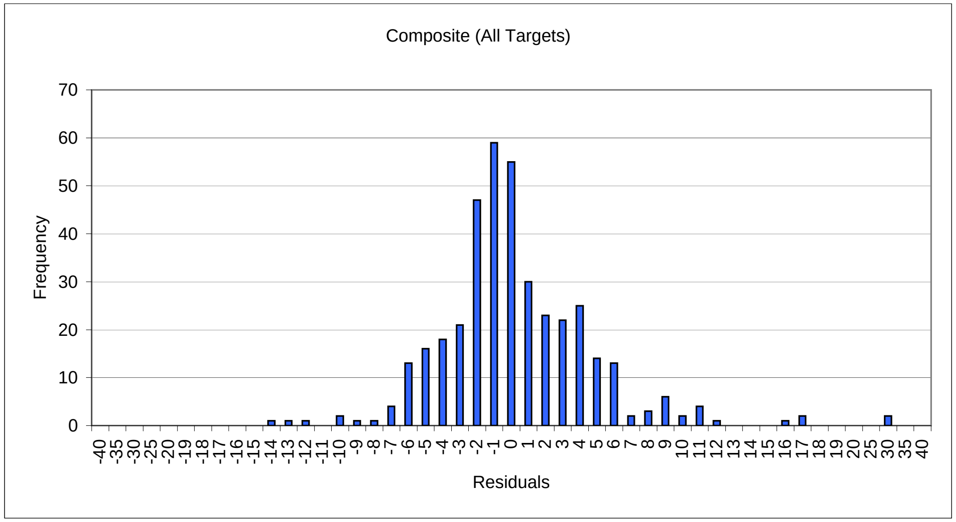


Figure 26 Calibration Residuals - Scatter Plot andHistograms for Entire Model Area

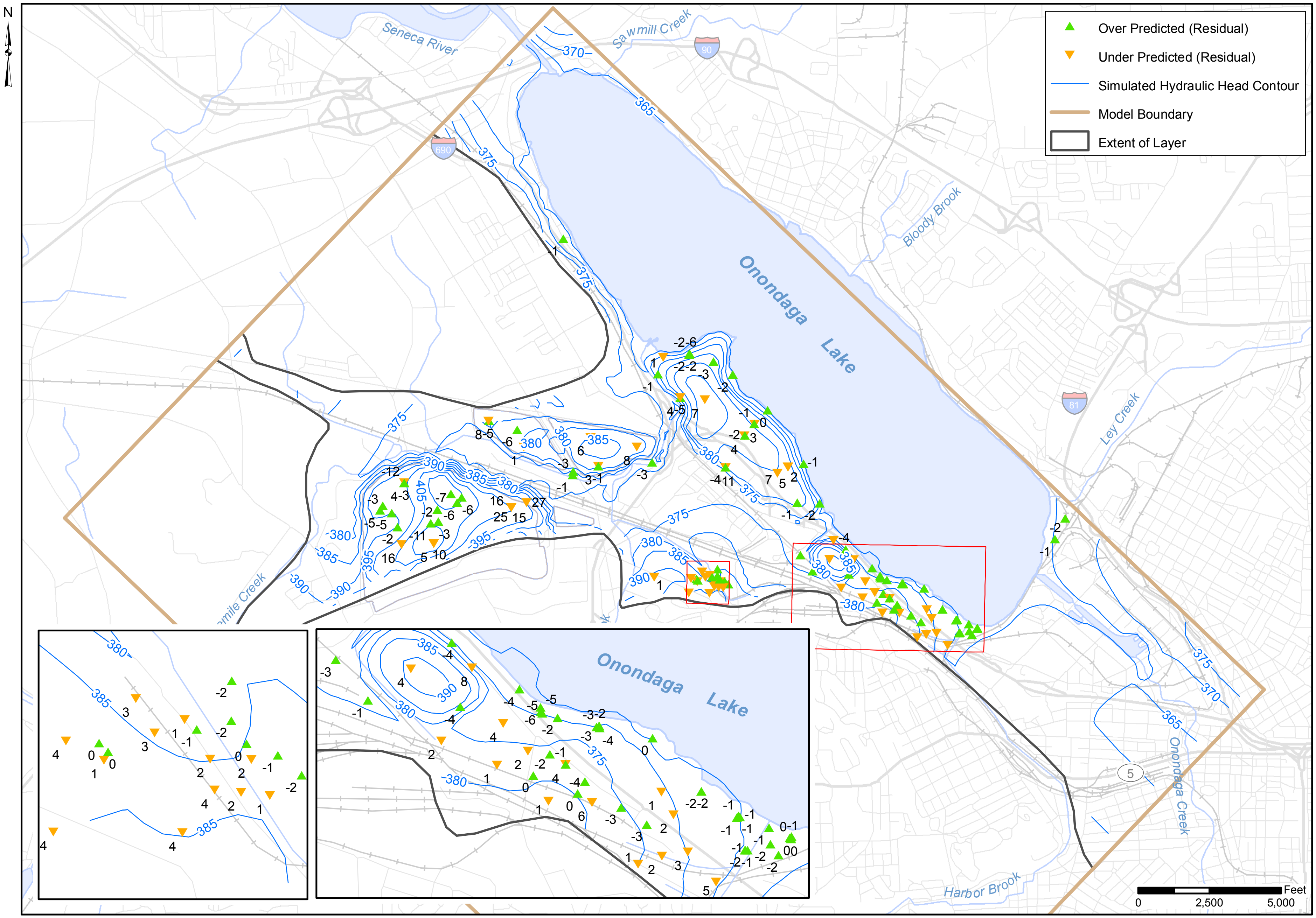


Figure 27 Model Calibration Targets and Hydraulic Heads in Layers 1 and 2

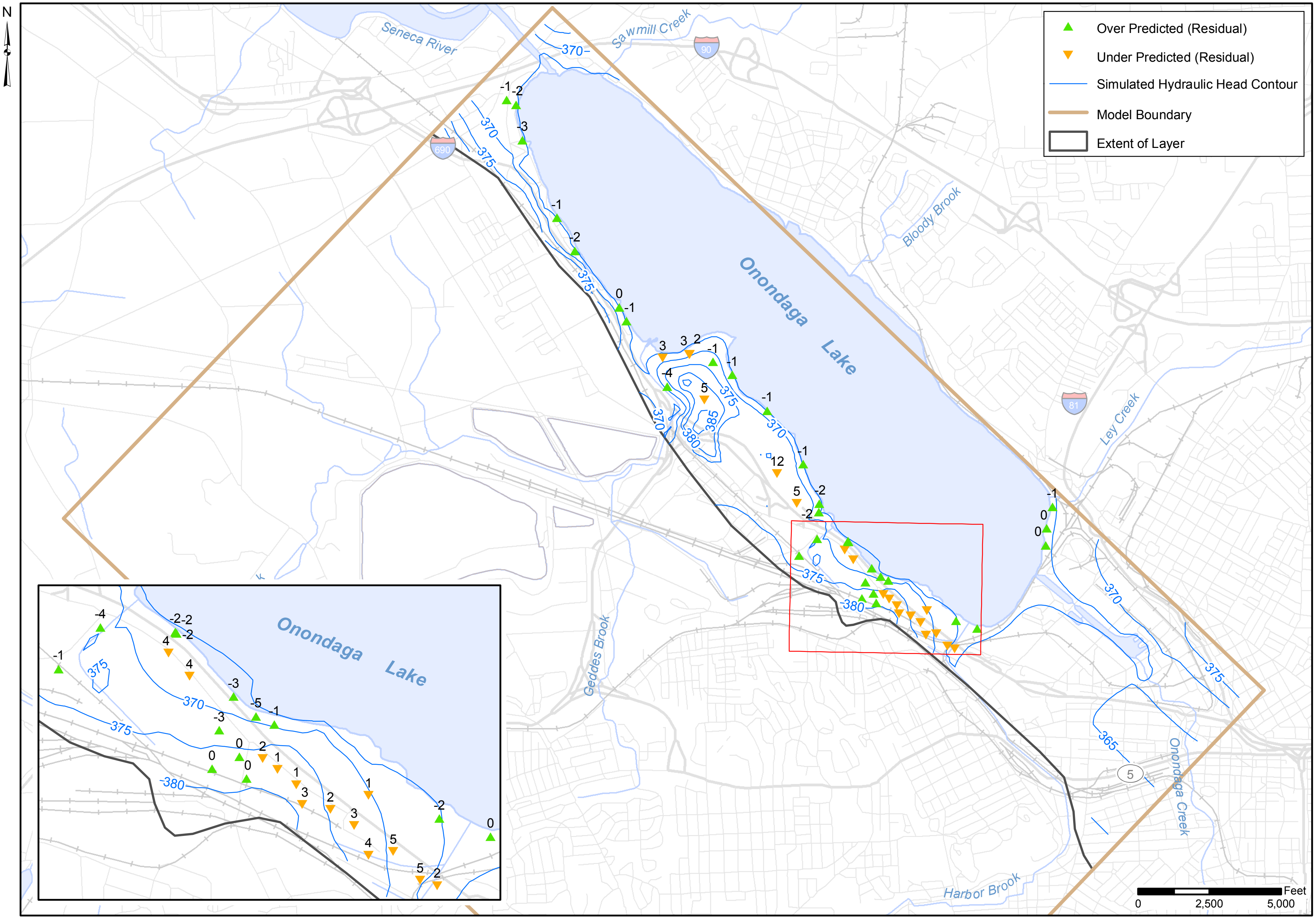


Figure 28 Model Calibration Targets and Hydraulic Heads in Layer 3

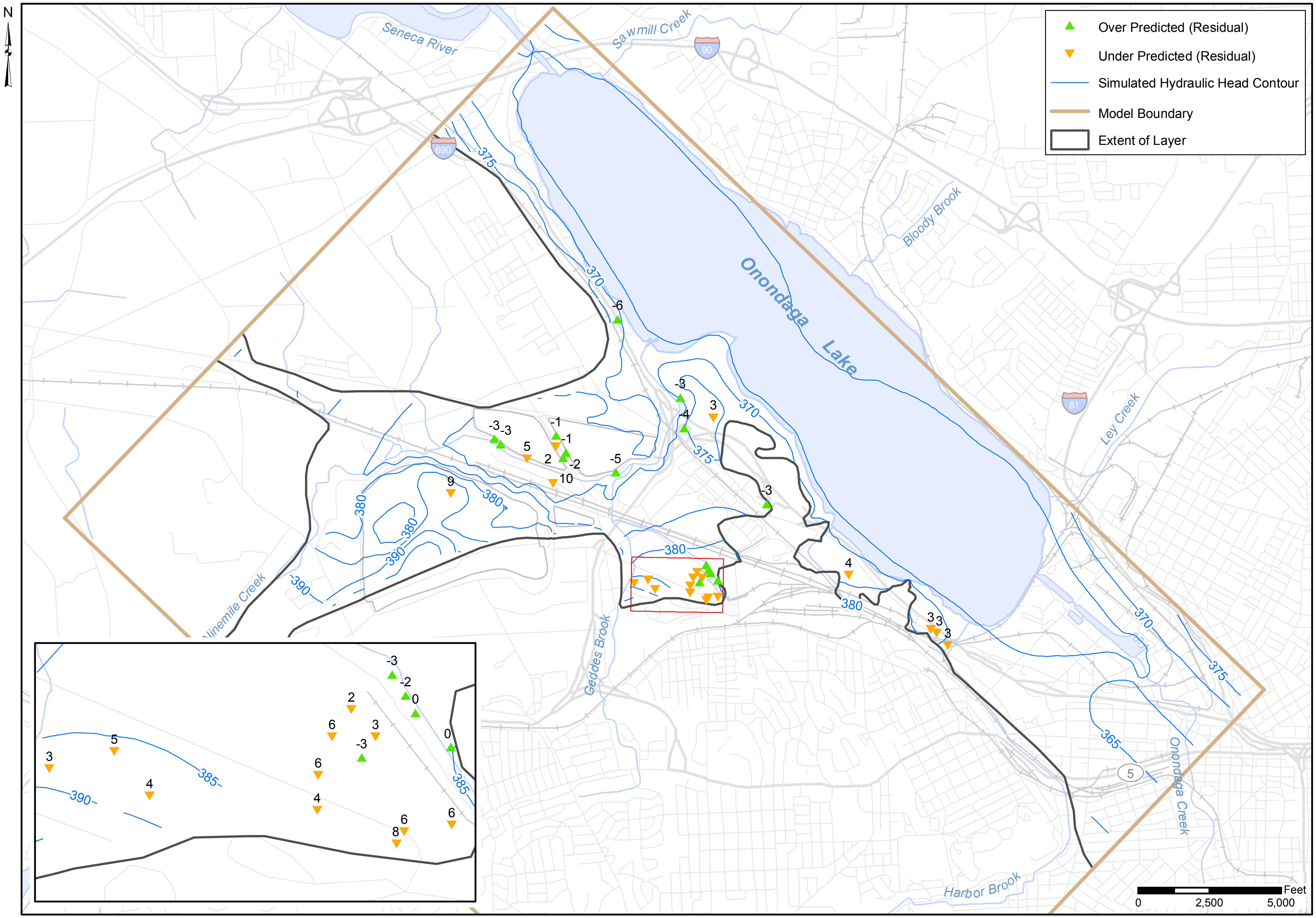


Figure 29 Model Calibration Targets and Hydraulic Heads in Layer 4

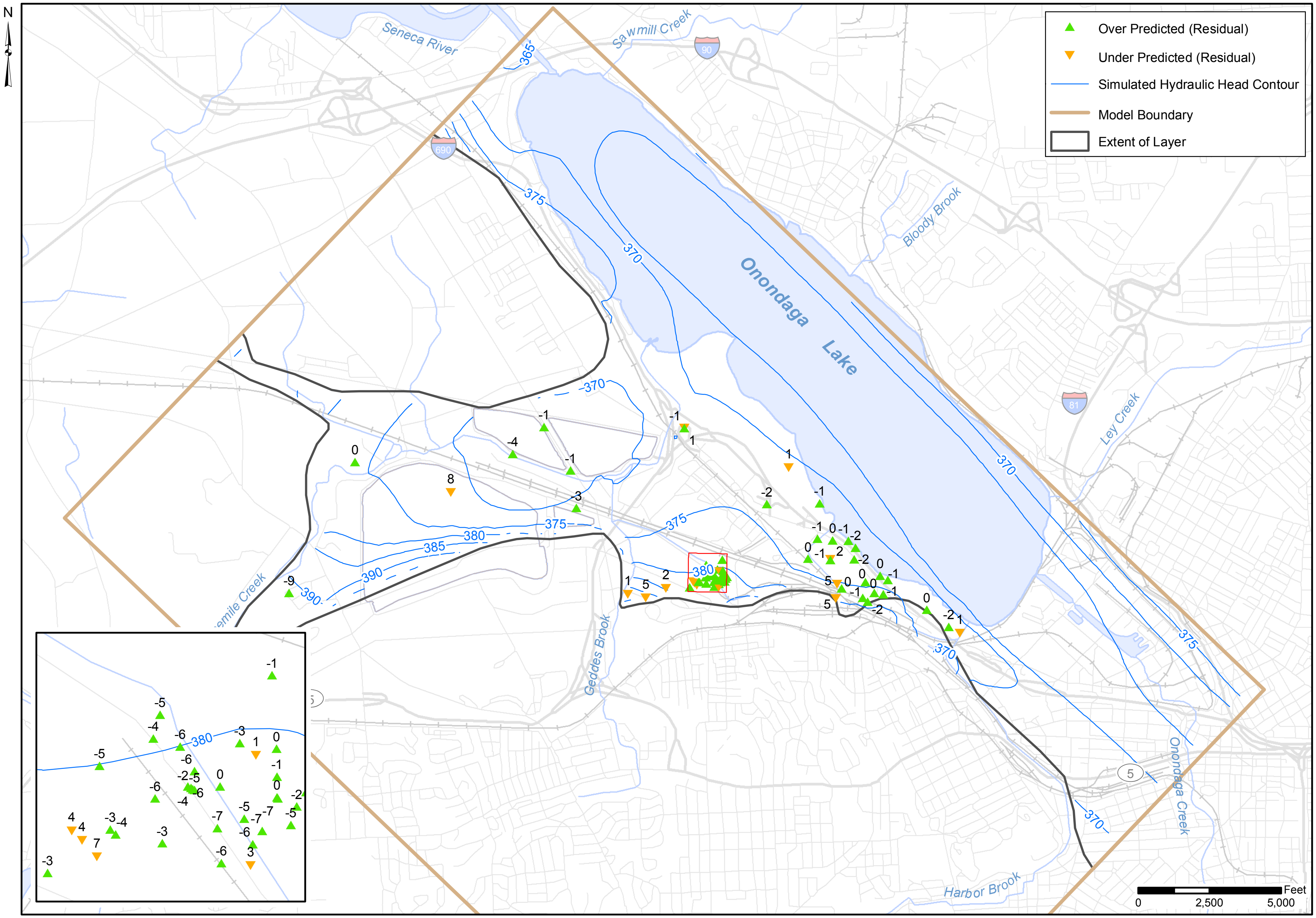


Figure 30 Model Calibration Targets and Hydraulic Heads in Layer 5

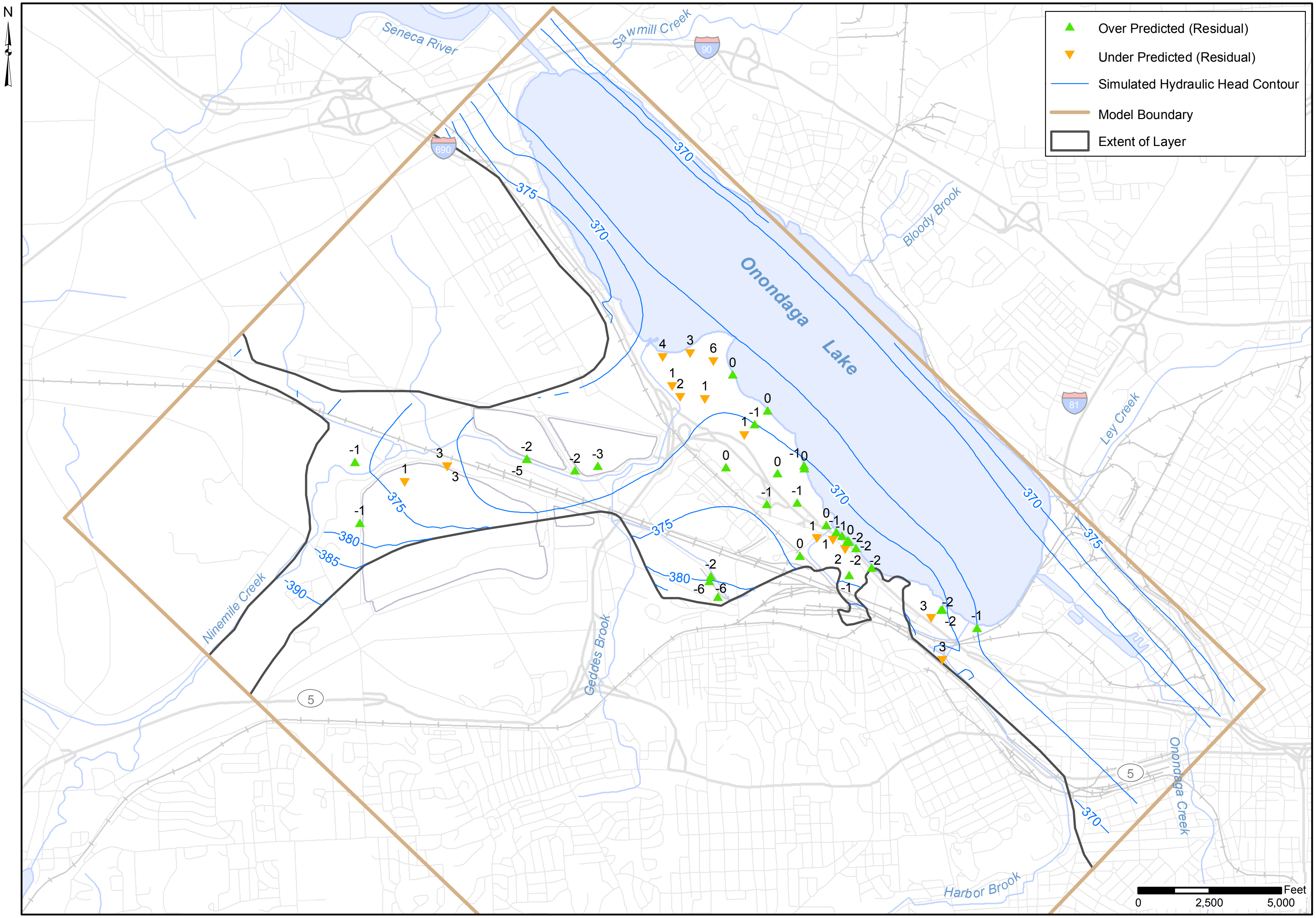


Figure 31 Model Calibration Targets and Hydraulic Heads in Layer 6

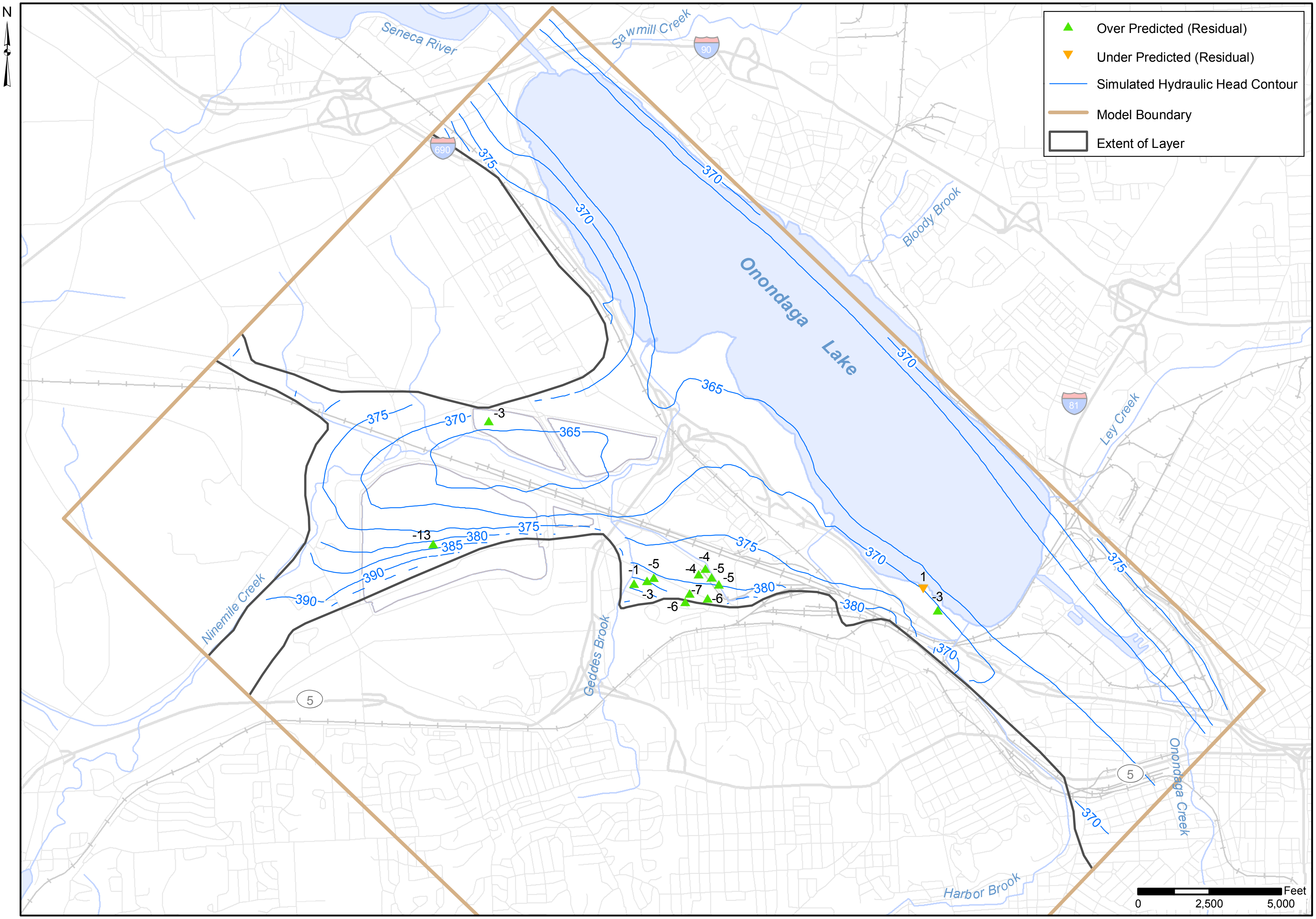


Figure 32 Model Calibration Targets and Hydraulic Heads in Layer 7

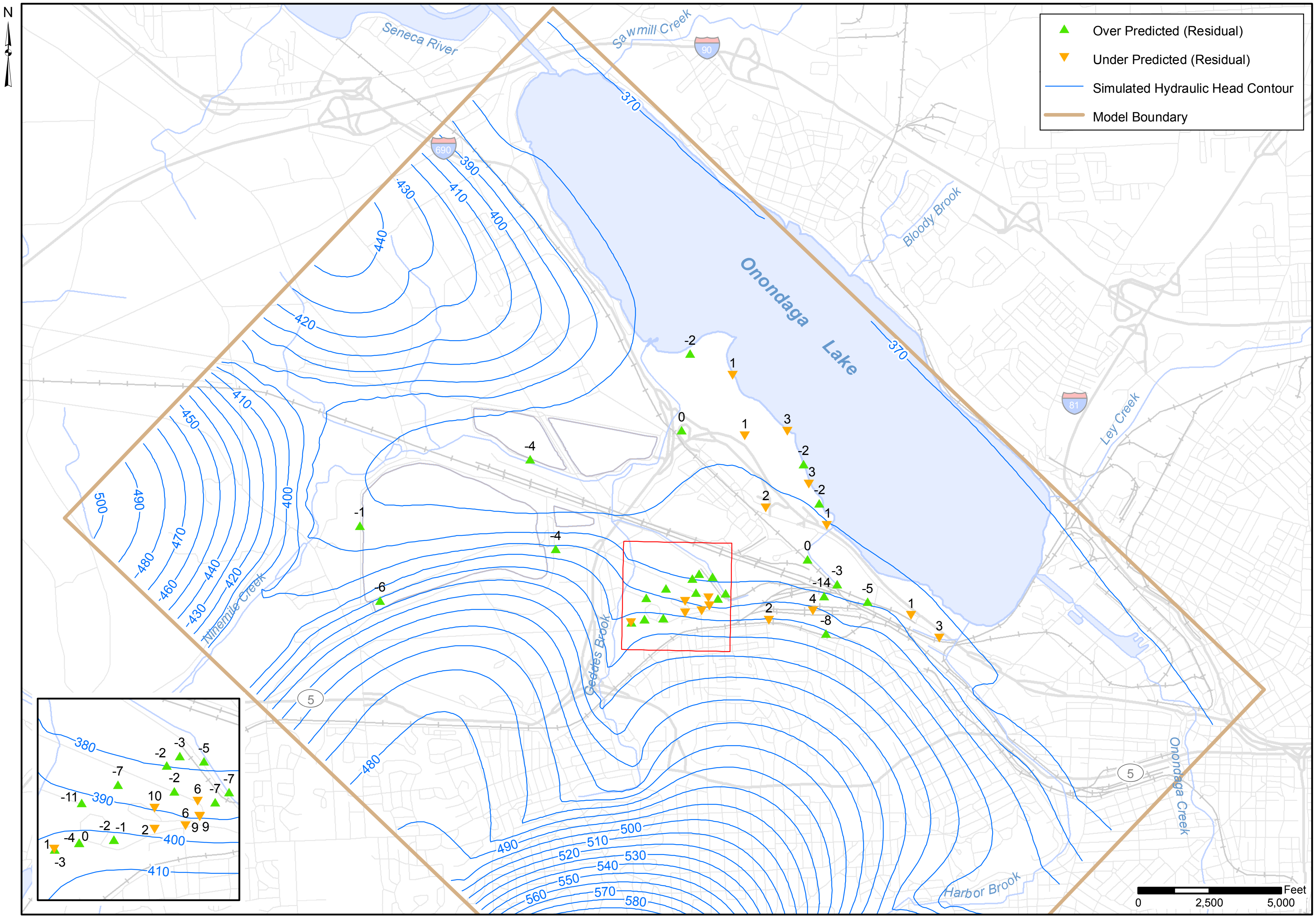
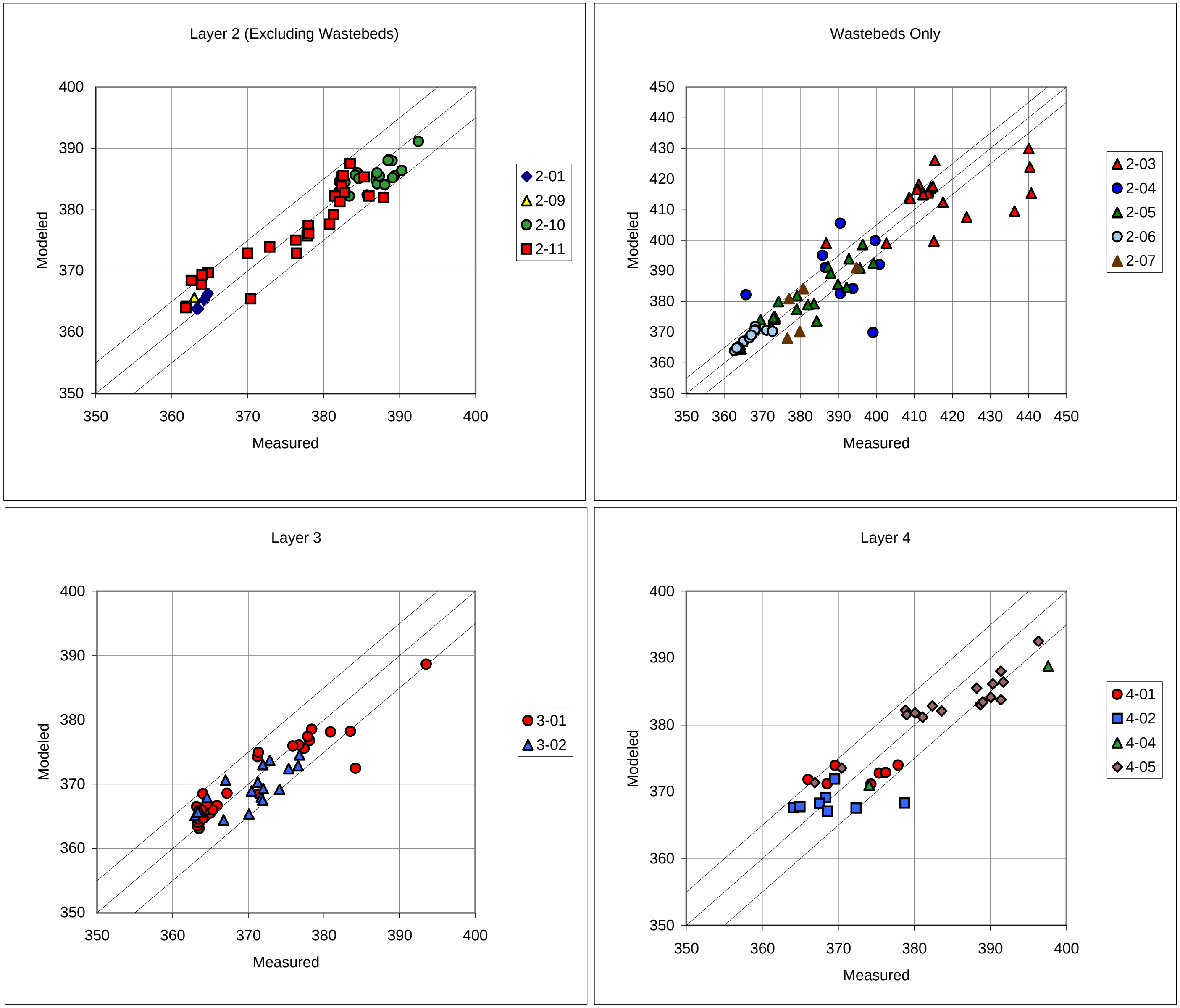
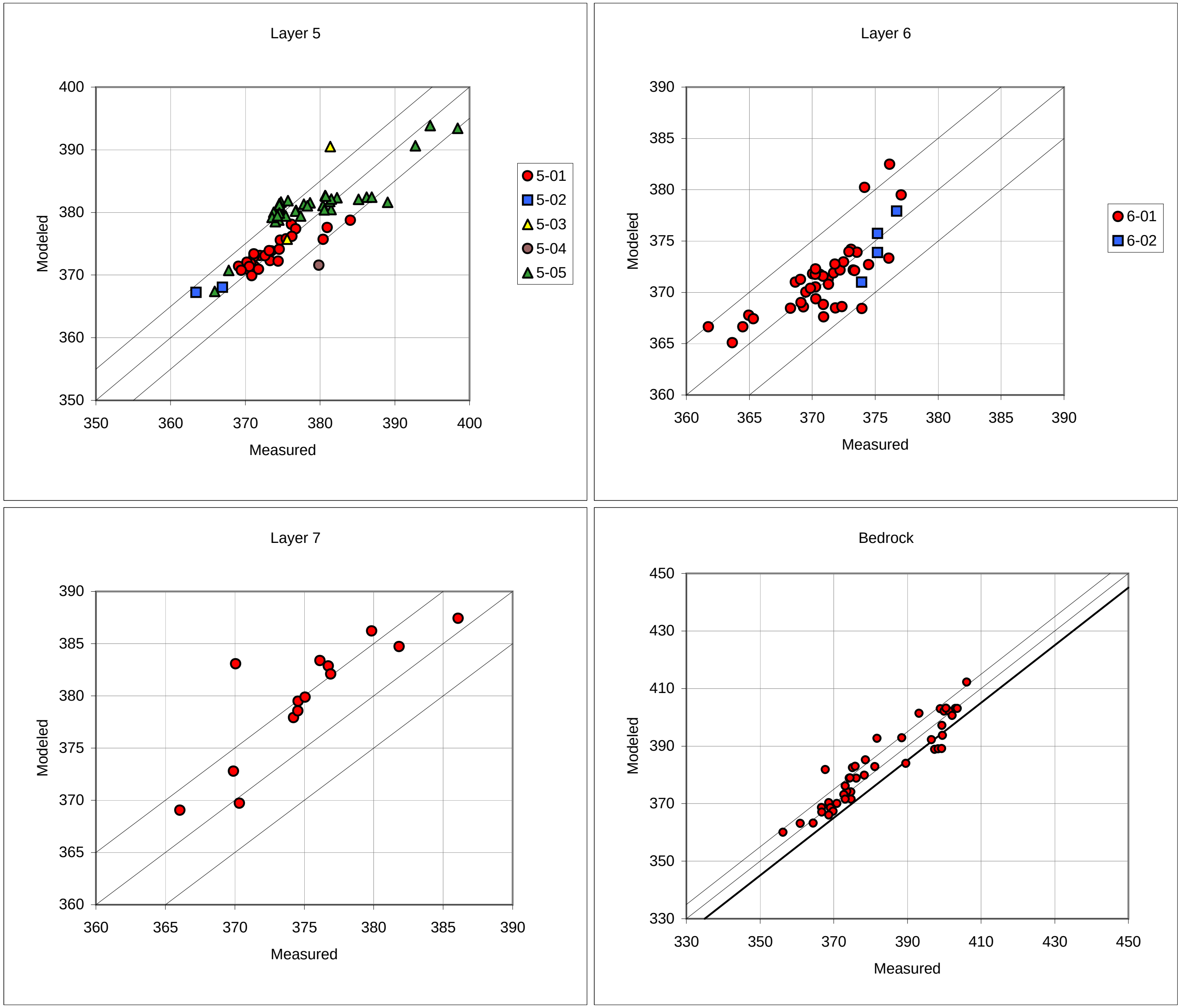


Figure 33 Model Calibration Targets and Hydraulic Heads in Bedrock



Note: Values shown are water level elevations in feet (NAVD 88).

Figure 34 Scatter Plots of Model Residuals in Layer 2, 3, 4, and Wastebeds



Note: Values shown are water level elevations in feet (NAVD 88).

Figure 35 Scatter Plots of Model Residuals in Layers 5, 6, 7, 8, and 9

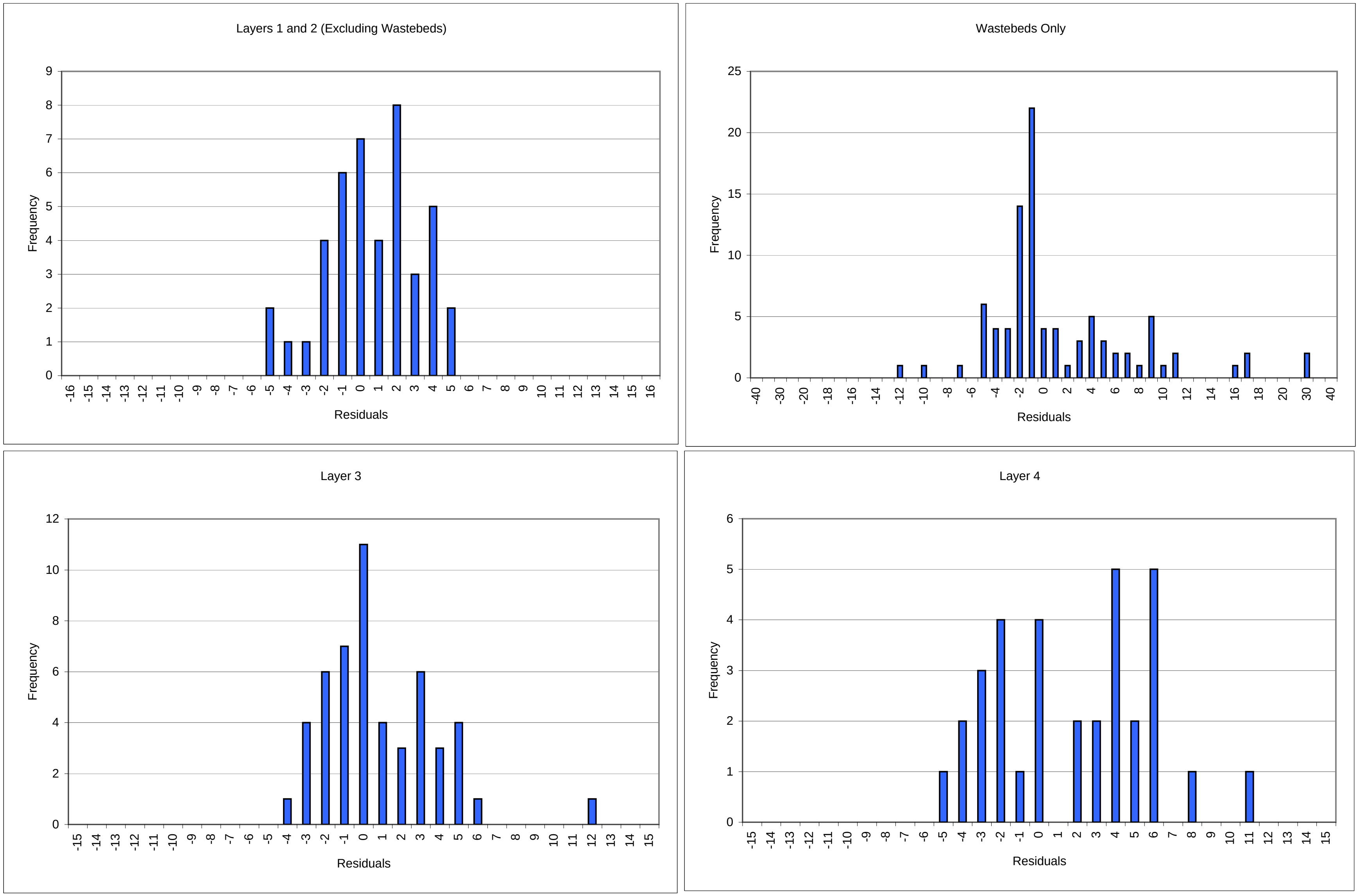


Figure 36 Histograms of Model Results for Layers 2, 3, and 4

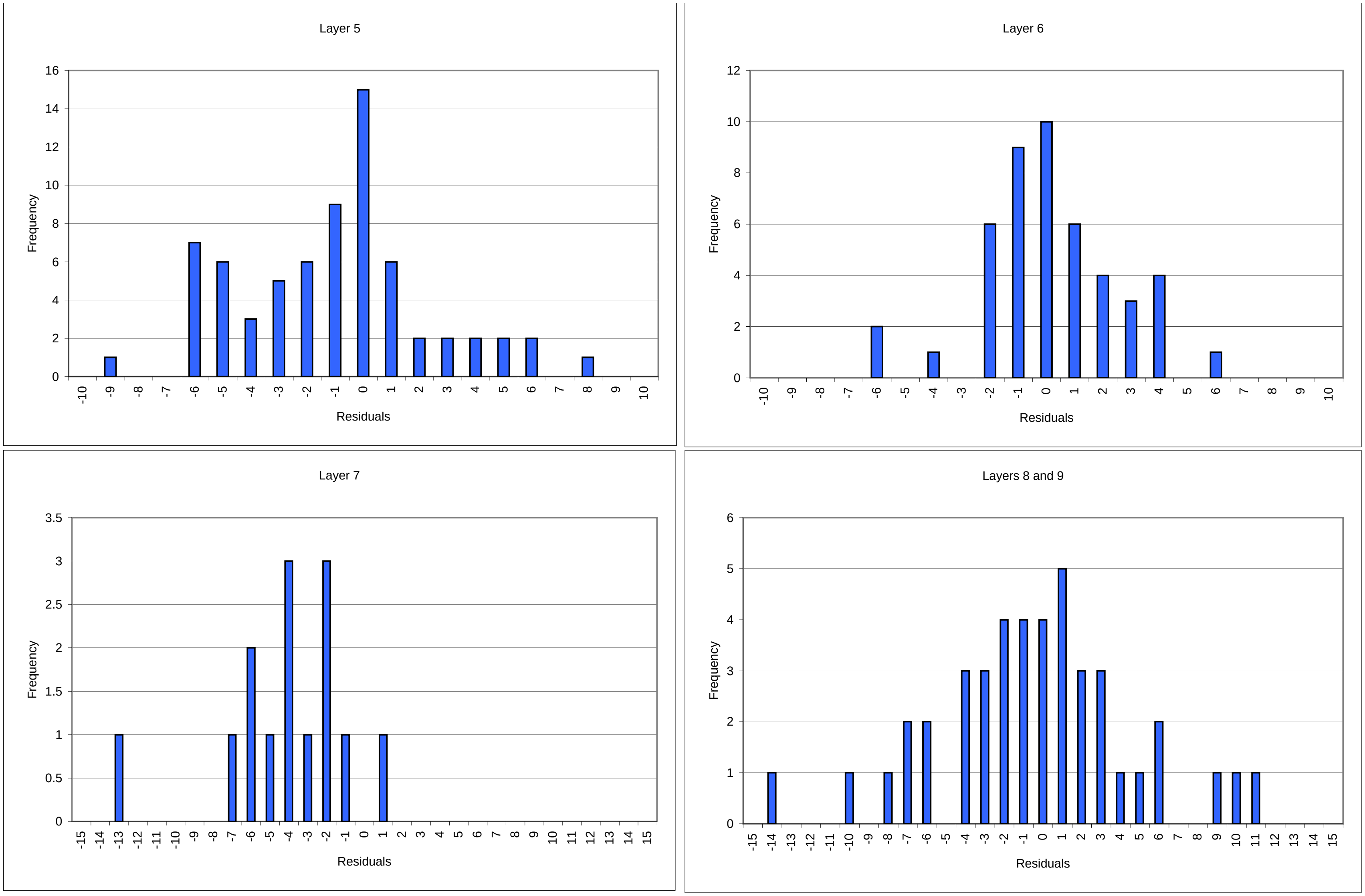
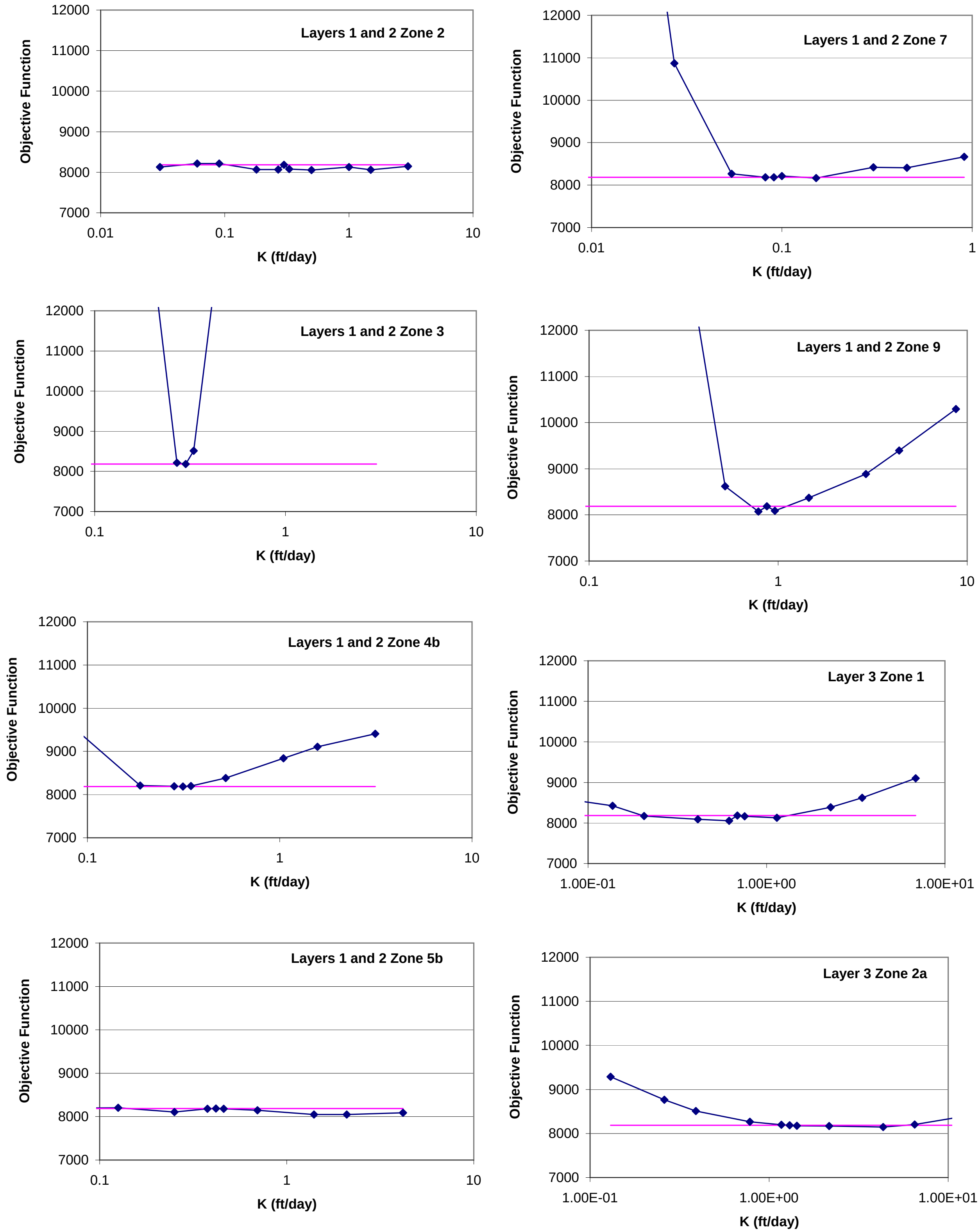
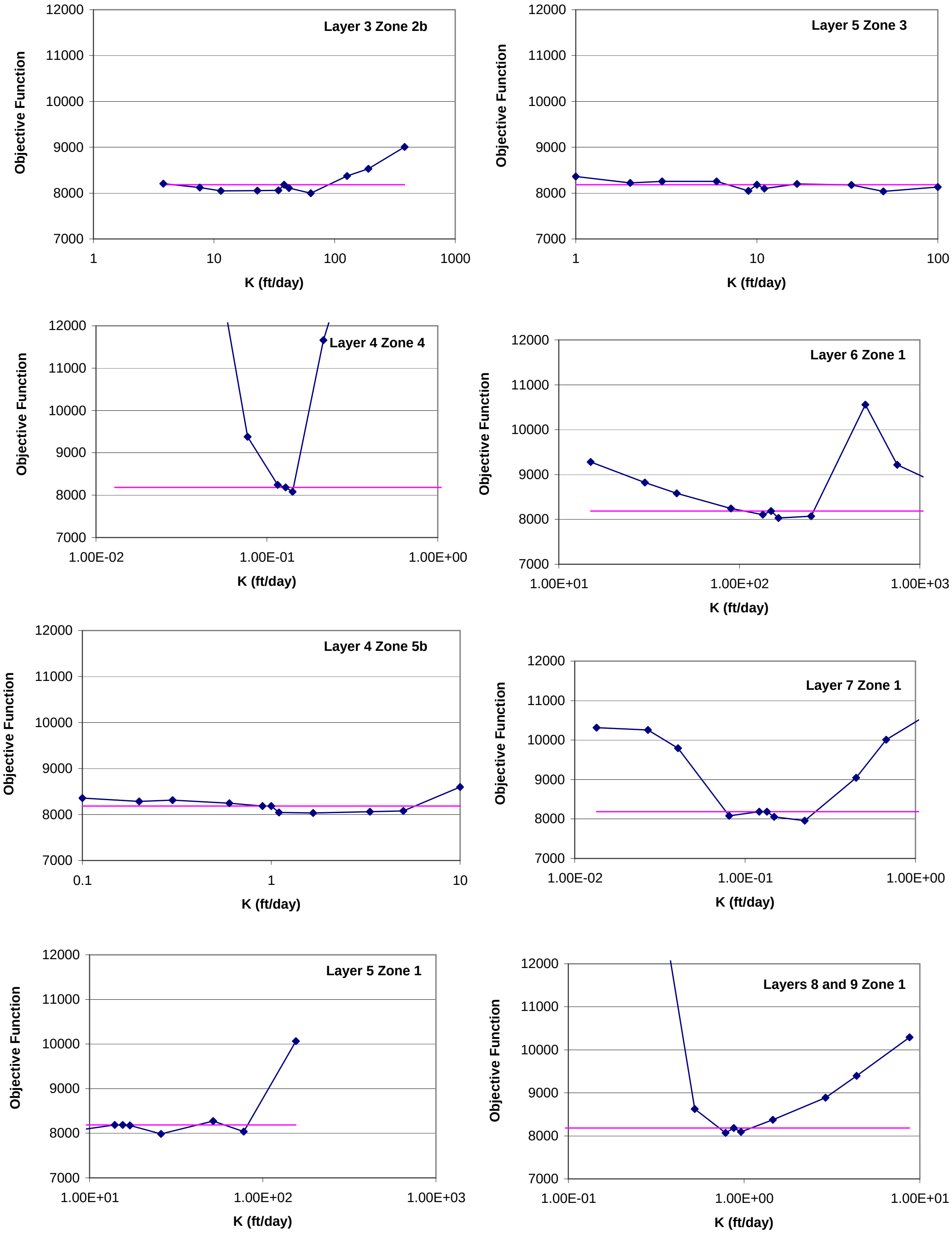


Figure 37 Histograms of Model Results for Layers 5, 6, 7, 8, and 9



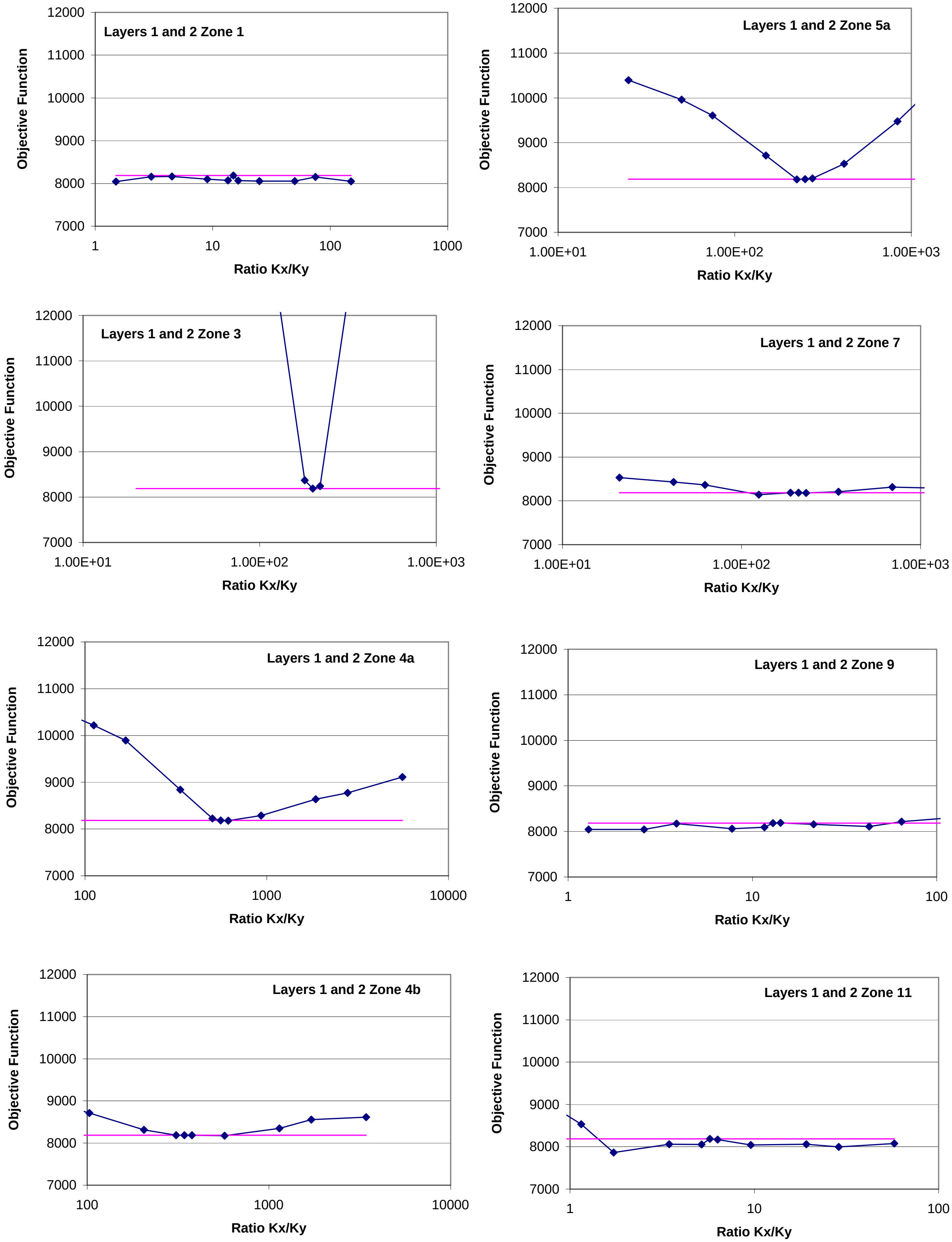
Note: The solid horizonal line represents the minimum objective function obtained with all parameters. The blue triangles represent the objective function calculated for various values of the selected parameter.

Figure 38a Sensitivity Plots for Selected Hydraulic Conductivity Parameters



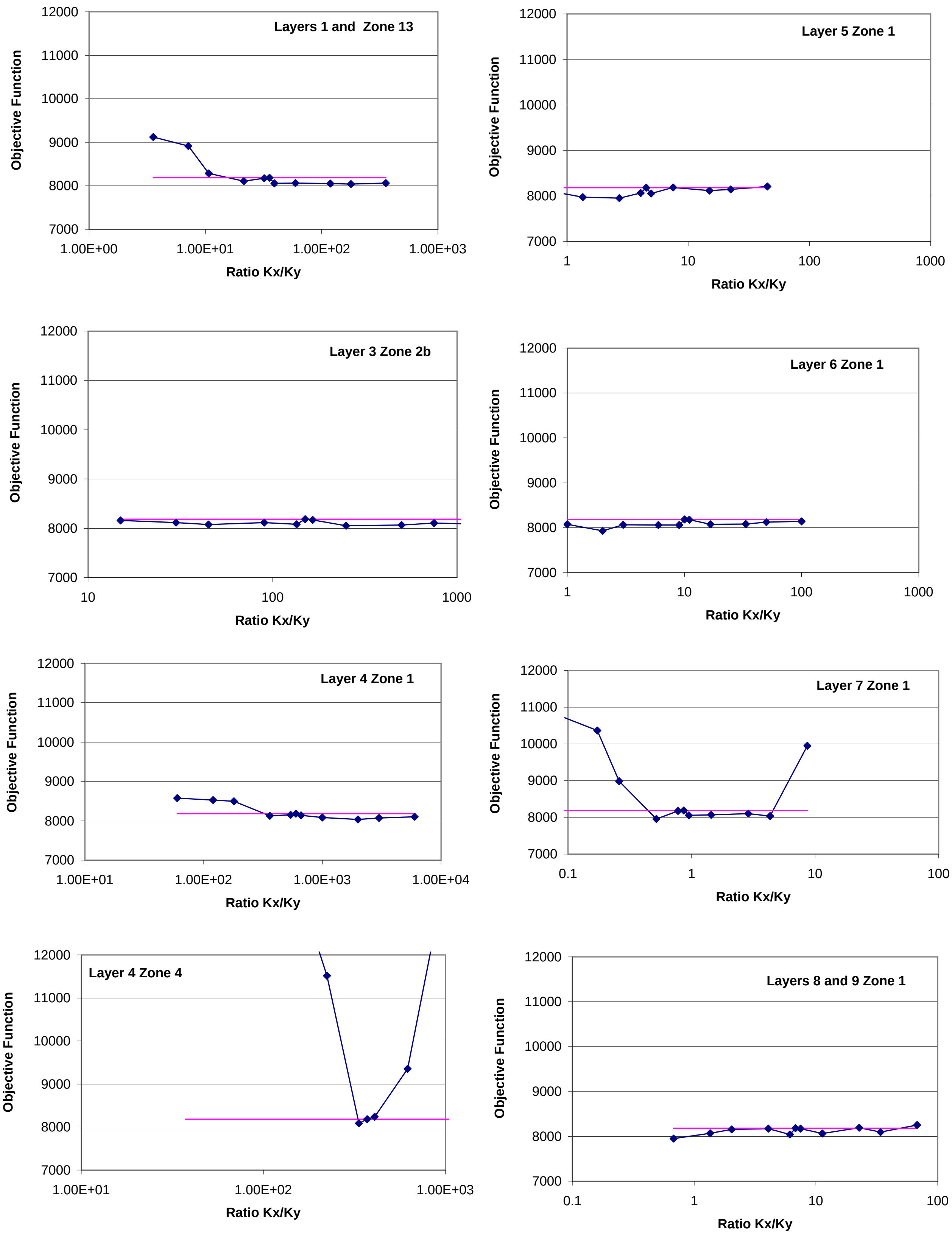
Note: The solid horizonal line represents the minimum objective function obtained with all parameters. The blue triangles represent the objective function calculated for various values of the selected parameter.

Figure 38b Sensitivity Plots for Selected Hydraulic Conductivity Parameters



Note: The solid horizonal line represents the minimum objective function obtained with all parameters. The blue triangles represent the objective function calculated for various values of the selected parameter.

Figure 39a Sensitivity Plots for Selected Ratios of Kx/Ky



Note: The solid horizonal line represents the minimum objective function obtained with all parameters. The blue triangles represent the objective function calculated for various values of the selected parameter.

Figure 39b Sensitivity Plots for Selected Ratios of Kx/Ky

TABLES

Table 1

Geologic Data

Well/Boring ID	State Plane (NAD 83 Feet) X-Coordinate	Y-Coordinate	Elevation (feet, NAVD 88) Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
493	919459.88	1120536.38	394.0	373.3	-	-	-	-	-	373.3	-	338.0	-	322.0	
494	919561.13	1120632.38	393.6	368.6	-	368.6	-	-	-	362.1	-	327.1	-	308.6	
495	919662.69	1120764.38	418.0	362.0	-	-	-	-	-	362.0	-	328.0	303.0	301.0	
7-3	913296.88	1118545.38	406.0	-	-	-	-	-	-	-	-	-	406.0	394.5	Yes
7-4	913272.88	1118599.88	409.6	-	-	-	-	-	-	-	-	-	409.6	389.6	Yes
#1	918061.69	1118183.13	383.3	-	-	-	-	-	-	383.3	-	-	333.3		
#10	918760.13	1118813.50	381.0	-	-	-	-	-	-	381.0	-	361.0	341.0	316.0	
#11	918157.19	1116196.13	411.7	-	-	-	-	-	-	-	-	-	-	411.7	
#12	918142.00	1116631.00	403.4	392.4	-	-	-	-	-	392.4	-	-	386.9	378.9	
#13	918205.50	1116766.25	389.1	-	-	-	-	-	-	389.1	-	-	377.6	363.1	
#14	918016.31	1116349.50	385.3	-	-	-	-	-	-	385.3					Yes
#15	917962.00	1116789.75	382.7	-	-	-	-	-	-	382.7					Yes
#3	918157.13	1118323.00	383.8	377.3	-	-	-	-	-	377.3	-	347.3	336.8		
#5	918249.38	1118412.75	384.7	378.2	-	-	-	-	-	378.2	-	353.2	329.7		
#7	918404.50	1118573.75	381.3	374.3	-	-	-	-	-	374.3	-	356.3	336.5		
#8	918543.81	1118454.25	381.9	374.9	-	-	-	-	-	374.9	-	350.4	340.9		
BF-BFMW-01D	923177.81	1117228.25	401.8	358.7	-	-	358.7	-	-	348.7	-	-	332.8		
BF-BFMW-02I	923396.38	1117095.25	402.4	359.3	-	-	359.3	-	-	349.4	-	-	343.4		Yes
BF-BFMW-03I	923665.94	1116859.25	406.9	359.8	-	-	359.8	-	-	-	-	-	349.9		
BF-BFMW-04D	924155.94	1116500.38	400.9	359.8	-	-	359.8	349.1	345.8	-	-	341.7	336.8		
BF-BFMW-05I	923752.31	1116576.75	400.1	361.1	-	-	361.1	-	-	-	-	-	357.0		
BF-BFMW-06I	922948.06	1116943.75	405.2	362.1	-	362.1	360.2	-	353.6	-	-	-	351.4		
BF-BFMW-07S	923160.88	1116588.63	387.2	373.2	-	-	-	-	-	-	-	-	373.2		
CB-03	913064.50	1119890.50	377.6	362.6	-	-	-	-	362.6						
CB-04	913446.88	1119767.75	378.4	369.4	-	-	-	-	369.4						
CB-05	913895.31	1119597.13	373.7	369.2	-	-	-	-	369.2						
CB-06	914593.19	1119409.25	375.3	369.3	-	-	-	-	369.3						
CB-07	915127.69	1119235.25	375.6	371.6	-	-	-	-	371.6	361.6					
CB-08	915720.31	1119107.25	374.5	370.5	-	-	-	-	370.5	360.5					
CB-09	916149.19	1118961.25	374.8	370.8	-	-	-	-	370.8	360.8					
CB-10	916606.50	1118796.88	376.6	374.6	-	-	-	-	374.6	362.1					
CB-11	917086.50	1118648.88	377.4	375.4	-	-	-	-	375.4	368.4					
CB-12	917646.38	1118400.38	383.8	378.8	-	-	-	-	378.8	374.8					
CB-13	918129.50	1118301.38	383.7	381.7	-	-	-	-	381.7	377.7					
CB-19	920106.50	1117865.63	380.5	378.5	-	-	-	-	-	378.5	-	-	370.5		
CB-20	920590.31	1117730.63	380.4	375.4	-	-	-	-	-	-	-	-	375.4	370.8	
CB-21	921000.69	1117873.38	377.5	375.0	-	-	-	-	-	-	-	-	375.0	366.0	
CB-22	920513.88	1118333.38	381.8	366.8	-	366.8	-	-	-	362.8					
DAF-02	926617.13	1115116.25	375.1	356.1	-	-	356.1	-	320.1	280.1	-	-	267.1		
DAF-03	927367.81	1114670.25	373.3	366.8	-	-	366.8	-	318.3	271.8	-	260.3	256.3	241.8	
DAF-06	923781.13	1116274.25	397.6	371.1											Yes
DAF-07	923929.31	1116156.00	398.5	389.0											Yes

Table 1

Geologic Data

Well/Boring ID	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)												
	X-Coordinate	Y-Coordinate	Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
DAF-08	924096.81	1116031.13	399.0	389.5											Yes
DAF-09	924250.88	1115919.88	398.7	382.2											Yes
DAF-10	926699.69	1114980.75	390.7	354.2	-	-	354.2								
DAF-29	922846.13	1116992.88	390.4	353.9											Yes
DAF-31	920515.38	1119734.00	365.0	363.0	-	-	363.0	-	348.5	-	-	-	321.0		
DAF-34	919714.13	1120689.25	395.0	384.0	-	-	-	-	-	384.0					
DH-06	918323.81	1118502.25	384.2	377.2	-	-	-	-	-	377.2	-	357.2	342.2		
DH-09	918569.63	1118676.88	380.6	-	-	-	-	-	-	380.6	-	358.6	343.6		
DNF-01	926540.00	1114957.75	369.5	358.5	-	-	358.5	-	327.5	282.5	-	279.5	274.5		
HB-GP-02	924089.31	1117431.50	384.1	350.1	-	-	350.1								Yes
HB-GP-03	924275.19	1117231.88	384.3	356.3	-	-	356.3								Yes
HB-GP-04	924481.69	1117154.75	376.6	352.6	-	-	352.6								Yes
HB-GP-05	925073.00	1116678.75	379.2	351.4	-	-	351.4	349.7							
HB-GP-06	925420.69	1116540.25	378.3	346.6	-	-	346.6								
HB-GP-07	925566.63	1116445.00	378.1	350.1	-	-	350.1								
HB-GP-08	923660.00	1117386.38	388.1	354.3	-	-	354.3								
HB-GP-09	923824.88	1117238.50	386.4	356.4	-	-	356.4	-	-	354.4					
HB-GP-10	924040.00	1117076.38	384.6	354.6	-	-	354.6								Yes
HB-GP-11	924236.31	1116908.13	382.1	356.1	-	-	356.1								Yes
HB-GP-13	924662.38	1116646.00	380.3	356.3	-	-	356.3	343.3							
HB-GP-14	924806.31	1116497.75	380.7	356.7	-	-	-	356.7							
HB-GP-15	925005.81	1116367.38	380.7	356.7	-	-	356.7								Yes
HB-GP-16	925209.50	1116230.25	379.5	355.5	-	-	355.5								Yes
HB-GP-17	925435.31	1116136.38	378.9	350.9	-	-	350.9								Yes
HB-GP-18	925675.13	1116047.88	379.1	351.1	-	-	351.1								
HB-GP-19	925841.31	1115882.88	369.2	357.2	-	-	-	357.2							
HB-GP-20	925855.19	1115832.25	373.5	357.5	-	-	357.5	351.5							Yes
HB-GP-25	925345.69	1115320.38	370.0	360.5	-	-	360.5	-	355.0						
HB-GP-26	925430.81	1115372.00	377.1	358.1	-	-	358.1	-	349.6						
HB-GP-27	925052.50	1115428.88	374.8	362.9	-	-	362.9	-	-	-	-	-	360.8		
HB-GP-28	924801.50	1115532.25	376.3	360.6	-	360.6	-	-	-	-	-	-	360.4		
HB-GP-29	924558.81	1115615.63	376.4	362.8	-	362.8	-	-	-	-	-	-	361.9		
HB-GP-30	924777.63	1115365.75	379.2	-	-	-	-	-	-	-	-	379.2	369.8		
HB-GP-32	925235.81	1115738.38	385.3	358.3	-	-	358.3	349.3	337.3						
HB-GP-33	925156.00	1115721.88	389.5	361.6	-	-	361.6	-	347.5						Yes
HB-GP-34	925002.69	1115734.13	392.1	355.0	-	-	355.0	-	348.2						
HB-GP-35	924712.69	1115838.63	390.3	364.7	-	-	364.7	-	-	-	-	355.2	351.3		
HB-GP-36	924505.81	1115880.75	390.4	358.8	-	-	358.8	-	352.8						
HB-GP-38	924082.50	1116046.75	381.7	372.2	-	-	-	-	372.2	-	-	-	371.2		
HB-GP-39	924005.50	1116256.50	385.4	361.5	-	-	-	-	-	-	-	-	361.5		
HB-HB-01D	924585.13	1117454.88	368.3	320.3	-	-	320.3	-	300.3	-	-	282.3	276.8		
HB-HB-02I	925743.13	1116367.25	365.5	353.5	-	-	353.5	339.5	337.5						

Table 1

Geologic Data

Well/Boring ID	State Plane (NAD 83 Feet) X-Coordinate	Y-Coordinate	Elevation (feet, NAVD 88) Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
HB-HB-03S	923856.69	1117620.25	369.7	353.7	-	-	353.7								
HB-HB-04D	925878.69	1115914.63	368.4	352.4	-	-	352.4	-	336.4	294.4	-	272.1	271.2		Yes
HB-HB-05D	925256.31	1116715.25	378.0	327.0	-	-	327.0	-	324.5	294.8	-	276.4	274.0		Yes
HB-HB-07S	925294.88	1114938.25	371.9	-	-	-	-	-	-	-	-	371.9	367.0		
HB-HB-08D	925458.81	1115475.50	376.9	363.4	-	-	363.4	-	355.3	-	-	-	311.9	309.4	
HB-HB-09S	924389.50	1115732.50	379.8	362.4	-	362.4	-	-	-	-	-	361.3	360.3		
HB-HB-10	924195.50	1116421.13	393.4	358.4	-	-	358.4	350.4							
HB-HB-11I	924507.38	1116271.88	394.5	358.9	-	-	358.9	-	349.5	-	-	333.4	331.0		
HB-HB-12D	925070.75	1115893.38	392.0	356.4	-	-	356.4	346.4	341.4	-	-	-	304.0		
HB-HB-13D	925156.00	1115723.00	389.5	361.6	-	-	361.6	350.2	337.9	-	-	306.4	304.4		
HB-HB-14D	924711.63	1115838.63	390.3	364.7	-	-	364.7	-	-	-	-	355.2	351.3		
HB-HB-16D	925489.63	1116123.38	378.8	350.8	-	-	350.8	337.0	308.8	304.8	-	274.8	272.2		
HB-HB-17D	924853.06	1116031.38	394.3	356.5	-	-	356.5	348.9	338.8	-	-	318.5	317.3		
HB-HB-18S	926312.06	1115850.75	363.5	347.5	-	-	347.5	-	326.5						Yes
HB-HB-19S	926203.25	1115997.75	363.5	347.5	-	347.5	345.5	-	327.7						Yes
HB-HB-20D	926478.31	1116106.00	363.5	342.5	-	-	342.5	-	317.5	241.5	-	238.0	230.0		
HB-HB-21I	925712.44	1115396.25	378.0	359.0	-	359.0	354.6								
HB-MW-212D	924103.75	1117547.13	370.2	348.2	-	-	348.2	-	-	334.2	-	-	307.7		Yes
HB-MW-213D	924041.38	1117672.25	367.0	333.0	-	-	333.0	-	325.0	318.7	-	306.5	302.7		Yes
HB-OW-02S	925765.75	1116387.75	364.1	352.6	-	-	352.6								Yes
HB-OW-05S	925785.00	1116373.13	363.9	352.1	-	-	352.1								Yes
HB-OW-08D	925101.38	1116709.38	378.4	348.6	-	-	348.6	-	325.2	292.4	-	279.0	278.7		Yes
HB-RISB-01	925003.00	1117098.63	363.1	333.6	-	-	333.6	-	328.1						Yes
HB-RISB-02	925162.31	1116928.63	363.5	328.0	-	-	328.0	-	323.5						Yes
HB-RISB-04	926663.19	1116169.63	363.4	357.4	-	-	357.4	-	323.9						Yes
HB-RISB-05	926582.50	1115835.88	365.2	359.2	-	-	359.2	-	328.2						Yes
HB-RISB-06	926857.88	1115980.13	364.3	348.3	-	-	348.3	-	324.8						Yes
HB-RISB-07	927037.81	1116093.63	365.3	351.5	-	-	351.5	-	321.5						Yes
HB-RISB-08	925656.88	1115421.25	376.5	356.8	-	-	356.8	347.0	340.5						Yes
HB-RISB-09	925522.00	1115305.75	370.7	359.2	-	348.4	359.2	-	347.9						Yes
HB-RISB-10	925655.50	1115229.25	382.4	359.4	-	-	359.4	344.9	340.4						Yes
HB-RISB-11	926046.31	1115832.75	367.6	343.6	-	343.6	341.6	-	328.1						Yes
HB-RISB-14	925635.19	1115406.75	374.2	360.8	-	360.8	359.0								Yes
HB-SB-01	923237.31	1117840.63	368.1	351.9	-	-	351.9	-	330.6						Yes
HB-SB-02	923383.88	1117811.38	368.5	354.5	-	-	354.5	-	334.7						Yes
HB-SB-03	923487.88	1117706.25	369.7	355.7	-	-	355.7	-	340.2						Yes
HB-SB-04	923772.69	1117723.75	368.5	352.5	-	-	352.5	-	330.5	317.5	-	-	304.9	295.0	Yes
HB-SB-05	923914.63	1117574.25	370.0	356.0	-	-	356.0	-	342.5						Yes
HB-SB-07	924360.63	1117423.63	369.2	349.2	-	-	349.2	-	328.7						Yes
HB-SB-08	924603.19	1117503.25	366.1	321.1	-	-	321.1	-	313.1						Yes
HB-SB-09	924481.38	1117225.75	376.5	353.8	-	-	353.8	-	343.0						Yes
HB-SB-10	924921.50	1117179.13	363.7	328.2	-	-	328.2	-	320.7	311.9	-	288.2	259.7	253.7	Yes

Table 1

Geologic Data

	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)												
Well/Boring ID	X-Coordinate	Y-Coordinate	Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
HB-SB-100	926380.44	1115643.00	371.8	353.8	-	-	353.8	-	317.8						Yes
HB-SB-101	926471.31	1115805.63	369.7	361.7	-	-	361.7	-	315.7						Yes
HB-SB-102	926452.38	1115870.13	362.9	337.9	-	-	337.9	-	309.9						Yes
HB-SB-103	926445.31	1115922.25	363.2	353.2	-	-	353.2	-	322.2						Yes
HB-SB-104	926572.75	1115900.63	363.6	357.6	-	-	357.6	-	307.6						Yes
HB-SB-105	926787.13	1115793.88	369.9	347.9	-	-	347.9	-	307.9						Yes
HB-SB-106	926670.63	1115891.00	364.2	359.2	-	-	359.2	-	304.2						Yes
HB-SB-107	926677.44	1115906.63	363.4	358.9	-	-	358.9	-	303.4						Yes
HB-SB-108	926637.13	1115988.63	362.8	357.8	-	-	357.8	-	287.8						Yes
HB-SB-109	926938.13	1116039.50	364.7	359.7	-	-	359.7	-	310.7						Yes
HB-SB-11	925013.38	1116969.75	365.5	349.5	-	-	349.5	-	327.7						Yes
HB-SB-110	926912.38	1116064.13	364.6	359.6	-	-	359.6	-	314.6						Yes
HB-SB-111	926883.06	1116099.88	364.1	350.1	-	-	350.1	-	314.1						Yes
HB-SB-112	923594.75	1117759.13	368.6	344.6	-	-	344.6	-	330.6	321.6					Yes
HB-SB-113	923633.13	1117676.25	369.9	351.9	-	-	351.9	-	339.9	327.9					Yes
HB-SB-114	923729.31	1117652.38	369.8	351.8	-	-	351.8	-	340.8	332.8					Yes
HB-SB-115	923600.50	1117437.50	385.6	351.6	-	-	351.6	-	-	339.6	-	-	325.1		Yes
HB-SB-116	923826.13	1117624.13	370.2	350.2	-	-	350.2	-	339.2	335.2	-	-	317.2		Yes
HB-SB-117	923920.00	1117593.75	370.2	354.2	-	-	354.2	-	-	334.2	-	-	317.2		Yes
HB-SB-118	924013.50	1117545.88	370.6	354.6	-	-	354.6	-	-	342.1	-	-	316.6		Yes
HB-SB-119	924099.13	1117548.63	370.5	348.5	-	-	348.5	-	-	336.5	-	-	310.5		Yes
HB-SB-12	925157.50	1116918.50	363.5	332.5	-	-	332.5	-	325.7						Yes
HB-SB-120	924099.69	1117493.00	379.4	345.4	-	-	345.4	-	-	334.4	-	-	311.4		Yes
HB-SB-121	924055.81	1117328.88	386.1	348.6	-	-	348.6	-	-	344.1	-	324.1	322.1		Yes
HB-SB-122	924174.50	1117491.38	370.1	350.1	-	-	350.1	-	333.6	328.1	-	312.1	312.0		Yes
HB-SB-123	924305.69	1117482.38	368.8	348.8	-	-	348.8	-	324.8	320.8	-	-	306.8	305.0	Yes
HB-SB-124	924442.06	1117501.25	367.6	327.6	-	-	327.6	-	315.6	299.6					Yes
HB-SB-125	924375.88	1117406.50	368.8	346.8	-	-	346.8	-	326.8	315.8					Yes
HB-SB-126	924454.00	1117341.25	373.3	345.3	-	-	345.3	-	326.8	319.3	-	314.3			Yes
HB-SB-127	924602.63	1117395.63	368.0	329.0	-	-	329.0	-	320.0						Yes
HB-SB-128	924525.06	1117276.00	373.2	345.7	-	-	345.7	-	337.2						Yes
HB-SB-129	924412.25	1117086.50	384.0	356.0	-	-	356.0	-	342.0	336.0	-	329.0	326.0		Yes
HB-SB-13	925264.50	1116810.38	364.9	334.9	-	-	334.9	-	325.9						Yes
HB-SB-130	924625.38	1117245.75	368.7	344.7	-	-	344.7	-	336.7	324.7					Yes
HB-SB-131	924603.75	1117211.38	368.1	352.6	-	-	352.6	-	339.1						Yes
HB-SB-132	924688.06	1117154.75	373.9	353.9	-	-	353.9	-	337.4	320.9					Yes
HB-SB-133	924799.56	1117142.38	365.4	351.4	-	-	351.4	-	329.4						Yes
HB-SB-134	924770.06	1117101.50	372.9	352.9	-	-	352.9	-	330.9						Yes
HB-SB-135	924854.25	1117050.00	370.9	352.9	-	-	352.9	-	330.9						Yes
HB-SB-136	924937.75	1116992.13	367.2	349.2	-	-	349.2	-	324.2						Yes
HB-SB-137	925023.06	1116939.63	366.6	348.6	-	-	348.6	-	323.6						Yes
HB-SB-138	924927.50	1116869.88	373.8	353.8	-	-	353.8	-	326.8						Yes

Table 1

Geologic Data

	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)												
Well/Boring ID	**X-Coordinate**	**Y-Coordinate**	**Ground Elevation**	**Base of Fill**	**Top of Onondaga Lake Deposits**	**Top of Peat**	**Top of Marl**	**Top of Sand**	**Top of Silt/Clay**	**Top of Fine Sand/Silt**	**Top of Mixed Ninemile**	**Top of Sand/Gravel**	**Top of Till**	**Top of Bedrock**	**New Boring**
HB-SB-139	924802.00	1116790.88	379.3	354.8	-	-	354.8	339.3	333.3						Yes
HB-SB-14	925479.38	1116715.38	365.0	331.1	-	-	331.1								Yes
HB-SB-140	925110.00	1116889.00	366.8	340.8	-	-	340.8	-	320.8						Yes
HB-SB-141	925189.56	1116830.75	369.3	329.3	-	-	329.3	-	319.3						Yes
HB-SB-142	925293.19	1116804.50	365.0	318.5	-	-	318.5	-	309.0	298.0					Yes
HB-SB-143	925274.00	1116778.50	366.6	326.6	-	-	326.6	-	318.6						Yes
HB-SB-144	925141.88	1116589.75	379.4	352.4	-	-	352.4	-	319.4	303.4					Yes
HB-SB-145	925359.75	1116723.38	366.1	326.1	-	-	326.1	-	316.1						Yes
HB-SB-146	925440.38	1116668.25	367.9	328.9	-	-	328.9	-	319.9						Yes
HB-SB-147	925389.44	1116602.88	378.5	331.5	-	-	331.5	-	318.5	307.5					Yes
HB-SB-148	925525.75	1116612.63	377.1	356.1	-	-	356.1	-	331.1						Yes
HB-SB-149	925610.75	1116564.00	367.0	347.0	-	-	347.0	-	325.0						Yes
HB-SB-15	925584.63	1116604.38	365.4	348.4	-	348.4	347.4	-	329.4	302.4	-	279.9	268.4	266.0	Yes
HB-SB-150	925695.44	1116512.50	365.4	347.4	-	-	347.4	-	324.4						Yes
HB-SB-151	925783.00	1116455.50	364.2	356.2	-	-	356.2	-	324.2						Yes
HB-SB-152	925868.13	1116409.75	363.9	353.9	-	-	353.9	-	323.9						Yes
HB-SB-153	925953.94	1116355.50	363.8	353.8	-	-	353.8	-	323.8						Yes
HB-SB-154	926041.88	1116308.50	363.4	353.4	-	-	353.4	-	324.4						Yes
HB-SB-155	926128.00	1116254.75	363.5	337.5	-	-	337.5	-	324.5						Yes
HB-SB-156	925090.06	1116989.63	360.0	340.0	-	-	340.0	-	314.0	300.0					Yes
HB-SB-16	925872.63	1116450.75	363.6	347.1	-	-	347.1	-	327.6						Yes
HB-SB-17	925761.88	1116219.63	364.9	353.9	-	-	353.9	-	331.4						Yes
HB-SB-18	926076.38	1116307.50	363.4	347.9	-	-	347.9	-	327.4	280.2	-	271.9	270.0	267.9	Yes
HB-SB-19	925969.69	1116127.50	363.6	353.8	-	-	353.8	-	328.1						Yes
HB-SB-20	925902.88	1115903.13	368.1	351.1	-	-	351.1	-	334.3						Yes
HB-SB-201	926099.06	1116107.75	363.6	355.6	-	-	355.6	-	321.6						Yes
HB-SB-202	925986.06	1115928.25	364.1	356.1	-	-	356.1	-	332.1						Yes
HB-SB-203	925938.00	1115854.63	368.6	363.6	-	-	363.6	-	320.6						Yes
HB-SB-204	926031.00	1115829.00	368.4	363.4	-	-	363.4	-	328.4						Yes
HB-SB-205	925983.88	1115743.13	370.2	354.2	-	-	354.2	-	328.2						Yes
HB-SB-206	926231.75	1115814.88	368.0	358.0	-	-	358.0	-	314.0						Yes
HB-SB-207	926351.44	1115844.38	362.7	351.7	-	-	351.7	-	314.7						Yes
HB-SB-208	926747.25	1115980.88	363.7	356.7	-	-	356.7	-	313.7						Yes
HB-SB-209	926835.13	1116018.75	363.6	357.6	-	-	357.6	-	309.6						Yes
HB-SB-21	925759.13	1115732.25	373.4	356.9	-	-	356.9	340.4	331.4	291.9	-	-	284.6	282.7	Yes
HB-SB-210	927017.00	1116122.38	364.3	361.3	-	-	361.3	-	306.3						Yes
HB-SB-211	927126.38	1116202.88	364.8	359.8	-	-	359.8	-	310.8						Yes
HB-SB-214	924241.88	1117633.00	366.9	331.9	-	-	331.9	-	320.9	308.9	-	290.4	289.4		Yes
HB-SB-215	923704.00	1117732.75	368.5	353.2	-	-	353.2	-	331.7	324.0	-	-	312.5		Yes
HB-SB-216	923798.63	1117713.13	368.6	350.6	-	-	350.6	-	329.6	323.3	-	-	306.1		Yes
HB-SB-217	923914.13	1117688.63	368.1	346.9	-	-	346.9	-	327.9	316.1	-	-	299.6		Yes
HB-SB-218	924122.13	1117654.25	366.3	334.8	-	-	334.8	-	326.3	316.3	-	-	298.3		Yes

Table 1

Geologic Data

Well/Boring ID	State Plane (NAD 83 Feet) X-Coordinate	Y-Coordinate	Elevation (feet, NAVD 88) Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
HB-SB-219	924326.75	1117619.88	366.3	330.3	-	-	330.3	-	311.3	298.9	-	-	288.3		Yes
HB-SB-22	925636.00	1115416.88	374.8	359.7	-	359.7	359.0	351.8	341.0						Yes
HB-SB-220	924198.94	1117577.38	361.2	336.7	-	-	336.7	-	323.2	313.2	-	-	300.7		Yes
HB-SB-221	924059.94	1117613.75	363.7	351.7	-	-	351.7	-	327.7	320.7	-	-	306.7		Yes
HB-SB-222	923972.50	1117622.63	363.7	348.7	-	-	348.7	-	-	328.7	-	-	311.7		Yes
HB-SB-223	924412.81	1117578.38	366.2	327.7	-	-	327.7	-	309.2	295.7	-	-	287.4		Yes
HB-SB-23	925536.19	1115297.88	370.0	361.2	-	-	361.2	-	350.0						Yes
HB-SB-24	925501.81	1115210.25	371.0	360.5	-	-	360.5	-	351.5	-	-	-	335.1	331.5	Yes
HB-SB-25	926262.19	1116106.00	363.8	332.1	-	-	332.1	-	310.3						Yes
HB-SB-26	926781.50	1116102.75	363.6	355.9	-	-	355.9	-	312.4						Yes
HB-SB-27	926677.19	1115905.75	363.4	352.6	-	-	352.6	-	309.7						Yes
HB-SB-28	927258.50	1116275.75	365.3	347.1	-	-	347.1	-	313.6						Yes
HB-SB-91	926130.63	1116207.50	363.4	351.4	-	-	351.4	-	321.4						Yes
HB-SB-92	925947.63	1116061.88	363.2	356.2	-	-	356.2	-	325.2						Yes
HB-SB-93	926009.81	1116038.50	363.6	357.6	-	-	357.6	-	321.6						Yes
HB-SB-94	926045.19	1116023.38	363.4	357.4	-	-	357.4	-	318.4						Yes
HB-SB-95	926091.25	1116002.63	363.2	358.2	-	-	358.2	-	325.2						Yes
HB-SB-95A	926091.25	1116002.63	363.2	358.2	-	-	358.2								Yes
HB-SB-96	926141.50	1115826.38	368.1	344.1	-	-	344.1	-	316.1						Yes
HB-SB-98	926177.81	1115929.50	363.6	358.6	-	-	358.6	-	317.6						Yes
HB-SB-99	926252.81	1115862.38	363.4	355.4	-	-	355.4	-	315.4						Yes
HB-TW-02	925761.88	1116379.63	364.3	352.5	-	-	352.5								Yes
HB-WA-08D	924706.38	1116702.88	380.8	356.8	-	-	356.8	343.8	336.8	319.8	-	304.8	303.3		
HB-WB-01	925334.50	1117452.00	364.0	309.0	-	-	309.0	-	309.0						
HB-WB-02	925134.63	1117227.25	364.0	313.0	-	-	313.0	-	313.0						
HB-WB-03	924899.13	1116987.63	375.0	338.0	-	-	-	-	338.0	313.0	-	301.0	299.5		
HB-WB-04	924823.13	1116929.25	382.0	362.0	-	-	362.0	-	338.0	334.0	-	-	324.0		
HB-WB-08	924467.00	1117402.63	370.0	352.0	-	-	352.0								
HB-WB-BL	924873.94	1116410.88	382.2	355.7	-	-	355.7	347.2	327.2	-	-	-	302.7		Yes
L11	913056.13	1116782.13	435.5	-	-	-	-	-	-	-	-	-	435.5		
L12	913041.31	1117514.13	425.1	-	-	-	-	-	-	-	-	-	425.1		
L128	915650.38	1122652.38	368.1	-	-	-	-	-	368.1	349.1	-	323.1	299.1		
L150	915777.81	1122580.75	366.6	-	-	-	-	-	366.6	-	-	355.6	302.6	285.6	
L152	916031.50	1122390.50	371.6	-	-	-	-	-	371.6	351.6	-	326.6	320.1	282.1	
L2	912970.50	1113683.25	497.0	-	-	-	-	-	-	-	-	-	497.0	421.7	
L46	913036.00	1114771.88	452.6	-	-	-	-	-	-	452.6	-	-	439.6	427.6	Yes
L51	913935.81	1119572.75	373.2	-	-	-	-	-	-	373.2	-	-	330.2	293.2	
L64	914470.81	1120380.25	368.2	-	-	-	-	-	368.2	349.2	-	308.2	-	288.2	
L67	914651.63	1120290.63	368.6	-	-	-	-	-	368.6	349.6	-	308.6	299.6	288.6	
L74	914881.19	1121002.25	366.5	365.5	-	-	-	-	365.5	347.0	-	316.5			
L91	915290.63	1121414.13	368.8	-	-	-	-	-	368.8	359.8	-	-	312.3	304.8	
LCP-B-1	916938.50	1117853.75	385.0	381.0	-	-	-	-	381.0	368.0					Yes

Table 1

Geologic Data

Well/Boring ID	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)												
	X-Coordinate	Y-Coordinate	Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
LCP-DB-01	917145.31	1117601.63	388.9	384.9	-	-	-	-	384.9	376.9	-	344.9	336.9		Yes
LCP-DB-02	917141.38	1117492.50	390.1	383.6	-	-	-	-	383.6	376.1	-	346.1	342.6		Yes
LCP-DB-03	917006.69	1117631.00	390.2	384.2	-	-	-	-	384.2	376.2	-	347.2	339.2		Yes
LCP-DB-04	917006.69	1117631.00	390.2	383.7	-	-	-	-	383.7	378.2	-	350.2			Yes
LCP-DB-05	917261.19	1117716.75	387.8	382.8	-	-	-	-	382.8	375.8	-	352.3			Yes
LCP-DB-06	916966.69	1117416.13	391.1	387.1	-	-	-	-	387.1	375.1	-	-	343.6		Yes
LCP-DB-07	917024.38	1117328.25	390.8	384.8	-	-	-	-	384.8	374.8	-	350.8	345.8		Yes
LCP-DB-08	917091.69	1117259.38	390.8	386.3	-	-	-	-	386.3	376.8	-	354.8			Yes
LCP-MW-10D	916730.56	1117524.75	383.2	380.7	-	-	-	-	380.7	372.2					Yes
LCP-MW-11D	917353.19	1117983.63	388.6	381.6	-	-	-	-	381.6	378.6					Yes
LCP-MW-12D	917093.19	1117765.63	386.5	384.5	-	-	-	-	384.5	382.5					Yes
LCP-MW-13D	917466.50	1117544.63	389.5	383.0	-	-	-	-	-	383.0	-	348.5			Yes
LCP-MW-14D	917383.25	1117027.88	391.9	387.9	-	-	-	-	387.9	379.9	-	353.9	350.9		Yes
LCP-MW-15D	917043.94	1116983.38	391.8	385.8	-	-	-	-	385.8	381.8	-	357.8	352.8		Yes
LCP-MW-16D	917260.50	1117382.63	390.8	386.8	-	-	-	-	386.8	384.8	-	348.8			Yes
LCP-MW-17D	916963.50	1117481.13	391.4	381.4	-	-	-	-	381.4	379.4					Yes
LCP-MW-18D	917241.19	1117557.38	388.9	377.9	-	-	-	-	377.9	376.9					Yes
LCP-MW-19D	916929.25	1117705.50	389.4	383.4	-	-	-	-	383.4	375.4					Yes
LCP-MW-20S	916824.81	1117886.63	389.7	382.4	-	-	-	-	382.4						Yes
LCP-MW-23S	917081.81	1117148.25	391.1	386.6	-	-	-	-	386.6						Yes
LCP-MW-24D	916650.06	1117869.38	386.7	383.7	-	-	-	-	383.7	376.7					Yes
LCP-MW-25S	916831.81	1117674.75	390.2	383.7	-	-	-	-	383.7						Yes
LCP-MW-26D	916935.81	1118100.75	384.0	376.0	-	-	-	-	376.0	372.0					Yes
LCP-MW-27S	917163.19	1117715.00	387.1	380.6	-	-	-	-	-	380.6					Yes
LCP-MW-28D	916954.38	1118125.25	382.3	380.3	-	-	-	-	380.3	377.3					Yes
LCP-MW-29D	917055.38	1117967.00	385.7	383.2	-	-	-	-	383.2	379.7					Yes
LCP-MW-30D	917125.75	1117843.38	385.3	380.8	-	-	-	-	380.8	379.3	-	347.3			Yes
LCP-MW-31S	917134.13	1118088.63	386.6	378.6	-	-	-	-	378.6	377.1					Yes
LCP-MW-32S	917433.38	1117923.13	389.1	381.1	-	-	-	-	-	381.1					Yes
LCP-MW-33D	917077.00	1117563.25	390.2	382.2	-	-	-	-	382.2	376.2	-	358.7	340.9		Yes
LCP-MW-3AR	916636.69	1117412.88	391.8	387.8	-	-	-	-	387.8						
LCP-MW-5A	916357.94	1117550.75	392.3	388.3	-	-	-	-	388.3						
LCP-MW-6A	916441.13	1117753.38	390.4	388.4	-	-	-	-	388.4						
LCP-W-01	916450.88	1117715.50	390.5	387.0	-	-	-	-	387.0	371.5					Yes
LCP-W-02	916212.88	1117441.88	392.5	386.5	-	-	-	-	386.5	371.5					Yes
LCP-W-03	916289.13	1117803.50	388.3	385.8	-	-	-	-	385.8	354.3					Yes
LCP-W-05	916439.00	1117654.25	393.4	385.4											Yes
LCP-W-06	916589.00	1117815.25	389.5	384.5	-	-	-	-	384.5						Yes
LCP-W-07	916513.69	1117674.75	391.2	387.2	-	-	-	-	387.2						Yes
LP1	919039.88	1120629.63	389.0	372.5	-	-	372.5	-	-	367.5	-	328.0	315.5	308.0	
LP2	918990.00	1120573.63	384.5	368.0	-	-	-	-	-	368.0	-	343.5			
MPS-A-01MW	919387.31	1116375.38	414.9	407.4	-	-	-	-	-	-	-	-	-	407.4	

Table 1

Geologic Data

Well/Boring ID	State Plane (NAD 83 Feet) X-Coordinate	Y-Coordinate	Elevation (feet, NAVD 88) Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
MPS-A-02MW	920293.00	1116466.50	408.6	402.6	-	-	-	-	-	-	-	-	402.6	396.6	
MPS-A-03MW	920442.63	1116120.25	428.0	410.0	-	-	-	-	-	-	-	-	-	410.0	
MPS-A-07MW	920486.63	1116650.25	404.0	394.0	-	-	-	-	-	-	-	-	394.0	382.0	
MPS-A-10MW	921215.31	1115937.75	419.7	412.7	-	-	-	-	-	-	-	412.7	396.2		
MPS-A-11B	921298.81	1115809.25	420.4	416.4	-	-	-	-	-	-	-	416.4	405.4		
MPS-A-12MW	921924.00	1116181.25	411.1	388.6	-	-	-	-	-	-	-	388.6	377.1		
MPS-A-13MW	922310.19	1115811.25	428.9	416.9	-	-	-	-	-	-	-	416.9	400.9	398.9	
MPS-A-15MW	922579.31	1116022.50	432.3	425.8	-	-	-	-	-	-	-	425.8	424.3		
MPS-A-16B	922064.50	1116692.00	390.6	377.6	-	-	-	-	-	377.6	-	372.6	369.6		
MPS-A-18MW	922025.63	1116896.38	388.0	380.5	-	-	-	-	380.5	-	-	358.0	354.0	352.5	
MPS-BG-1	918475.13	1116898.38	435.0	430.0	-	-	-	-	-	-	-	-	-	430.0	
MPS-BG-2	920524.88	1116583.88	440.0	436.0	-	-	-	-	-	-	-	-	-	436.0	
MPS-Boring19/BH-19	920523.50	1117930.50	405.0	395.0	-	-	-	-	-	-	-	-	395.0	394.2	
MPS-H-2	920673.06	1116787.75	398.5	390.5	-	-	-	-	-	-	-	-	390.5		
MPS-H-5MW	919681.25	1116916.13	406.0	391.0	-	-	-	-	-	391.0	-	-	387.0		
MPS-H-8MW	919293.31	1116744.75	404.9	391.9	-	-	-	-	-	391.9	-	-	-	355.9	
MPS-MW-01BR	919188.88	1116242.00	409.4	407.9	-	-	-	-	-	-	-	-	-	407.9	Yes
MPS-MW-02BR	918971.88	1116531.50	410.2	396.8	-	-	-	-	-	-	-	-	396.8	394.2	Yes
MPS-MW-104	921084.88	1117123.75	401.6	390.6	-	-	-	-	-	-	-	-	390.6		
MPS-MW-107	921327.81	1116978.25	397.0	393.0	-	-	-	-	-	-	-	-	393.0		
MPS-MW-108	921456.13	1117015.75	397.0	391.0	-	-	-	-	-	-	-	-	391.0		
MPS-R-13	921607.50	1116046.13	411.5	406.0	-	-	-	-	-	-	-	406.0	380.5		
MPS-R-14MW	921325.13	1116060.75	412.4	408.4	-	-	-	-	-	-	-	408.4	395.9		
MPS-R-2	921567.81	1116715.63	394.4	387.4	-	-	-	-	-	387.4	-	-	384.9		
MPS-R-8MW	921719.19	1116486.38	404.7	375.7	-	-	-	-	-	375.7	-	372.0	371.7		
MPS-SB-01	918930.75	1116518.13	410.1	402.1	-	-	-	-	-	-	-	-	402.1	394.6	Yes
MPS-SB-02	919169.50	1116332.25	409.1	403.1	-	-	-	-	-	-	-	-	403.1	402.1	Yes
MPS-SB-03	919206.69	1116240.88	409.6	407.1	-	-	-	-	-	-	-	-	407.1	406.8	Yes
MPS-SB-04	919192.50	1116164.25	410.6	409.0	-	-	-	-	-	-	-	-	-	409.0	Yes
MPS-SB-05	919168.06	1116241.88	409.1	407.1	-	-	-	-	-	-	-	-	-	407.1	Yes
MPS-SB-06	918985.88	1116531.00	410.2	398.2	-	-	-	-	-	-	-	-	398.2	384.6	Yes
MPS-SB-07	919073.88	1116505.00	409.1	399.1	-	-	-	-	-	-	-	-	399.1		Yes
MPS-SB-08	921017.50	1117092.38	400.4	396.4	-	-	-	-	-	-	-	-	396.4	361.4	Yes
MPS-SB-09	920943.38	1117036.00	401.3	397.3	-	-	-	-	-	-	-	-	397.3	369.8	Yes
MPS-SB-10	920380.94	1116694.38	400.7	386.2	-	-	-	-	-	-	-	-	386.2	379.2	Yes
MPS-SB-11	920456.44	1116688.00	399.9	393.4	-	-	-	-	-	-	-	-	393.4	378.2	Yes
MPS-SB-12	920512.50	1116683.88	401.1	396.1	-	-	-	-	-	-	-	-	396.1	379.1	Yes
MPS-SB-13	922011.75	1116640.38	390.0	375.0	-	-	-	-	-	375.0	-	-	-	372.5	Yes
MPS-SB-14	921885.88	1116651.38	390.0	378.0	-	-	-	-	-	378.0	-	-	-	369.0	Yes
MPS-SB-15	921596.31	1116811.63	391.2	377.7	-	-	-	-	-	-	-	-	377.7	359.2	Yes
MPS-SB-16	921456.31	1116920.75	393.3	388.5	-	-	-	-	-	-	-	-	388.5	363.3	Yes
MPS-SB-17	921551.25	1116921.38	389.4	383.2	-	-	-	-	-	-	-	-	383.2	360.8	Yes

Table 1

Geologic Data

Well/Boring ID	State Plane (NAD 83 Feet) X-Coordinate	Y-Coordinate	Elevation (feet, NAVD 88) Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
MPS-SB-18	921637.25	1116915.63	388.2	376.2	-	-	-	-	-	-	-	-	376.2	356.2	Yes
MPS-SB-19	921034.69	1117125.50	400.5	395.5	-	-	-	-	-	395.5	-	-	390.5	361.0	Yes
MPS-SB-20	921270.63	1115807.13	419.0	399.0	-	-	-	-	-	-	-	-	399.0	379.0	Yes
MPS-SB-21	921197.50	1115812.38	421.0	404.0	-	-	-	-	-	-	-	-	404.0		Yes
MPS-SB-21A	921192.38	1115812.25	421.0	404.0	-	-	-	-	-	-	-	-	404.0	383.0	Yes
MPS-SB-22	921142.56	1115809.50	421.4	397.4	-	-	-	-	-	-	-	-	397.4	385.4	Yes
MPS-SB-23	921205.44	1115905.25	417.2	415.2	-	-	-	-	-	-	-	415.2	391.2	378.7	Yes
NMDSA-GWS-01	914174.13	1126348.00	370.3	360.3	-	360.3	359.8								Yes
NMDSA-GWS-02	913892.19	1126812.88	371.7	360.7	-	360.7	360.0								Yes
NMDSA-GWS-03	913739.00	1127241.25	370.6	360.1	-	360.1	359.6								Yes
NMDSA-GWS-04	912623.31	1128313.63	364.3	356.3	-	-	356.3	-	-	354.3					Yes
NMDSA-GWS-05	912321.00	1128856.13	370.1	362.4	-	362.4	361.1								Yes
NMDSA-GWS-06	912060.19	1129314.25	368.5	360.5	-	360.5	359.5	-	353.5						Yes
NMDSA-GWS-07	911892.63	1129712.25	368.7	362.2	-	362.2	361.7								Yes
NMDSA-GWS-08	911590.81	1130066.75	369.6	364.1	-	364.1	362.6								Yes
NMDSA-GWS-09	911313.38	1130350.75	367.4	361.4	-	361.4	360.4	-	352.4						Yes
NMDSA-GWS-10	910771.31	1131771.00	364.8	363.8	-	-	363.8	-	352.8						Yes
NMDSA-GWS-11	910528.69	1132277.63	364.5	363.5	-	-	363.5	-	353.0						Yes
NMDSA-GWS-12	910193.81	1132529.38	364.4	361.1	-	-	361.1	-	352.4	351.4					Yes
NMDSA-GWS-13	910172.38	1133023.25	368.3	362.8	-	362.8	362.8	-	-	354.3					Yes
NMDSA-GWS-14	909986.50	1133437.75	366.5	362.8	-	362.8	362.3	-	-	351.5					Yes
NMDSA-GWS-15	909886.81	1133951.25	366.0	362.0	-	362.0	361.0	-	-	353.0					Yes
NMDSA-GWS-16	910094.69	1134387.25	366.3	360.8	-	360.8	359.8								Yes
NMDSA-GWS-17	910203.69	1134653.38	365.8	361.8	-	361.8	361.3								Yes
NMDSA-MW-01	914019.81	1126621.25	371.6	361.6	-	361.6	361.1								Yes
NMDSA-MW-02	913692.56	1126681.13	371.6	363.6	-	363.6	361.6								Yes
NMDSA-MW-03	913766.88	1127090.63	371.7	365.7	-	-	365.7								Yes
NMDSA-MW-04	912164.44	1129039.25	369.5	363.0	-	363.0	362.5								Yes
NMDSA-MW-05	911733.38	1129457.25	370.8	360.8	-	-	360.8	-	355.8						Yes
NMDSA-MW-06	911523.56	1130185.50	370.1	361.1	-	-	361.1								Yes
NMDSA-MW-07	910262.13	1132882.88	368.1	361.1	-	361.1	360.6								Yes
NMDSA-MW-08	909680.69	1134270.38	373.8	363.3	-	363.3	362.3								Yes
NMDSA-MW-09	910022.75	1134114.75	368.4	361.4	-	361.4	360.9	-	352.6						Yes
NMDSA-SB-01	914069.69	1126367.13	372.6	364.4	-	364.4	363.6								Yes
NMDSA-SB-02	913753.38	1126692.25	371.9	360.9	-	360.9	359.9								Yes
NMDSA-SB-03	913512.31	1127115.88	375.5	366.5	-	-	366.5	-	-	-	-	-	356.5		Yes
NMDSA-SB-04	912607.19	1128268.25	364.1	363.1	-	-	363.1	-	-	353.1					Yes
NMDSA-SB-05	912241.63	1128874.63	370.7	359.7	-	359.7	358.7								Yes
NMDSA-SB-06	911990.38	1129305.00	368.3	361.3	-	361.3	360.5	-	353.3						Yes
NMDSA-SB-07	911753.69	1129597.75	366.1	362.1	-	362.1	361.6	-	-	354.9					Yes
NMDSA-SB-08	911451.63	1130078.25	367.7	363.2	-	363.2	361.7	-	353.2						Yes
NMDSA-SB-09	911394.50	1130188.13	368.8	361.8	-	361.8	360.8	-	354.8						Yes

Table 1

Geologic Data

	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)												
Well/Boring ID	X-Coordinate	Y-Coordinate	Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
NMDSA-SB-10	910736.13	1131782.25	364.0	363.0	-	-	363.0	-	350.0						Yes
NMDSA-SB-11	910459.31	1132346.25	364.0	363.0	-	-	363.0	-	350.0	352.0					Yes
NMDSA-SB-12	910124.00	1132516.13	364.1	363.1	-	-	363.1	-	352.4	351.1					Yes
NMDSA-SB-13	910098.81	1133003.75	368.6	361.6	-	361.6	361.6	-	353.6						Yes
NMDSA-SB-14	909864.31	1133396.50	366.1	362.1	-	362.1	361.6	-	-	350.4					Yes
NMDSA-SB-15	909838.88	1133946.25	365.9	362.1	-	362.1	361.6	-	353.4						Yes
NMDSA-SB-16	910042.63	1134389.25	366.0	362.0	-	362.0	361.0	-	-	350.5					Yes
NMDSA-SB-17	910152.13	1134684.50	365.8	362.0	-	362.0	361.8								Yes
OL-SB-10115	923135.00	1118005.00	347.4	337.4	-	-	337.4	-	325.4						Yes
OL-SB-10121	923614.31	1117794.13	362.6	344.6	-	-	344.6	-	328.6						Yes
OL-SB-10124	923591.25	1117850.88	361.7	332.7	-	-	332.7	-	321.7						Yes
OL-SB-10129	923826.19	1117999.50	361.0	326.0	-	-	326.0	-	308.5						Yes
OL-SB-10130	923877.19	1118242.38	360.1	320.1	-	-	320.1	-	300.1						Yes
OL-SB-10131	924455.94	1117817.75	357.4	305.4	-	-	305.4	-	273.4	252.4	-	245.9			Yes
OL-SB-10132	924561.44	1118276.25	345.2	303.2	-	-	303.2	-	294.2						Yes
OL-SB-10133	925001.69	1117318.00	362.5	323.5	-	-	323.5	-	311.5						Yes
OL-SB-10134	925164.50	1117635.88	359.3	309.3	-	-	309.3								Yes
OL-SB-10135	925359.38	1118032.63	353.6	307.6	-	-	307.6	-	287.6						Yes
OL-SB-20067	922416.19	1118643.88	361.8	353.8	-	-	353.8	-	330.8						Yes
OL-SB-20068	922654.63	1118378.13	359.0	346.0	-	-	346.0								Yes
OL-SB-40146	916206.75	1126152.63	357.4	-	357.4	-	347.4	-	-	-	311.4				Yes
OL-SB-40147	916509.19	1126076.63	359.3	-	359.3	-	349.3	-	-	-	315.3				Yes
OL-SB-60001-VC	928470.06	1121360.63	359.7	-	359.7	-	351.7								Yes
OL-SB-60002-VC	928629.69	1121163.75	359.7	-	359.7	-	351.7								Yes
OL-SB-60003-VC	928834.94	1120895.50	361.1	-	361.1	-	353.1								Yes
OL-SB-60004-VC	928702.88	1120572.50	360.5	-	360.5	-	352.5								Yes
OL-SB-60005-VC	928807.25	1119933.13	360.7	-	360.7	-	352.7								Yes
OL-SB-60006-VC	928676.38	1119541.00	360.7	-	360.7	-	352.7								Yes
OL-SB-60007-VC	928698.31	1119195.38	360.7	-	360.7	-	352.7								Yes
OL-SB-60008-VC	928646.81	1118910.38	360.5	-	360.5	-	352.5								Yes
OL-SB-60009-VC	928640.06	1118657.88	360.6	-	360.6	-	352.6								Yes
OL-SB-60010-VC	928579.50	1118356.38	360.6	-	360.6	-	352.6								Yes
OL-SB-60011-VC	928296.94	1117842.38	360.5	-	360.5	-	352.5								Yes
OL-SB-60012-VC	928157.50	1117573.88	360.2	-	360.2	-	352.2								Yes
OL-SB-60013-VC	928031.31	1117304.75	360.5	-	360.5	-	352.5								Yes
OL-SB-60014-VC	927755.81	1117202.13	360.2	-	360.2	-	352.2								Yes
OL-SB-60015-VC	927606.00	1117016.88	360.3	-	360.3	-	352.3								Yes
OL-SB-70001-VC	927065.38	1116285.50	361.5	-	361.5	-	353.5								Yes
OL-SB-70002-VC	927021.31	1116473.38	360.6	-	360.6	-	352.6								Yes
OL-SB-70003-VC	927305.13	1116492.00	360.9	-	360.9	-	352.9								Yes
OL-SB-70004-VC	927225.13	1116590.38	360.7	-	360.7	-	352.7								Yes
OL-SB-80052	923974.88	1118745.13	323.9	297.9	-	-	297.9	-	248.9	218.9	-	213.9	-	205.4	Yes

Table 1

Geologic Data

	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)												
Well/Boring ID	**X-Coordinate**	**Y-Coordinate**	**Ground Elevation**	**Base of Fill**	**Top of Onondaga Lake Deposits**	**Top of Peat**	**Top of Marl**	**Top of Sand**	**Top of Silt/Clay**	**Top of Fine Sand/Silt**	**Top of Mixed Ninemile**	**Top of Sand/Gravel**	**Top of Till**	**Top of Bedrock**	**New Boring**
OL-SB-80053	924685.38	1118753.13	322.0	280.0	-	-	280.0	-	237.5	168.0	-	-	-	164.2	Yes
OL-SB-80054	925589.88	1118437.63	335.0	309.0	-	-	309.0	-	256.0	175.5	-	120.5	-	117.2	Yes
OL-STA-10001-VC	923452.25	1118517.75	336.2	323.2	336.2										Yes
OL-STA-10002-VC	924291.63	1118312.00	353.5	340.5											Yes
OL-STA-10003-VC	924907.56	1118153.63	351.2	338.2											Yes
OL-STA-10004-VC	924950.88	1118356.38	340.9	327.9											Yes
OL-STA-10005-VC	925576.06	1117898.13	352.9	339.9											Yes
OL-STA-10006-VC	925796.06	1118267.13	336.9	323.9	336.9										Yes
OL-STA-10007-VC	926138.50	1117646.88	349.1	336.1											Yes
OL-STA-10008-VC	923319.56	1118083.00	349.8	330.3											Yes
OL-STA-10009-VC	924174.44	1117950.75	361.4	342.9											Yes
OL-STA-10010-VC	924773.69	1117686.13	359.7	340.2											Yes
OL-STA-10011-VC	925301.94	1117369.88	359.4	340.4											Yes
OL-STA-10013-SB	923900.19	1118375.50	349.5	315.0											Yes
OL-STA-10014-SB	924596.38	1118398.88	336.9	295.9	-	-	295.9	-	290.9						Yes
OL-STA-10015-SB	925464.81	1118228.75	337.9	311.4											Yes
OL-STA-10016-SB	925905.75	1117874.38	344.2	314.2											Yes
OL-STA-10017-SB	926113.94	1118233.63	335.9	-	335.9										Yes
OL-STA-10018-SB	923784.00	1117844.25	359.3	327.8	-	-	327.8	-	318.3						Yes
OL-STA-10019-SB	923847.94	1118111.63	360.2	327.2	-	-	327.2	-	312.7						Yes
OL-STA-10020-SB	924383.25	1117703.25	358.4	308.4	-	-	-	-	308.4						Yes
OL-STA-10021-SB	924469.88	1117948.38	355.7	315.6											Yes
OL-STA-10022-SB	924560.00	1118138.63	351.7	306.2											Yes
OL-STA-10023-SB	925020.00	1117456.63	359.6	317.6	-	-	317.6								Yes
OL-STA-10024-SB	925237.19	1117848.63	356.2	296.2	-	-	296.2								Yes
OL-STA-10025-SB	925484.56	1117210.50	358.3	315.3											Yes
OL-STA-10026-SB	925701.69	1117575.38	354.9	307.9	-	-	307.9								Yes
OL-STA-10108	924813.38	1118335.75	342.0	295.0	-	-	295.0	-	280.0	218.0	-	202.0	193.0	173.0	Yes
OL-STA-20001-SB	922506.88	1118567.13	361.2	-	361.2	-	351.2	-	328.2						Yes
OL-STA-20002-VC	922578.06	1118665.50	351.4	336.9	351.4	-	336.9	-	323.4						Yes
OL-STA-20003-VC	922643.31	1118494.75	353.6	340.6	-	-	340.6	-	323.6						Yes
OL-STA-20004-SB	922720.75	1118298.63	358.3	344.3	-	-	-	-	344.3						Yes
OL-STA-20005-VC	922826.06	1118448.75	347.9	329.4	347.9	-	329.4	-	316.9						Yes
OL-STA-20006-VC	922874.81	1118261.13	352.3	330.3	-	-	330.3	-	321.8						Yes
OL-STA-20007-SB	922930.00	1118056.75	352.0	329.0	352.0	-	329.0	-	326.0						Yes
OL-STA-20008-VC	923030.81	1118223.50	348.2	329.2	-	-	329.2	-	319.7						Yes
OL-STA-20009-VC	922522.88	1118611.13	351.8	348.8	-	-	348.8	-	316.8						Yes
OL-STA-20010-VC	922580.88	1118426.25	360.4	-	360.4	-	350.4	-	325.4						Yes
OL-STA-20011-VC	922701.25	1118547.13	347.8	331.3	-	-	331.3	-	318.8						Yes
OL-STA-20012-VC	922766.00	1118395.00	351.7	328.6	351.6	-	328.6								Yes
OL-STA-20013-VC	922806.69	1118187.00	357.8	334.3	-	-	334.3	-	318.8						Yes
OL-STA-20014-VC	922919.31	1118321.88	349.5	329.0	349.5	-	329.0	-	317.5						Yes

Table 1

Geologic Data

Well/Boring ID	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)												
	X-Coordinate	Y-Coordinate	Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
OL-STA-20015-VC	922985.56	1118145.38	349.4	330.4	-	-	330.4	-	315.9						Yes
OL-STA-20016-SB	921701.50	1119321.00	358.7	-	358.7	-	353.7	-	338.7	318.7	-	299.7	-	285.9	Yes
OL-STA-20017-SB	922058.75	1119042.75	358.5	353.5	-	-	353.5	-	326.5	310.5	-	271.5	-	238.5	Yes
OL-STA-20018-SB	922402.94	1118675.13	357.2	-	357.2	-	355.2	322.2	313.2	297.2					Yes
OL-STA-20021-VC	922737.63	1118346.63	354.6	334.6	-	-	334.6	-	321.6						Yes
OL-STA-20022-VC	922836.25	1118232.13	354.4	331.4	-	-	331.4	-	324.4						Yes
OL-STA-20023-VC	922941.25	1118104.13	350.6	331.6	-	-	331.6	-	321.6						Yes
OL-STA-20034	922493.38	1118505.75	360.0	-	360.0	-	357.0								Yes
OL-STA-20036	922682.63	1118313.75	358.0	335.0	-	-	335.0								Yes
OL-STA-20038	922865.38	1118126.13	360.0	333.5	360.0	-	333.5	-	326.0						Yes
OL-STA-20042	922587.75	1118433.50	360.0	-	360.0	-	355.0	-	321.0						Yes
OL-STA-20052	923067.31	1117989.88	358.0	338.0	358.0	-	338.0	-	329.7						Yes
OL-STA-20053	922852.63	1118166.38	360.0	331.7	360.0	-	331.7								Yes
OL-STA-20054	923227.38	1117943.38	358.0	339.5	358.0	-	339.5								Yes
OL-STA-20056	923425.94	1117902.88	360.0	324.7											Yes
OL-STA-20058	922559.81	1118482.50	360.0	-	360.0	-	350.0								Yes
OL-STA-30001-SB	917782.19	1125199.13	359.7	356.7	-	-	356.7	-	-	-	327.7				Yes
OL-STA-30002-SB	918171.44	1125139.13	347.7	322.2	-	-	322.2								Yes
OL-STA-30003-SB	920793.31	1121617.75	357.9	329.9	-	-	329.9								Yes
OL-STA-30004-SB	920793.31	1121617.75	333.3	314.3	-	-	314.3								Yes
OL-STA-30005-VC	917258.88	1126431.63	359.0	-	359.0	-	351.0								Yes
OL-STA-30006-VC	917779.50	1126195.38	359.6	-	359.6	-	351.6								Yes
OL-STA-30007-VC	917661.88	1125697.00	360.7	-	360.7	-	352.7								Yes
OL-STA-30008-VC	917649.19	1125369.38	360.3	-	360.3	-	352.3								Yes
OL-STA-30009-VC	918016.00	1124700.13	360.9	350.1											Yes
OL-STA-30010-VC	918259.00	1124185.75	360.7	351.2	-	-	351.2								Yes
OL-STA-30011-VC	918787.69	1124050.25	361.0	347.8											Yes
OL-STA-30012-VC	919124.63	1123593.00	361.3	358.1	-	-	358.1								Yes
OL-STA-30013-VC	919404.06	1123299.00	361.2	358.0	-	-	358.0								Yes
OL-STA-30014-VC	919880.94	1122979.00	358.2	345.0											Yes
OL-STA-30015-VC	920087.44	1122553.25	358.9	345.9											Yes
OL-STA-30016-VC	920293.31	1122040.25	360.6	347.4											Yes
OL-STA-30017-VC	920560.00	1121166.63	360.9	347.9											Yes
OL-STA-30018-VC	920912.25	1120707.13	361.2	351.1	-	-	351.1								Yes
OL-STA-30019-VC	921110.31	1120319.75	359.0	345.8											Yes
OL-STA-30033	920460.31	1122344.63	339.0	319.0	-	-	319.0	-	294.0	282.0	-	264.0	234.0	228.0	Yes
OL-STA-40001-VC	915404.69	1125692.75	360.4	-	360.4	-	352.4								Yes
OL-STA-40002-SB	916046.31	1125795.75	359.9	-	359.9	-	349.9								Yes
OL-STA-40003-SB	916643.25	1126211.88	358.9	-	358.9	-	348.9								Yes
OL-STA-60016-SB	928826.06	1120194.88	359.1	-	359.1	-	353.1								Yes
OL-STA-60017-SB	928663.31	1120228.00	358.2	-	358.2	-	348.2								Yes
OL-STA-60018-SB	928426.81	1118122.25	360.2	-	360.2	-	350.2								Yes

Table 1

Geologic Data

	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)													
Well/Boring ID	**X-Coordinate**	**Y-Coordinate**	**Ground Elevation**	**Base of Fill**	**Top of Onondaga Lake Deposits**	**Top of Peat**	**Top of Marl**	**Top of Sand**	**Top of Silt/Clay**	**Top of Fine Sand/Silt**	**Top of Mixed Ninemile**	**Top of Sand/Gravel**	**Top of Till**	**Top of Bedrock**	**New Boring**
OL-STA-60019-SB	928296.25	1118229.25	359.2	-	359.2	-	344.2								Yes
OL-STA-70005-SB	926837.56	1116458.00	360.0	-	360.0	-	354.5								Yes
OL-STA-70006-SB	926791.00	1116572.50	359.2	-	359.2	-	355.2								Yes
OL-STA-70007-SB	927348.94	1116714.13	360.6	-	360.5	-	356.5								Yes
OL-STA-70008-SB	927388.13	1116879.00	360.5	-	360.5	-	354.5								Yes
OL-VC-10034	923085.69	1118059.75	347.9	330.4	-	-	330.4								Yes
OL-VC-10035	923155.88	1118249.13	347.0	328.0	-	-	328.0								Yes
OL-VC-10036	923262.88	1118201.63	347.4	327.9	-	-	327.9								Yes
OL-VC-10037	923321.19	1118398.63	344.3	326.3	344.3	-	326.3								Yes
OL-VC-10038	923415.06	1117947.63	361.9	343.0											Yes
OL-VC-10039	923575.38	1118088.38	351.0	333.0											Yes
OL-VC-10040	923587.31	1118351.88	349.7	329.9	349.7										Yes
OL-VC-10041	923642.13	1117900.75	361.3	341.6											Yes
OL-VC-10042	923697.13	1118505.00	338.7	318.9											Yes
OL-VC-10043	923946.69	1118496.63	338.6	319.0											Yes
OL-VC-10044	923964.81	1118365.50	349.8	330.8											Yes
OL-VC-10046	924008.63	1118047.25	359.6	340.4											Yes
OL-VC-10047	924146.38	1118465.25	339.7	319.9											Yes
OL-VC-10048	924158.38	1118168.75	360.0	340.3											Yes
OL-VC-10049	924167.38	1117989.75	360.7	341.1											Yes
OL-VC-10050	925985.13	1117816.38	346.6	327.2	346.6										Yes
OL-VC-10051	926006.88	1117854.75	346.2	326.4	346.2										Yes
OL-VC-10052	925963.81	1117852.63	346.6	326.8	346.6										Yes
OL-VC-10053	924313.00	1117722.00	361.0	341.8											Yes
OL-VC-10054	924273.19	1117823.75	361.2	342.4											Yes
OL-VC-10055	924347.88	1118435.38	341.4	322.5											Yes
OL-VC-10056	924315.81	1118096.50	359.6	340.4											Yes
OL-VC-10057	924432.38	1118236.25	353.9	334.4											Yes
OL-VC-10058	924442.81	1117838.00	358.3	338.5											Yes
OL-VC-10059	924590.38	1117726.63	359.8	340.5											Yes
OL-VC-10060	924676.31	1117861.38	359.9	341.9	359.9										Yes
OL-VC-10061	924717.31	1118238.75	350.7	331.0											Yes
OL-VC-10062	924727.13	1117993.75	358.0	338.8											Yes
OL-VC-10063	924795.38	1118434.75	338.0	318.2											Yes
OL-VC-10064	924771.69	1117684.25	359.8	340.0											Yes
OL-VC-10065	924792.19	1117697.13	360.4	340.6											Yes
OL-VC-10066	924773.38	1117659.00	360.8	341.0											Yes
OL-VC-10067	924750.19	1117697.50	360.9	341.8											Yes
OL-VC-10068	924860.69	1117921.75	356.9	337.3											Yes
OL-VC-10069	924950.88	1117812.25	357.7	337.9	357.7										Yes
OL-VC-10070	924919.88	1117455.25	360.3	341.2											Yes
OL-VC-10071	925183.69	1118398.88	335.2	315.4	335.2										Yes

Table 1

Geologic Data

Well/Boring ID	State Plane (NAD 83 Feet) X-Coordinate	Y-Coordinate	Elevation (feet, NAVD 88) Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
OL-VC-10072	925154.13	1118217.63	344.1	324.3											Yes
OL-VC-10073	925124.38	1118025.13	353.2	333.4											Yes
OL-VC-10074	925137.13	1117740.63	356.9	337.1											Yes
OL-VC-10075	925124.13	1117274.00	360.3	341.4											Yes
OL-VC-10076	925240.31	1117526.38	357.8	338.0											Yes
OL-VC-10077	925345.50	1118080.00	349.5	331.6											Yes
OL-VC-10078	925415.88	1117846.00	354.2	334.4	354.2										Yes
OL-VC-10079	925420.69	1117654.25	355.9	337.0											Yes
OL-VC-10080	925396.31	1116980.63	360.6	341.3											Yes
OL-VC-10081	925496.00	1117441.00	357.6	337.8											Yes
OL-VC-10082	925614.88	1118354.25	333.6	313.8	333.6										Yes
OL-VC-10083	925633.81	1118077.38	344.1	324.3											Yes
OL-VC-10084	925660.69	1117489.50	355.4	335.6											Yes
OL-VC-10085	925641.88	1117135.00	358.5	338.7											Yes
OL-VC-10086	925660.63	1116945.75	359.4	341.4											Yes
OL-VC-10087	925592.63	1116769.13	360.4	341.4											Yes
OL-VC-10088	925722.13	1117764.50	353.1	333.3											Yes
OL-VC-10089	925742.88	1117288.38	356.6	336.9											Yes
OL-VC-10090	925905.19	1118132.25	338.8	319.0	338.8										Yes
OL-VC-10091	925945.19	1117683.13	352.9	333.3											Yes
OL-VC-10092	925874.69	1117470.75	354.6	335.6											Yes
OL-VC-10093	925873.50	1116983.50	358.5	338.7											Yes
OL-VC-10094	925868.38	1116632.25	360.4	340.6											Yes
OL-VC-10095	925972.69	1118333.88	334.1	317.6	334.1										Yes
OL-VC-10096	925984.69	1117842.38	347.0	327.2	347.0										Yes
OL-VC-10097	926020.38	1117273.38	355.2	336.8											Yes
OL-VC-10098	926041.69	1117287.00	354.9	335.1											Yes
OL-VC-10099	926020.19	1117250.50	355.3	335.5											Yes
OL-VC-10100	925996.81	1117287.25	355.1	336.0											Yes
OL-VC-10101	926082.63	1117979.00	341.4	325.9	341.4										Yes
OL-VC-10102	926067.63	1117485.00	353.9	336.7											Yes
OL-VC-10103	926131.81	1117084.25	354.9	336.9											Yes
OL-VC-10104	926107.63	1116687.13	359.1	346.0											Yes
OL-VC-10105	926187.19	1116859.38	356.8	340.3											Yes
OL-VC-10106	926169.88	1116498.38	359.8	353.3	359.8										Yes
OL-VC-10107	926342.69	1116313.75	360.7	-	360.7										Yes
OL-VC-20067	921495.88	1120067.38	334.9	-	334.9										Yes
OL-VC-20068	921526.44	1119832.38	349.6	-	-	-	349.6								Yes
OL-VC-20069	921376.75	1119611.75	360.9	-	360.9	-	357.6	350.9	345.4						Yes
OL-VC-20070	921495.50	1119473.13	361.3	-	361.3	-	357.3	353.8	349.3						Yes
OL-VC-20072	922398.50	1118947.38	357.5	-	357.5	-	357.1								Yes
OL-VC-20073	922653.31	1119022.75	339.6	-	339.6	-	328.8								Yes

Table 1

Geologic Data

	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)												
Well/Boring ID	X-Coordinate	Y-Coordinate	Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
OL-VC-20074	922807.69	1118876.25	338.9	-	338.9	-	328.9								Yes
OL-VC-20075	922723.13	1118763.63	342.7	335.7	342.7	-	335.7								Yes
OL-VC-20076	923011.63	1118721.38	335.3	-	335.3	-	326.3								Yes
OL-VC-20077	922898.38	1118596.50	341.2	-	341.2	-	330.9								Yes
OL-VC-20078	923175.88	1118583.75	335.9	323.9	335.9	-	323.9								Yes
OL-VC-20079	923077.19	1118450.38	342.7	327.7	342.7	-	327.7								Yes
OL-VC-20080	921606.75	1119415.13	360.5	360.3	-	-	360.3	347.2	344.0						Yes
OL-VC-20081	921665.06	1119359.38	360.5	-	-	-	360.5	346.5							Yes
OL-VC-20082	921635.00	1119387.00	360.5	-	-	-	360.5	347.5	343.5						Yes
OL-VC-30034	918520.31	1125003.00	336.7	326.7											Yes
OL-VC-30035	918722.75	1124646.00	335.6	325.6											Yes
OL-VC-30036	919470.31	1123677.25	337.5	328.3	-	-	328.3								Yes
OL-VC-30037	919843.75	1123334.75	334.3	324.3	334.3										Yes
OL-VC-30038	920969.44	1121027.13	342.7	332.7											Yes
OL-VC-30039	918519.75	1124497.88	344.5	324.5											Yes
OL-VC-30040	919388.31	1123561.00	346.3	329.8	-	-	329.8								Yes
OL-VC-30041	918100.88	1124394.50	359.9	349.9											Yes
OL-VC-30042	918392.00	1124361.00	353.8	334.0											Yes
OL-VC-30043	918489.38	1124086.75	360.5	351.5	-	-	351.5								Yes
OL-VC-40016	914737.06	1127102.38	334.3	-	334.3	-	324.8								Yes
OL-VC-40017	914439.88	1126826.88	339.2	-	339.2										Yes
OL-VC-40018	914808.69	1126806.63	338.6	-	338.6	-	324.2								Yes
OL-VC-40019	915144.13	1126800.50	339.0	-	339.0										Yes
OL-VC-40021	915965.00	1127043.25	334.2	-	334.2										Yes
OL-VC-40022	916606.38	1126896.50	341.8	-	341.8										Yes
OL-VC-40023	916422.63	1127090.25	335.9	-	335.9	-	329.4								Yes
OL-VC-40024	916606.38	1126926.25	340.7	-	340.7	-	334.1								Yes
OL-VC-40025	914560.06	1126369.00	349.0	-	349.0	-	330.0								Yes
OL-VC-40026	914761.63	1126562.63	346.7	-	346.7										Yes
OL-VC-40027	915097.88	1126610.38	349.2	-	349.2										Yes
OL-VC-40028	915545.94	1126632.13	349.1	-	349.1										Yes
OL-VC-40029	915807.56	1126698.13	345.5	-	345.5										Yes
OL-VC-40030	916186.06	1126360.50	353.3	-	353.3	-	343.8								Yes
OL-VC-40031	916265.94	1126674.75	348.9	-	348.9	-	345.6								Yes
OL-VC-40032	916693.00	1126701.75	345.8	339.8	345.8	-	339.8								Yes
OL-VC-40033	914154.81	1126582.75	360.1	-	360.1	-	352.1	-	-	-	345.1				Yes
OL-VC-40034	914342.19	1126271.88	360.2	-	360.2	-	360.2								Yes
OL-VC-40035	914699.00	1125978.25	360.3	-	360.3	-	356.3								Yes
OL-VC-40036	914971.56	1126012.63	357.6	-	357.6										Yes
OL-VC-40038	915146.13	1125835.88	361.2	-	361.2	-	351.2								Yes
OL-VC-40039	915408.88	1126343.50	360.2	-	360.2										Yes
OL-VC-40040	915413.81	1125964.13	359.5	-	359.5										Yes

Table 1

Geologic Data

	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)												
Well/Boring ID	X-Coordinate	Y-Coordinate	Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
OL-VC-40041	915733.75	1125806.38	360.3	-	360.3	-	350.3								Yes
OL-VC-40042	916397.19	1126190.75	357.9	-	357.9										Yes
OL-VC-40133	915583.25	1125637.38	361.0	-	361.0	-	360.5								Yes
OL-VC-60054	927585.19	1120967.63	338.7	-	338.7										Yes
OL-VC-60055	927405.56	1120409.63	334.3	-	334.3										Yes
OL-VC-60056	927263.63	1119788.38	334.3	-	334.3										Yes
OL-VC-60057	926948.31	1118991.75	333.6	-	333.6										Yes
OL-VC-60058	926592.25	1118416.63	361.1	-	361.1										Yes
OL-VC-60059	927880.63	1121126.25	354.7	-	354.7	-	344.7								Yes
OL-VC-60060	928052.50	1120588.88	351.9	-	351.9										Yes
OL-VC-60061	928094.19	1120000.75	353.3	-	353.3										Yes
OL-VC-60062	927966.44	1119550.25	353.2	-	353.2										Yes
OL-VC-60063	927787.81	1119021.50	352.2	-	352.2										Yes
OL-VC-60064	927634.13	1118434.38	351.8	-	351.8										Yes
OL-VC-60065	927153.81	1118069.00	348.8	-	348.8										Yes
OL-VC-60066	928366.63	1121149.75	358.4	-	358.4	-	348.4								Yes
OL-VC-60067	928358.56	1120674.13	357.2	-	357.2	-	349.2	-	344.2						Yes
OL-VC-60068	928330.19	1119471.25	358.6	-	358.6										Yes
OL-VC-60069	928237.75	1118853.38	359.3	-	359.3										Yes
OL-VC-60070	927621.13	1117647.50	358.4	-	358.4										Yes
OL-VC-70016	926210.00	1118264.25	335.6	-	335.6										Yes
OL-VC-70017	926250.81	1117925.88	341.9	325.4	341.9										Yes
OL-VC-70018	926309.19	1117598.13	346.0	336.0	346.0										Yes
OL-VC-70019	926562.19	1117503.50	350.5	-	350.5										Yes
OL-VC-70020	926516.63	1117125.75	352.4	-	352.4										Yes
OL-VC-70021	926381.69	1117330.63	350.3	335.3	350.3										Yes
OL-VC-70021A	926379.50	1117330.00	350.3	333.8	350.3										Yes
OL-VC-70022	926817.13	1117172.13	353.1	-	353.1	-	336.6								Yes
OL-VC-70023	926348.63	1116853.63	356.5	343.5	356.5										Yes
OL-VC-70024	926641.19	1116857.75	356.0	-	356.0										Yes
OL-VC-70025	926720.13	1116331.38	360.7	-	360.7	-	356.4								Yes
OL-VC-70026	926928.13	1116387.38	360.4	-	360.4	-	358.4								Yes
OL-VC-70027	926946.38	1116245.75	361.2	-	361.2	-	359.2								Yes
OL-VC-70028	927228.88	1116367.75	361.3	358.8	-	-	358.8								Yes
OL-VC-70029	927423.19	1116559.88	361.0	-	361.0	-	358.5								Yes
OL-VC-70030	927657.88	1116809.25	360.4	-	360.4	-	358.9								Yes
OL-VC-70031	926518.00	1117865.50	341.7	-	341.7										Yes
OL-VC-70032	926402.50	1117342.13	349.9	339.9	349.9										Yes
OL-VC-70033	926380.31	1117304.75	350.8	339.3	350.8										Yes
OL-VC-70034	926358.63	1117342.63	350.3	337.1	350.3										Yes
OL-VC-80028	923386.50	1118619.25	328.7	319.7	328.7										Yes
OL-VC-80029	924083.94	1118587.00	330.1	320.1	330.1										Yes

Table 1

Geologic Data

Well/Boring ID	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)													
	X-Coordinate	Y-Coordinate	Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
OL-VC-80030	924726.00	1118544.75	331.2	321.2	331.2										Yes
OL-VC-80031	925320.50	1118458.25	328.7	318.7	328.7										Yes
OL-VC-80032	926062.69	1118423.13	295.6	285.6	295.6										Yes
OL-VC-80033	923782.94	1118853.25	317.3	297.6	317.3										Yes
OL-VC-80034	924390.56	1118808.88	317.3	301.3	317.3										Yes
OL-VC-80035	925064.00	1118788.25	320.0	310.0	320.0										Yes
OL-VC-80036	925582.25	1118777.25	321.6	311.6	321.6										Yes
OL-VC-80050	924201.88	1119232.38	308.0	-	308.0	-	297.0								Yes
OL-VC-80051	925420.13	1119151.00	314.4	cc	314.4										Yes
PP-1	917692.50	1119511.75	375.0	371.0	-	-	-	-	-	371.0	-	359.5	351.5		
PSA-SB-01	921189.50	1116996.38	400.0	391.5	-	-	-	-	-	-	-	-	391.5	361.0	Yes
PSA-SB-02	921141.50	1117057.88	398.6	-	-	-	-	-	-	-	-	-	398.6	357.0	Yes
PSA-SB-03	921152.88	1117112.25	397.8	394.1	-	-	-	-	-	-	-	-	394.1	360.4	Yes
PSA-SB-04	921249.50	1117064.38	398.9	397.0	-	-	-	-	-	-	-	-	397.0	352.9	Yes
PSA-SB-05	921099.38	1117122.63	397.8	387.5	-	-	-	-	-	-	-	-	387.5	362.5	Yes
PSA-SB-06	921096.81	1117134.63	410.0	406.0	-	-	-	-	-	-	-	-	406.0	370.5	Yes
SB915-MW-34S	906285.69	1118638.25	435.0	378.0											Yes
SB915-MW-35S	906267.31	1117371.88	435.0	417.0											Yes
SB915-MW-36D	907405.63	1118695.63	449.3	387.5	-	-	-	-	387.5	352.3	-	-	336.3		Yes
SB915-MW-40S	914447.94	1122219.63	431.9	377.9											Yes
SB915-MW-42D	913116.00	1121522.88	431.0	361.2	-	-	-	-	361.2	345.0	-	318.0	299.0		Yes
SB915-MW-43S	912821.81	1122525.50	432.0	378.0											Yes
SB915-MW-50S	910255.50	1122741.00	431.6	383.6											Yes
SB915-MW-51S	910496.50	1122149.38	433.8	385.8											Yes
SB915-MW-53D	909244.75	1123033.75	431.1	359.5	-	-	-	-	-	-	359.5	332.0	309.0		Yes
SB915-MWB-01D	909715.81	1121656.00	377.2	375.2	-	-	-	-	-	-	375.2	369.2			Yes
SB915-PZ-01D	907968.88	1120503.63	429.1	369.1											Yes
SB915-PZ-02D	906338.38	1120814.00	430.1	363.6	-	-	-	-	-	-	363.6	356.6			Yes
SB915-PZ-02N	906342.31	1120817.00	430.1	364.6	-	-	-	-	-	-	364.6	356.6			Yes
SB915-PZ-03	910629.56	1120205.75	447.3	375.5											Yes
SB915-PZ-04	910090.50	1118820.00	447.6	385.6	-	-	-	-	-	385.6					Yes
SB915-PZ-05	908973.88	1120047.38	453.6	393.6	-	-	-	-	-	-	393.6				Yes
SB915-PZ-07D	910103.19	1120055.75	445.3	378.8											Yes
SB915-PZ-07N	910107.13	1120059.75	445.3	378.8	-	-	-	-	-	-	378.8				Yes
SB915-SB-01	904888.19	1118937.88	401.0	400.7	-	-	-	-	400.7	396.5	-	385.6			Yes
SB915-SB-03	904858.56	1120137.75	399.0	398.7	-	-	-	-	-	-	398.7	376.0			Yes
SB915-SB-05	905664.56	1121215.38	397.0	-	-	-	-	-	-	-	397.0	373.0			Yes
SB915-SB-07	907408.25	1121533.50	394.0	-	-	-	-	-	-	-	394.0	368.0			Yes
SB915-SB-09	908618.75	1121160.13	391.0	-	-	-	-	-	-	-	391.0	363.0			Yes
SB915-SB-11	909626.75	1120862.00	385.0	381.0	-	-	-	-	-	-	381.0				Yes
SB915-SB-12	909566.31	1120620.75	441.0	377.4	-	-	-	-	-	-	377.4				Yes
SB915-SB-13	910314.00	1120653.88	378.0	-	-	-	-	-	-	-	378.0				Yes

Table 1

Geologic Data

Well/Boring ID	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)												
	X-Coordinate	Y-Coordinate	Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
SB915-SB-14	910233.44	1120468.38	424.0	370.8	-	-	-	-	-	-	370.8				Yes
SB915-SB-15	910666.44	1120531.50	378.0	367.4	-	-	-	-	-	-	367.4	341.0			Yes
SB915-SB-16	910622.44	1120210.63	447.0	375.2	-	-	-	-	-	-	375.2				Yes
SB915-SB-18	911120.00	1119716.75	423.0	368.8	-	-	-	-	368.8						Yes
SB915-SB-19	911392.50	1118952.63	390.0	-	-	-	-	-	390.0	384.0					Yes
SB915-SB-20	911311.00	1118923.00	434.0	388.8	-	-	-	-	-	388.8					Yes
SB915-SB-21	907476.94	1119590.00	435.0	392.0	-	-	-	-	-	-	392.0				Yes
SB915-SB-22	906652.38	1119441.38	434.0	368.2	-	-	-	-	-	-	-	368.2			Yes
SB915-SB-30	907643.00	1119093.75	435.0	370.0	-	-	-	-	370.0	365.0					Yes
SB915-SB-31	907793.25	1118255.63	435.0	377.0	-	-	-	-	-	377.0					Yes
SB915-SB-32	906496.69	1118722.13	435.0	373.0	-	-	-	-	-	373.0					Yes
SB915-SB-33	906765.44	1117678.50	435.0	376.5	-	-	-	-	-	376.5					Yes
SB915-SB-34	905603.31	1118564.00	435.0	373.5	-	-	-	-	-	373.5					Yes
SB915-SB-35	905753.50	1117267.50	435.0	374.5	-	-	-	-	-	374.5					Yes
SB915-SB-36	907401.50	1118699.50	449.0	387.2	-	-	-	-	387.2	352.0	-	-	336.0		Yes
SB915-SB-37	906799.06	1118447.88	448.0	388.5	-	-	-	-	388.5	353.0	-	-	345.0	299.0	Yes
SB915-SB-40	914451.94	1122223.00	431.5	365.5	-	-	-	-	365.5	357.5	-	327.5	289.5	271.5	Yes
SB915-SB-41	913873.13	1122409.25	434.6	367.8	-	-	-	-	367.8	357.6					Yes
SB915-SB-42	913101.44	1121518.75	430.8	361.0	-	-	-	-	361.0	344.8	-	317.8	299.0		Yes
SB915-SB-43	912809.13	1122513.38	435.0	365.0	-	-	-	-	-	-	365.0				Yes
SB915-SB-44A	911810.25	1122632.25	431.4	364.1	-	-	-	-	-	-	364.1				Yes
SB915-SB-44B	911635.06	1122519.88	372.0	368.0	-	-	-	-	-	-	368.0				Yes
SB915-SB-45A	912535.81	1121498.63	431.2	361.2	-	-	-	-	361.2	348.2					Yes
SB915-SB-45B	912208.63	1121611.13	371.7	369.2	-	-	-	-	369.2	-	353.7				Yes
SB915-SB-46B	913451.63	1121285.38	371.1	369.1	-	-	-	-	369.1	352.6					Yes
SB915-SB-48A	914352.38	1122571.13	431.0	367.1	-	-	-	-	367.1	361.0					Yes
SB915-SB-49A	912380.88	1122864.50	431.2	363.7	-	-	-	-	-	-	363.7				Yes
SB915-SB-50	910257.31	1122732.75	430.0	357.0	-	-	-	-	-	-	357.0	336.0	264.0	246.0	Yes
SB915-SB-51	910503.50	1122137.38	434.0	374.0	-	-	-	-	-	-	374.0				Yes
SB915-SB-52	909727.44	1123110.38	435.0	365.0	-	-	-	-	-	-	365.0				Yes
SB915-SB-53	909261.69	1123026.50	431.0	359.5	-	-	-	-	-	-	359.5	333.0	309.0		Yes
SB915-SB-54A	911008.69	1122771.13	429.1	365.0	-	-	-	-	-	-	365.0	355.0			Yes
SB915-SB-54B	911132.94	1122921.75	371.6	364.6	-	-	-	-	-	-	364.6				Yes
SB915-SB-55A	911649.00	1121769.88	430.8	365.3	-	-	-	-	-	-	365.3				Yes
SB915-SB-56A	909706.75	1122468.00	429.8	364.8	-	-	-	-	-	-	364.8				Yes
SB915-SB-57A	908994.13	1123360.75	430.5	380.3	-	-	-	-	-	-	380.3				Yes
SB915-SB-58A	910166.38	1123205.38	429.3	365.8	-	-	-	-	-	-	365.8				Yes
SB915-SB-60	909456.31	1122417.25	374.5	368.5	-	-	-	-	-	-	368.5				Yes
SB915-SB-61	909329.44	1122461.50	374.6	362.6	-	-	-	-	-	-	362.6				Yes
SB915-SB-62	909557.38	1122355.63	373.5	365.5	-	-	-	-	-	-	365.5				Yes
SB915-SB-63	909627.44	1122299.38	373.8	369.8	-	-	-	-	-	-	369.8				Yes
SB915-SB-64	909750.31	1122188.63	372.9	370.9	-	-	-	-	-	-	370.9				Yes

Table 1

Geologic Data

Well/Boring ID	State Plane (NAD 83 Feet) X-Coordinate	Y-Coordinate	Elevation (feet, NAVD 88) Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
SB915-SB-65	909796.81	1122143.75	372.6	364.6	-	-	-	-	-	-	364.6				Yes
SB915-SB-67	910017.44	1121928.38	374.9	371.9	-	-	-	-	-	-	371.9				Yes
SB915-SB-68	910192.31	1121863.63	384.6	380.1	-	-	-	-	-	-	380.1	350.6			Yes
SB915-SB-70	910108.94	1121880.38	378.9	375.9	-	-	-	-	-	-	375.9				Yes
SB915-TH-07A	909835.13	1117721.75	446.0	-	-	-	-	-	-	446.0	-	-	444.0	430.0	
SB915-TH-08A	910894.13	1117743.75	436.0	-	-	-	-	-	-	436.0	-	-	434.0	411.0	
SB915-WB-01L	902386.06	1116879.88	403.9	-	-	-	-	-	403.9	401.9	-	342.9	341.9		Yes
SB915-WB-02L	904802.69	1119281.38	400.7	398.7	-	-	-	-	-	398.7	-	390.7	295.7	292.7	Yes
SB915-WB-03L	904593.56	1121509.38	401.5	395.5	-	-	-	-	-	-	395.5	367.0	326.5		Yes
SB915-WB-04L	907823.00	1121395.25	396.4	-	-	-	-	-	-	-	396.4	328.4			Yes
SB915-WB-05R	910722.25	1121709.00	386.0	374.0	-	-	-	-	-	-	374.0	354.0	264.5	251.5	Yes
SB915-WB-07L	912305.50	1121355.75	377.5	370.5	-	-	-	-	370.5	357.5	-	337.5	310.5	274.5	
SB915-WB-09U	914998.38	1121686.75	375.4	373.4	-	-	-	-	373.4	365.4					
SB915-WB-10U	913725.88	1121314.63	376.5	374.0	-	-	-	-	-	374.0					
SB915-WB-11U	912244.25	1121314.63	377.5	374.5	-	-	-	-	374.5	356.5					
SB915-WB-12U	911543.75	1120904.25	375.8	373.8	-	-	-	-	-	-	373.8				Yes
SB915-WB-15A	905566.25	1116671.75	429.0	392.0	-	-	-	-	-	-	-	-	392.0		Yes
SP-M-201	921582.00	1119317.00	371.0	344.0	-	-	-	-	344.0	340.0	-	303.0	292.0	277.0	Yes
SP-M-202	922634.00	1118420.00	371.0	351.0	-	-	351.0	326.0	322.0	305.5	-	276.0	259.0	256.0	Yes
SP-R-01	920993.31	1117207.00	404.3	366.8	-	-	-	-	-	366.8	-	-	352.3		Yes
SP-R-02	920897.63	1117297.25	403.3	366.2	-	-	-	-	-	366.2					Yes
SP-R-03	920693.88	1117488.50	402.3	362.5	-	-	-	-	-	362.5	-	-	342.5	329.5	Yes
SP-R-04	920639.69	1117552.50	399.1	365.1	-	365.1	-	-	-	364.1	-	-	327.1		Yes
SP-R-05	920570.19	1117630.25	398.1	362.1	-	362.1	-	-	-	358.1	-	-	326.6	326.3	Yes
SP-R-06	920540.81	1117699.75	398.4	362.6	-	362.6	-	-	-	360.4	-	-	334.4	322.4	Yes
SP-R-07	920503.88	1117802.00	397.8	367.8	-	-	-	-	-	367.8	-	-	327.8	326.3	Yes
SP-R-08	920460.81	1117962.25	397.7	359.7	-	-	-	-	-	359.7	-	-	326.7	322.7	Yes
SP-R-09	921027.00	1118498.25	395.1	354.6	-	-	-	-	354.6	352.6	-	-	314.6		Yes
SP-R-10	921284.00	1118398.00	396.1	364.1	-	364.1	-	-	-	362.1	-	-	316.1	303.1	Yes
SP-R-11	921504.13	1117919.88	398.0	362.0	-	362.0	-	-	-	359.5	-	-	314.0		Yes
SP-SB-02	921735.63	1117316.13	398.4	368.4	-	368.4	-	-	365.9						Yes
SP-SB-04	921478.88	1117502.25	387.7	365.7	-	-	-	-	-	365.7	-	-	360.5		Yes
SP-SB-05	921355.19	1117590.00	386.5	374.5	-	-	-	-	-	374.5	-	-	361.8		Yes
SP-SB-06	921246.50	1117679.00	382.6	370.6	-	-	-	-	370.6	368.6	-	-	363.6		Yes
SP-SB-08	921003.63	1117880.50	383.3	368.3	-	368.3	-	-	-	367.3					Yes
SP-SB-09	920907.00	1117961.75	383.4	364.4	-	364.4	-	-	363.9						Yes
SP-SB-10	920794.13	1118061.63	383.3	365.3	-	-	-	-	365.3						Yes
SP-SB-11	920705.19	1118163.00	380.9	365.0	-	365.0	-	-	363.9	358.9					Yes
SP-SB-12	920512.88	1118386.38	380.5	359.0	-	359.0	-	-	357.5	357.0					Yes
SP-SB-13	920589.50	1118249.75	381.8	366.0	-	366.0	-	-	364.8	361.8					Yes
SP-SB-14	920450.31	1118521.25	379.5	364.5	-	364.5	-	-	362.5	360.5					Yes
SP-SB-15	920480.50	1118671.88	381.7	358.2	-	358.2	-	-	355.7	352.7					Yes

Table 1

Geologic Data

	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)													
Well/Boring ID	X-Coordinate	Y-Coordinate	Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
SP-SB-16	920520.69	1118819.75	373.7	361.7	-	361.7	-	-	359.9	351.2					Yes
SP-SB-17	920625.31	1118897.75	372.8	361.8	-	-	-	-	361.8	356.8					Yes
SP-SB-18	921001.19	1119121.00	373.0	360.0	-	-	360.0	-	350.0						Yes
SP-SB-19	921135.88	1119191.50	371.4	358.4	-	-	358.4	-	349.9						Yes
SP-SP-02A	920685.75	1117972.50	381.4	369.4	-	-	-	-	-	369.4	-	-	358.4		
SP-SP-03C	921960.94	1117884.50	388.4	360.6	-	360.6	360.4	-	351.4	339.4	-	320.4	314.4		
SP-SP-04C	921304.25	1118382.38	404.1	359.1	-	359.1	358.1	-	352.1	348.1	-	319.1	-	314.1	
SP-SP-05C	920819.94	1119132.50	373.6	361.8	-	361.8	359.6	-	-	355.6	-	323.6	309.6	307.6	
SP-SP-06C	922135.81	1118424.13	392.1	362.1	-	362.1	360.6	348.1	332.1	311.1	-	291.1	287.1		
SP-SP-07C	921813.56	1118748.13	391.7	361.7	-	361.7	361.2	347.7	338.7	319.7	-	303.7	291.7		
SP-SP-08C	921382.19	1119077.13	395.4	360.4	-	360.4	358.4	-	348.4	345.4	-	320.4	-	306.4	
SP-SP-09C	920226.25	1118519.13	375.5	363.5	-	-	-	363.5	339.5	-	-	334.5	-	324.5	
SP-SP-10BR	920507.31	1118401.25	382.0	365.5	-	-	-	-	365.5	358.0	-	330.4	328.0	324.6	Yes
SP-SP-11BR	921547.75	1117545.38	401.3	363.3	-	363.3	-	-	-	362.6	-	-	358.3	331.3	Yes
SP-SP-12BR	922636.88	1116944.13	396.8	364.8	-	364.8	362.7	-	-	359.3	-	-	-	355.8	Yes
SP-TB-01	921348.19	1117589.88	387.1	364.6	-	-	-	-	-	-	-	-	364.6		
SP-TB-02	921406.13	1117649.00	401.7	368.0	-	-	-	-	-	368.0					
SP-TB-03	921215.31	1117796.38	402.9	368.4	-	-	-	-	-	368.4	-	-	360.1		
SP-TB-04	921166.19	1117746.50	383.1	365.6	-	-	-	-	-	-	-	-	365.6	352.1	
SP-TB-05	920921.19	1117951.00	383.7	367.7	-	-	-	-	-	367.7	-	343.7			
SP-TB-07	920504.19	1118475.25	380.8	366.3	-	-	-	-	366.3	360.8	-	-	-	328.8	
SP-TB-09	920637.13	1118853.00	386.7	361.2	-	361.2	-	-	-	359.7					
SP-TB-10	920761.69	1118983.38	390.2	362.3	-	362.3	360.5	-	356.7	353.4					
SP-TB-11	921138.63	1119156.63	395.5	359.7	-	359.7	358.9	-	350.7						
SP-TB-12	920903.69	1119094.13	391.7	360.4	-	360.4	357.0	-	-	352.7					
SP-TB-13	921413.69	1119050.75	396.4	362.4	-	362.4	361.6	-	352.2						
SP-TB-14	921436.50	1119008.13	396.9	362.8	-	362.8	358.6	-	349.9	347.9					
SP-TB-15	921446.50	1119064.25	390.4	362.4	-	362.4	360.9	-	-	347.8					
SS-1	916424.81	1119942.88	375.0	370.0	-	-	-	-	370.0	363.0	-	-	357.0	341.0	
SY-2	929028.19	1120833.13	371.0	370.0	-	-	370.0	-	355.0	335.0	-	320.0			Yes
TH-301	928083.31	1116143.25	374.3	354.8	-	-	354.8								
TH-302	928103.50	1116238.75	373.8	359.8	-	-	359.8								
TH-304	928576.81	1117190.13	371.9	357.9	-	-	357.9								
TH-305	928532.50	1116939.13	371.2	357.2	-	-	357.2	-	333.2	241.2					
TH-307	928636.50	1116039.75	373.9	359.9	-	-	359.9								
TH-308	928814.19	1116802.38	374.8	360.8	-	-	360.8								
TH-311	929608.69	1116951.38	373.7	365.7	-	-	365.7								
TH-312	927970.31	1116615.38	371.9	357.9	-	-	357.9								
TH-313	928392.31	1116999.50	370.5	356.5	-	-	356.5								
TH-314	928625.50	1117680.25	370.1	359.6	-	-	359.6								
TH-315	928939.88	1116980.75	373.6	360.1	-	-	360.1								
TH-316	928065.50	1116450.13	373.1	357.1	-	-	357.1								

Table 1

Geologic Data

	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)												
Well/Boring ID	X-Coordinate	Y-Coordinate	Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
TH-318	928218.38	1117040.25	371.1	357.6	-	-	357.6								
TH-325	928954.50	1117161.25	372.9	355.9	-	-	355.9								
TH-328	928920.88	1116287.25	374.8	360.3	-	-	360.3								
TH-330	927990.13	1117000.88	375.7	366.7	-	-	366.7								
TH-332	927477.19	1116133.88	373.4	341.9											Yes
TH-333	927562.38	1116283.63	377.4	347.4	-	-	347.4								
TH-334	927639.81	1116425.13	379.0	359.0	-	-	359.0								
TH-337	927820.69	1115957.25	372.2	356.7	-	-	356.7								
USGS-Ley Creek	929592.50	1120548.38	365.0	358.0	-	-	358.0	-	338.0	320.0	-	291.0	-	254.0	Yes
USGS-Midway	911531.69	1129747.88	368.0	358.0	-	-	358.0	-	349.0	337.0	-	319.0	314.0	305.5	Yes
USGS-Outlet	910838.81	1135879.88	367.0	363.0	-	-	363.0	-	-	319.0	-	269.0	242.0	207.0	Yes
USGS-Parkway	926046.00	1123014.00	346.0	-	-	-	346.0	-	316.0	288.0	-	-	272.0	258.0	Yes
USGS-Saddle	918641.31	1127438.75	307.0	-	307.0	-	288.0	-	283.0	203.0					Yes
USGS-Spencer Street	931936.38	1114208.25	380.0	365.0	-	-	-	-	-	365.0	-	90.0	25.0	9.0	Yes
USGS-West Trail	914123.81	1127207.38	340.0	-	-	-	340.0	-	313.0	275.0	-	-	260.5	237.0	Yes
WA-HR-01	920613.50	1116657.63	403.5	397.5	-	-	-	-	-	397.5					Yes
WA-MC-B01	921918.75	1117628.63	400.0	374.4	-	-	-	-	-	374.4	-	337.5	335.5		Yes
WA-MC-B02	921983.00	1117510.88	400.0	371.3	-	371.3	-	-	-	371.0	-	341.5	339.5		Yes
WA-MC-B03	922031.63	1117424.75	400.0	374.5	-	374.5	-	-	-	371.5					Yes
WA-MC-B04A	922063.50	1117592.38	400.0	373.0	-	373.0	-	-	-	369.0	-	335.0	333.9		Yes
WA-MC-B05	922099.06	1117456.00	400.0	370.0	-	370.0	-	368.5	364.0	358.0	-	338.0	336.1		Yes
WA-MC-B06	921995.94	1117672.13	400.0	372.0	-	372.0	-	-	-	366.0	-	330.4	329.0		Yes
WA-MC-B07	922039.13	1117557.88	400.0	370.5	-	370.5	-	368.0	364.0	358.0					Yes
WA-MC-B08	922029.44	1117540.75	400.0	370.0	-	370.0	-	-	-	367.5					Yes
WA-MC-B09	922011.63	1117531.38	400.0	368.1	-	368.1	-	-	-	367.5					Yes
WA-MC-B10	921995.81	1117522.13	400.0	371.9	-	371.9	-	369.5	364.0						Yes
WA-MC-B11	922028.81	1117574.75	400.0	371.5	-	371.5	-	368.0	364.0						Yes
WA-MC-B12	922048.38	1117541.13	400.0	371.9	-	371.9	-	-	-	368.0					Yes
WA-MC-B13	922058.81	1117522.25	400.0	371.8	-	371.8	-	369.1	364.0						Yes
WA-MC-B14	922070.19	1117503.50	400.0	374.0	-	374.0	-	369.0	364.0						Yes
WA-MW-01	922772.50	1117767.75	389.3	363.3	-	-	363.3	-	354.3	344.3	-	-	299.3		Yes
WA-MW-02	923202.50	1117776.88	372.6	348.6	-	-	348.6	-	336.6	324.6	-	-	280.6		Yes
WA-MW-03	922742.81	1118174.38	372.8	337.8	-	-	337.8	-	326.8	293.8	-	-	281.8		Yes
WA-MW-04	912653.81	1120129.88	371.9	351.9	-	-	351.9								Yes
WA-MW-05	923202.50	1117776.88	367.1	345.1	-	-	345.1	-	336.1						Yes
WA-MW-100BR	921147.63	1119631.88	371.4	355.4	-	-	355.4	-	-	346.0	-	312.4	301.6	297.1	Yes
WA-OW-01D	921869.94	1119049.25	371.8	357.8	-	-	357.8	347.8	336.8	326.8	-	297.8	269.8		Yes
WA-OW-02D	921919.63	1119064.25	370.1	356.1	-	-	356.1	346.1	336.6	320.1					Yes
WA-OW-03I	921916.69	1119061.25	370.3	356.3											
WA-OW-04D	921697.38	1119232.13	369.7	351.4	-	-	351.4	344.7	343.2	331.7	-	305.7	287.7		
WA-OW-05D	921481.56	1119379.13	371.7	352.7	-	-	352.7	-	344.7	334.7	-	305.7	299.7		
WA-OW-06D	921940.06	1119041.63	370.0	356.0	-	-	356.0	346.0	335.0	325.0	-	296.0	268.0		

Table 1

Geologic Data

Well/Boring ID	State Plane (NAD 83 Feet) X-Coordinate	Y-Coordinate	Elevation (feet, NAVD 88) Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
WA-OW-07D	922175.13	1118833.00	370.2	356.2	-	-	356.2	346.2	324.2	308.2					
WA-OW-08S	923077.06	1117794.63	371.9	357.9	-	-	357.9								Yes
WA-OW-09I	923082.00	1117850.75	370.6	353.1	-	-	353.1								Yes
WA-OW-10I	921928.88	1119051.38	370.1	356.1											
WA-OW-11D	922187.38	1118820.25	370.4	356.4	-	-	356.4	346.4	324.4	308.4	-	280.4	259.4		Yes
WA-PS-01	921093.63	1116929.75	399.2	393.2	-	-	-	-	-	-	-	-	393.2		Yes
WA-PS-02	921177.19	1117113.50	394.3	394.0	-	-	-	-	-	-	-	-	394.0		Yes
WA-PS-03D	921575.00	1117022.88	391.4	382.4	-	-	-	-	-	-	-	-	382.4	350.7	Yes
WA-PW-01	922794.69	1117701.25	389.4	359.4	-	-	359.4	-	354.4	345.4	-	-	299.4		Yes
WA-PW-02	922949.38	1117934.25	371.6	347.6	-	-	347.6	-	326.6	306.6	-	-	278.6		Yes
WA-PW-03	922950.50	1117929.25	370.7	353.7	-	-	353.7	-	332.7						Yes
WA-TW-01D	921895.31	1119082.75	369.8	355.8	-	-	355.8	345.8	335.8	324.8	-	295.8	273.8		Yes
WA-TW-03I	921907.50	1119071.00	370.2	356.2	-	-	356.2	346.7							Yes
WA-WA-01D	922746.44	1118138.50	370.1	354.1	-	-	354.1	-	332.1	308.1	-	280.1	-	264.0	
WA-WA-02D	923053.69	1117869.13	371.2	353.2	-	-	353.2	-	335.2	315.2	-	-	-	289.0	
WA-WA-03D	923317.38	1117730.13	370.4	354.4	-	-	354.4	-	346.4	323.4	-	307.9	-	307.4	
WA-WA-04D	922857.88	1117269.25	400.2	361.7	-	361.7	360.7	-	351.2	340.2	-	-	331.2		
WA-WA-05D	922449.25	1117081.38	394.0	363.0	-	363.0	362.0	-	-	355.5	-	-	344.0		
WA-WA-06D	921705.81	1117406.50	398.6	365.6	-	365.6	-	-	364.1	363.6	-	354.6	352.6		
WA-WA-07D	922533.75	1117641.25	387.7	359.7	-	359.7	358.7	-	-	349.2	-	311.2	310.0		
WB18-B-85-02	915636.19	1124251.75	411.0	357.0	-	357.0	356.0	-	-	-	344.0				
WB18-CM107	916582.56	1124940.88	424.2	361.7	-	-	361.7								
WB18-CM108	916109.88	1125128.13	425.4	359.8	-	-	-	-	-	-	359.8				
WB18-CM109	915953.25	1124098.75	427.1	362.6	-	-	-	-	-	-	362.6				
WB18-CM201	916802.50	1124790.00	428.2	360.2	-	360.2									
WB18-DW101	918643.56	1122866.00	431.0	361.5	-	361.5	360.0	-	-	353.5	-	311.0	299.5		
WB18-DW103	915654.38	1124348.13	424.9	359.4	-	359.4	359.3	-	-	-	349.4	269.9			
WB18-EB-01C	916258.69	1124452.63	425.8	362.0	-	-	-	-	-	-	362.0				
WB18-EB-02	916413.31	1123627.25	426.5	361.5	-	-	-	-	361.5						
WB18-EB-03	916346.50	1123352.75	399.2	368.2	-	-	-	-	368.2	358.2					
WB18-EB-04	916524.19	1124326.63	426.0	361.0	-	-	361.0	348.8							
WB18-EB-05	915869.50	1124664.38	424.5	360.5	-	360.5	-	-	-	-	358.5				
WB18-EB-06	915496.69	1124910.38	387.4	359.7	-	359.7	358.4	-	-	-	350.4				
WB18-EB-07	916685.38	1124582.75	427.9	361.7	-	-	361.7								
WB18-EB-08	916887.81	1124935.75	425.2	363.4	-	-	363.4								
WB18-EB-10	917296.19	1124396.25	421.9	359.2	-	359.2									
WB18-EB-11	917641.19	1124509.75	378.2	360.4	-	360.4	358.7								
WB18-GWS-01	920883.69	1120365.25	368.0	357.0	-	-	357.0	-	336.0						Yes
WB18-GWS-02	920393.38	1121375.38	365.2	356.2	-	-	356.2	-	328.2						Yes
WB18-GWS-03	920059.19	1122279.50	365.7	356.2	-	-	356.2	-	337.7						Yes
WB18-GWS-04	919501.69	1123036.25	366.3	358.1	-	-	358.1	-	333.8						Yes
WB18-GWS-05	918770.81	1123812.75	366.5	359.0	-	-	359.0	-	335.5						Yes

Table 1

Geologic Data

Well/Boring ID	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)												
	X-Coordinate	Y-Coordinate	Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
WB18-GWS-06	917919.63	1124490.00	365.7	357.7	-	-	357.7	-	325.7						Yes
WB18-GWS-07	917587.63	1125122.00	365.3	360.8	-	-	360.8	-	-	-	313.3				Yes
WB18-GWS-08	917137.31	1126131.88	387.0	355.5	-	355.5	351.0								Yes
WB18-GWS-09	916668.50	1125795.88	388.1	360.1	-	360.1	356.1	344.6							Yes
WB18-GWS-10	916367.19	1125590.13	381.3	361.8	-	-	361.8	361.8							Yes
WB18-GWS-11	915871.81	1125336.75	391.0	360.0	-	-	360.0	350.0							Yes
WB18-GWS-12	914884.50	1125174.00	387.4	355.6	-	355.6	354.9								Yes
WB18-GWS-13	915340.81	1124481.25	388.8	360.8	-	360.8	356.8	-	-	-	348.8				Yes
WB18-GWS-14	915670.31	1124197.38	411.5	357.0	-	357.0	-	-	-	-	354.5				Yes
WB18-GWS-15	916059.63	1123659.50	376.8	359.8	-	359.8	-	356.8	-	-	340.8				Yes
WB18-GWS-16	916692.13	1122478.00	403.9	379.9	-	-	-	-	379.9	372.9					Yes
WB18-GWS-17	917121.88	1121967.88	401.1	376.1	-	-	-	-	376.1	370.1	-	341.1			Yes
WB18-GWS-18	918136.69	1121044.75	399.9	370.9	-	-	-	-	370.9	364.9					Yes
WB18-GWS-19	918582.38	1120645.88	398.6	370.6	-	-	-	-	370.6	364.6					Yes
WB18-GWS-20	920087.38	1120364.25	420.0	360.0	-	360.0	358.5	-	-	355.0					Yes
WB18-INC-01	915814.69	1124175.13	425.0	363.0	-	-	-	-	-	-	363.0				
WB18-INC-02	916393.88	1123700.88	425.0	361.0	-	-	-	-	361.0	351.0					
WB18-MS104.1	916854.25	1123850.63	426.8	360.3	-	360.3	358.8	-	353.8						
WB18-MS105.1	916286.69	1123976.00	425.8	361.3	-	-	361.3	349.8							
WB18-MS106.1	916344.38	1124840.38	426.8	363.3	-	-	363.3	349.8							
WB18-MW-01D	920302.75	1121726.88	365.4	352.4	-	-	352.4	-	329.6	309.0	-	289.4	-	271.9	Yes
WB18-MW-02D	919010.19	1123582.25	366.3	359.8	-	-	359.8	-	333.3	312.8	-	296.3	-	268.6	Yes
WB18-MW-03BR	917761.38	1124796.50	366.2	359.0	-	-	359.0	-	-	-	324.2	247.2	230.2	224.2	Yes
WB18-MW-03D	917752.44	1124814.00	366.3	359.1	-	-	359.1	-	-	-	308.3	247.3	-	230.3	Yes
WB18-MW-04BR	916260.75	1125515.88	389.0	362.2	-	-	362.2	351.2	-	-	329.4	243.0	235.0	218.5	Yes
WB18-MW-04D	916253.63	1125514.00	388.7	362.0	-	-	362.0	351.0	-	-	330.7	265.2	235.2		Yes
WB18-MW-05D	915308.19	1125359.00	388.2	356.4	-	356.4	356.2	-	-	-	333.2	282.5	260.7		Yes
WB18-MW-06BR	918221.31	1122678.63	430.7	361.2	-	361.2	360.7	-	-	348.7	-	339.0	313.2	292.7	Yes
WB18-MW-06D	918207.69	1122691.75	430.8	361.3	-	361.3	358.5	-	-	348.8	-	339.0	313.3		Yes
WB18-MW-07D	919397.81	1121384.63	420.0	361.0	-	361.0	359.0	-	-	356.0	-	335.0	316.3	314.0	Yes
WB18-MW-08D	917576.81	1121558.38	402.9	377.6	-	-	-	-	-	377.6	-	342.9	319.9		Yes
WB18-MW-09BR	920869.00	1120366.88	368.2	360.2	-	-	360.2	-	338.2	322.2	-	-	310.2	277.2	Yes
WB18-MW-09D	920886.63	1120367.25	368.1	360.0	-	-	360.0	-	338.0	319.1	-	309.3	307.3		Yes
WB18-MW-10D	920095.31	1120369.38	420.2	361.0	-	361.0	-	-	-	355.1	-	333.4	318.3		Yes
WB18-MW-11I	915484.06	1124364.00	411.5	358.0	-	358.0	356.7								Yes
WB18-MW-12S	920869.31	1120061.88	364.6	360.6	-	-	360.6								Yes
WB18-MW-13BR2	919004.88	1120176.25	374.7	370.6	-	-	-	-	370.6	366.6	-	333.1	325.1	306.6	Yes
WB18-MW-13D	919041.88	1120301.75	376.4	372.7	-	-	-	-	372.7	362.9	-	334.9	327.4		Yes
WB18-MW-14BR	916006.63	1122830.50	374.8	372.8	-	-	-	-	372.8	363.3	-	331.3	315.8	280.8	Yes
WB18-MW-14D	916093.06	1122918.63	374.6	372.6	-	-	-	-	372.6	354.6	-	-	315.6		Yes
WB18-MW-15S	915138.31	1124770.63	388.4	362.4											Yes
WB18-MW-16D	916800.19	1123913.25	426.1	358.7	-	358.7	356.5	-	348.4	337.2	-	313.6	294.1	293.2	Yes

Table 1

Geologic Data

Well/Boring ID	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)												
	X-Coordinate	Y-Coordinate	Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
WB18-MW-17D	917080.81	1125248.13	409.2	358.6	-	-	358.6	-	-	-	326.2	255.6	227.6		Yes
WB18-MW-18D	915937.13	1123977.25	425.0	356.0	-	-	356.0	350.0	-	-	345.3	315.8	279.4	279.0	Yes
WB18-MW-19BR2	920502.25	1121031.38	366.0	356.4	-	-	356.4	-	338.5	312.5	-	285.5	274.4	260.0	Yes
WB18-MW-20BR	919706.94	1122865.63	366.4	359.3	-	-	359.3	-	336.4	310.4	-	293.4	285.4	252.4	Yes
WB18-MW-21D	918555.25	1123090.63	428.3	360.4	-	360.4	359.9	-	350.0	338.3	-	311.3	292.3		Yes
WB18-MW-22D2	919773.56	1121596.50	432.1	358.2	-	-	358.2	-	-	348.1	-	-	305.1		Yes
WB18-MW-23I	917105.75	1123297.63	429.7	372.7	-	-	-	-	372.7	365.7					Yes
WB18-MW-OW-01S	916224.00	1125492.88	388.6	363.0	-	363.0	362.8								Yes
WB18-MW-OW-02S	916223.31	1125509.38	388.4	362.6	-	-	362.6								Yes
WB18-MW-OW-03S	918985.69	1123580.63	366.4	361.4	-	-	361.4								Yes
WB18-MW-OW-04S	918978.88	1123606.13	366.2	359.2	-	-	359.2								Yes
WB18-MW-OW-05G	916245.56	1125423.25	388.2	360.9	-	360.9	360.4	346.3	-	-	336.7				Yes
WB18-MW-OW-06G	916272.88	1125485.25	388.2	362.4	-	-	362.4	347.2							Yes
WB18-MW-TW-01S	916232.06	1125499.88	388.5	363.0	-	-	363.0								Yes
WB18-MW-TW-02S	918998.13	1123588.00	366.2	360.7	-	-	360.7								Yes
WB18-MW-TW-03G	916248.19	1125485.75	388.5	360.3	-	-	360.3	348.5	-	-	338.5				Yes
WB18-MW-TW-04D	920313.69	1121680.75	364.6	352.6	-	-	352.6	-	328.6	305.1	-	289.6	266.6		Yes
WB18-OB-01	919088.69	1121807.00	434.4	356.4	-	-	-	-	-	356.4	-	-	309.4	306.9	Yes
WB18-OB-02	919060.81	1122015.50	436.6	356.6	-	-	-	-	356.6	348.6	-	-	312.6	308.1	Yes
WB18-SB-01	920931.69	1120176.00	365.8	356.3	-	-	356.3	-	334.8						Yes
WB18-SB-02	920741.00	1120731.00	366.3	357.3	-	-	357.3	-	332.3						Yes
WB18-SB-03	920355.13	1121598.25	365.3	349.7	-	-	349.7	-	330.3						Yes
WB18-SB-04	920154.31	1122047.75	365.6	358.1	-	-	358.1	-	334.6						Yes
WB18-SB-05	919959.88	1122527.25	366.7	359.0	-	-	359.0	-	336.7						Yes
WB18-SB-06	919336.38	1123218.75	365.8	361.8	-	-	361.8	-	335.8						Yes
WB18-SB-07	919050.88	1123547.75	365.0	360.5	-	-	360.5	-	337.0						Yes
WB18-SB-08	918717.19	1123862.25	366.7	359.7	-	-	359.7	-	332.7						Yes
WB18-SB-09BR	918164.88	1124070.13	365.8	362.9	-	-	362.9	-	329.9	302.8	-	280.3	252.3	251.2	Yes
WB18-SB-10	917874.50	1124621.50	366.6	355.1	-	-	355.1	-	312.9						Yes
WB18-SB-11	917600.13	1125052.25	365.1	362.1	-	362.1	361.6	-	-	-	311.1				Yes
WB18-SB-12	917450.63	1125662.50	409.0	351.5	-	351.5	346.0	-	-	-	315.3				Yes
WB18-SB-13BR	917490.19	1125925.38	408.2	349.7	-	349.7	345.9	-	-	-	306.2	180.7	168.7	159.6	Yes
WB18-SB-14	917187.31	1126211.63	387.4	350.3	-	-	350.3	-	-	-	317.7				Yes
WB18-SB-15	916802.81	1126046.75	387.6	356.4	-	356.4	353.6	-	-	-	322.4				Yes
WB18-SB-16BR	916329.38	1125763.25	366.3	363.1	-	-	363.1	326.3	-	-	310.8	261.5	234.3	232.0	Yes
WB18-SB-17	916020.69	1125424.38	388.7	355.0	-	-	355.0	337.3	-	-	333.3				Yes
WB18-SB-18	915372.50	1125421.25	389.8	356.8	-	356.8	356.6								Yes
WB18-SB-19BR	920489.69	1121088.38	388.8	355.0	-	355.0	352.3	-	334.8	304.8	-	279.4	266.8	252.9	Yes
WB18-SB-20	914640.31	1125288.00	376.8	358.3	-	358.3	354.8	-	-	-	332.8				Yes
WB18-SB-21	914843.38	1124880.75	377.8	360.8	-	-	360.8	-	-	-	342.8				Yes
WB18-SB-22	915210.81	1124471.50	380.7	362.9	-	-	362.9	-	-	-	352.7				Yes
WB18-SB-23	915479.50	1124205.75	382.1	362.3	-	-	362.3	-	-	-	352.1				Yes

Table 1

Geologic Data

Well/Boring ID	State Plane (NAD 83 Feet)		Elevation (feet, NAVD 88)												
	X-Coordinate	Y-Coordinate	Ground Elevation	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock	New Boring
WB18-SB-25	915996.50	1123512.13	374.6	359.6	-	-	359.6	-	356.6						Yes
WB18-SB-26	920770.50	1119988.25	374.7	360.8	-	-	360.8	-	348.2						Yes
WB18-SB-27NM	915746.69	1125310.75	388.9	358.1	-	358.1	357.4								Yes
WB18-SB-28NM	915979.69	1125288.75	390.3	361.4	-	361.4	360.9	349.8	-	-	342.5				Yes
WB18-SB-29NM	916735.81	1125862.75	387.4	359.1	-	-	359.1	-	-	-	339.4				Yes
WB18-SB-30NM	916426.13	1125287.25	387.4	360.2	-	360.2	356.5	349.7	-	-	343.9				Yes
WB18-SB-31NM	917279.69	1124405.25	417.0	357.5	-	357.5	354.5	-	339.0						Yes
WB18-SB-32	920493.38	1120149.50	420.8	359.6	-	359.6	359.0	-	-	349.1					Yes
WB18-SB-33	920222.31	1120545.00	436.6	360.7	-	360.7	360.4	-	-	354.7					Yes
WB18-SB-34	919726.88	1120890.00	418.9	359.7	-	359.7	357.5	-	-	356.4					Yes
WB18-SB-35	919198.38	1121175.88	419.8	368.0	-	368.0	-	-	-	367.6					Yes
WB18-SB-36	919358.13	1121612.13	439.6	360.3	-	360.3	358.4	-	-	354.5					Yes
WB18-SB-37	918726.50	1122104.38	435.4	359.9	-	359.9	358.4	-	357.4	355.2					Yes
WB18-SB-38	919031.38	1122341.88	437.7	360.0	-	-	360.0	-	-	349.2					Yes
WB18-SB-39	918458.88	1122989.63	430.7	361.1	-	361.1	359.9	-	-	350.3					Yes
WB18-SB-40	917829.38	1123031.63	430.1	360.9	-	360.9	358.5	-	-	350.9					Yes
WB18-SB-41	917715.38	1124840.88	365.9	357.9	-	-	357.9	-	-	-	308.1				Yes
WB18-SB-42	917546.00	1125286.50	366.5	364.3	-	-	364.3	-	-	-	306.5				Yes
WB18-SB-43	917559.00	1122025.50	400.7	377.0	-	-	-	-	-	377.0					Yes
WB18-SB-44	918653.88	1120943.63	394.2	364.7	-	-	-	-	364.7	359.2					Yes
WB18-SB-46BR	915663.00	1124191.00	411.5	354.5	-	354.5	-	-	-	-	351.5	272.8	262.7	254.6	Yes
WB18-SB-47	915953.00	1124835.00	423.2	361.5	-	-	361.5	-	-	-	353.6				Yes
WB18-SB-48	916857.00	1124804.00	422.4	360.9	-	-	360.9								Yes
WB18-SB-49	917679.00	1124024.00	420.8	354.8	-	-	354.8								Yes
WB18-SB-50	919158.00	1122590.00	438.4	368.6	-	368.6	368.4	-	-	357.4					Yes
WB18-SB-51	917112.00	1123292.00	429.8	372.8	-	-	-	-	372.8	365.8					Yes
WB18-SB-73	918814.13	1123510.88	370.8	359.8	-	359.8	358.8	-	342.3						Yes
WB18-SB-75	918028.69	1124094.50	372.6	359.0	-	359.0	358.3	-	335.5						Yes
WB18-TH-100	921316.81	1119521.13	370.0	357.0	-	-	357.0	-	343.4	340.0	-	315.0			

Notes: "-" indicates the unit is not present
A blank field indicates the boring terminated before the unit may have been encountered

Table 2

Comparison of 2009 to 2004 Geologic Data

Well/Boring ID	Difference in Elevation (feet, NAVD88)										
	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock
493	Newly Present			-		-	-20.8		Newly Present	-	Newly Present
494	25.6		Newly Present	-		-	19.1		Newly Present	No longer present	34.6
495	0.0			-		-	0.0		Newly Present	-4.0	0.0
#1	No longer present			-		No longer present	16.5		-	0.0	
#10	-			-		-	0.0		Newly Present	-5.0	Newly Present
#11	-			-		-	-		-	-	0.0
#12	14.4			-		-	0.0		-	-0.5	-3.5
#13	No longer present			-		-	Newly Present		-	-0.5	-1.0
#3	0.5			No longer present		-	10.0		0.0	0.0	
#5	Newly Present			-		No longer present	0.0		0.0	-13.5	
#7	0.0			-		-	0.0		Newly Present	-7.8	
#8	0.0			-		-	0.0		Newly Present	-4.0	
BF-BFMW-01D	-0.3			-0.3		No longer present	6.7		-	0.0	
BF-BFMW-03I	0.0			0.0		-	-		-	0.0	
BF-BFMW-04D	0.8			0.8	Newly Present	-1.2	-		Newly Present	-2.2	
BF-BFMW-05I	0.0			0.0		-	-		-	0.0	
BF-BFMW-06I	1.9		Newly Present	0.0		0.0	-		-	0.0	
BF-BFMW-07S	0.2			-		-	-		-	0.2	
CB-03	0.0			No longer present		1.0					
CB-04	0.0			No longer present		1.0					
CB-05	0.0			-		0.0					
CB-06	0.0			-		0.0					
CB-07	0.0			-		0.0	Newly Present				
CB-08	0.0			-		0.0	Newly Present				
CB-09	-4.0			No longer present		0.0	Newly Present				
CB-10	-2.0			No longer present		0.0	Newly Present				
CB-11	-2.0			No longer present		0.0	0.0				
CB-12	0.8			-		0.0	Newly Present				
CB-13	Newly Present			-		-2.0	Newly Present				
CB-19	0.5			-		No longer present	Newly Present		-	0.0	
CB-20	0.0			-		-	-		-	0.0	Newly Present
CB-21	0.0			-		-	-		-	0.0	Newly Present
CB-22	0.0		Newly Present	-		-	Newly Present				
DAF-02	1.0			1.0		0.0	0.0		-	-1.0	
DAF-03	0.5			0.5		21.0	-0.5		Newly Present	-1.0	Newly Present
DAF-10	-0.5			Newly Present							
DAF-31	7.5			7.5		0.0	-		-	0.0	
DAF-34	Newly Present			-		No longer present	10.0				
DH-06	0.0			-		-	0.0		Newly Present	0.0	
DH-09	-			-		-	0.0		Newly Present	0.0	
DNF-01	0.0			0.0		0.0	0.0		0.0	0.0	
HB-GP-05	-1.8			-1.8	Newly Present						
HB-GP-06	0.0			Newly Present							
HB-GP-07	0.0			Newly Present							
HB-GP-08	0.0			Newly Present							
HB-GP-09	0.0			0.0		-	Newly Present				
HB-GP-13	0.3			0.3	Newly Present	No longer present					
HB-GP-14	-2.0			-	Newly Present						
HB-GP-18	-0.7			Newly Present							
HB-GP-19	-0.3			-	Newly Present						
HB-GP-25	0.0			0.0		0.0					
HB-GP-26	0.0			0.0		0.0					
HB-GP-27	-0.1			Newly Present		-	-		-	-0.2	
HB-GP-28	-2.3		Newly Present	-		-	-		No longer present	0.0	
HB-GP-29	-0.2		Newly Present	No longer present		-	-		-	-0.1	

Table 2

Comparison of 2009 to 2004 Geologic Data

Well/Boring ID	Difference in Elevation (feet, NAVD88)										
	Base of Fill	Top of Onondaga Lake Deposits	Top of Peat	Top of Marl	Top of Sand	Top of Silt/Clay	Top of Fine Sand/Silt	Top of Mixed Ninemile	Top of Sand/Gravel	Top of Till	Top of Bedrock
HB-GP-30	-			-		-	-		Newly Present	3.6	
HB-GP-32	0.3			0.3	Newly Present	-4.0					
HB-GP-34	-0.1			-0.1		Newly Present					
HB-GP-35	-0.3			-0.3		-	-		Newly Present	0.0	
HB-GP-36	-0.2			-0.2		-0.1					
HB-GP-38	Newly Present			-		Newly Present	-		-	0.0	
HB-GP-39	-0.3			-		-	-		No longer present	0.0	
HB-HB-01D	0.0			Newly Present		-20.0	No longer present		0.0	-1.5	
HB-HB-02I	-4.0			-4.0	Newly Present	2.0	No longer present			No longer present	
HB-HB-03S	0.1			Newly Present							
HB-HB-07S	No longer present			-		-	-		Newly Present	0.0	
HB-HB-08D	0.5			0.5		0.3	-		-	-1.1	Newly Present
HB-HB-09S	-3.6		Newly Present	No longer present		-	-		Newly Present	0.3	
HB-HB-10	Newly Present			NA	Newly Present						
HB-HB-11I	-0.6			-0.6		0.0	No longer present		-0.1	0.0	
HB-HB-12D	-0.1			-0.1	Newly Present	-0.1	-		-	0.0	
HB-HB-13D	0.6			0.6	Newly Present	-9.1	No longer present		0.4	0.4	
HB-HB-14D	-0.1			Newly Present		-	-		Newly Present	Newly Present	
HB-HB-16D	2.0			2.0	Newly Present	-27.0	-0.2		-0.2	0.2	
HB-HB-17D	-0.5			-0.5	Newly Present	-0.2	-		-0.5	0.3	
HB-HB-20D	-0.5			-0.5		-9.5	0.0		0.0	0.0	
HB-HB-21I	0.0		Newly Present	-4.4							
HB-WA-08D	2.5			2.5	Newly Present	0.5	-0.2		Newly Present	0.1	
HB-WB-01	8.0			8.0		10.0					
HB-WB-02	0.0			Newly Present		0.0	No longer present				
HB-WB-03	Newly Present			No longer present		9.0	0.0		0.0	0.0	
HB-WB-04	0.0			0.0		-14.0	0.0		-	0.0	
HB-WB-08	0.0			Newly Present							
L11	No longer present			-		-	-		-	6.5	
L12	No longer present			-		-	-		-	6.5	
L128	-			-		0.0	0.0		Newly Present	0.0	
L150	No longer present			No longer present		Newly Present	No longer present		Newly Present	0.0	4.0
L152	No longer present			-		Newly Present	0.0		Newly Present	0.0	0.0
L2	No longer present			-		-	-		-	14.0	Newly Present
L51	-			-		-	0.0		-	0.0	0.0
L64	-			-		0.0	15.0		Newly Present	No longer present	0.0
L67	-			-		0.0	0.0		0.0	0.0	0.0
L74	0.0			-		0.0	0.0		11.5		
L91	-			-		0.0	21.0		-	0.0	0.0
LCP-MW-3AR	9.8			-		0.0					
LCP-MW-5A	10.3			-		0.0					
LCP-MW-6A	10.4			-		0.0					
LP1	0.0			0.0		-	0.0		7.0	0.0	0.0
LP2	0.0			-		-	0.0		23.0		
MPS-A-01MW	29.4			-		-	-		-	-	0.0
MPS-A-02MW	24.6			-		-	-		-	0.0	0.0
MPS-A-03MW	32.0			-		-	-		-	-	0.0
MPS-A-07MW	16.0			-		No longer present	-		-	Newly Present	0.0
MPS-A-10MW	34.7			-		-	-		Newly Present	-16.5	
MPS-A-11B	38.4			-		-	-		Newly Present	4.0	
MPS-A-12MW	10.6			No longer present		No longer present	No longer present		Newly Present	0.1	
MPS-A-13MW	38.9			-		-	No longer present		15.5	0.0	0.0
MPS-A-15MW	47.8			-		-	-		Newly Present	2.0	
MPS-A-16B	0.1			-		No longer present	Newly Present		Newly Present	1.1	
MPS-A-18MW	2.5			-		0.0	-		0.0	0.0	0.0

Table 2

Comparison of 2009 to 2004 Geologic Data

Well/Boring ID	Difference in Elevation (feet, NAVD88)										
	Base of Fill	**Top of Onondaga Lake Deposits**	**Top of Peat**	**Top of Marl**	**Top of Sand**	**Top of Silt/Clay**	**Top of Fine Sand/Silt**	**Top of Mixed Ninemile**	**Top of Sand/Gravel**	**Top of Till**	**Top of Bedrock**
MPS-BG-1	52.0			-		-	-		-	-	0.0
MPS-BG-2	58.0			-		-	-		-	-	0.0
MPS-Boring19/BH-19	17.0			-		-	-		-	Newly Present	0.2
MPS-H-2	12.5			-		-	-		-	0.0	
MPS-H-5MW	13.0			-		-	-0.1		-	-0.1	
MPS-H-8MW	13.9			-		-	2.0		-	-	0.0
MPS-MW-104	Newly Present			-		-	-		-	0.0	
MPS-MW-107	Newly Present			-		-	-		-	0.0	
MPS-MW-108	Newly Present			-		-	-		-	0.0	
MPS-R-13	28.0			-		-	No longer present		Newly Present	0.0	
MPS-R-14MW	30.4			-		-	No longer present		Newly Present	0.0	
MPS-R-2	9.4			-		-	0.0		-	0.0	
MPS-R-8MW	-2.0			-		-	-2.0		Newly Present	0.0	
PP-1	0.0			-		No longer present	3.6		Newly Present	0.0	
SB915-TH-07A	-			-		-	Newly Present		-	1.0	0.0
SB915-TH-08A	-			-		-	Newly Present		-	0.0	0.0
SB915-WB-07L	0.0			-		0.0	0.0		19.0	0.0	0.0
SB915-WB-09U	6.0			-		6.0	0.0				
SB915-WB-10U	7.5			-		-	Newly Present				
SB915-WB-11U	2.0			-		2.0	0.0				
SP-SP-02A	0.4			-		-	Newly Present		-	0.4	
SP-SP-03C	0.2		Newly Present	0.0		0.0	-1.0		4.0	0.0	
SP-SP-04C	0.0		Newly Present	-1.0		0.0	10.0		5.0	No longer present	Newly Present
SP-SP-05C	0.2		Newly Present	-2.0		No longer present	-0.4		12.0	1.0	Newly Present
SP-SP-06C	1.0		Newly Present	-0.5	Newly Present	0.0	0.0		-5.5	0.0	
SP-SP-07C	0.0		Newly Present	-0.5	Newly Present	-1.0	0.0		10.0	0.0	
SP-SP-08C	0.0		Newly Present	-2.0		0.0	0.0		7.0	No longer present	Newly Present
SP-SP-09C	12.0			No longer present	Newly Present	0.0	No longer present		5.0	-	0.0
SP-TB-01	-11.5			-		No longer present	-		-	0.0	
SP-TB-02	0.3			-		-	0.3				
SP-TB-03	0.0			-		-	2.5		-	0.2	
SP-TB-04	0.0			-		-	-		-	0.0	1.0
SP-TB-05	0.0			-		-	0.0		4.0		
SP-TB-07	0.0			No longer present		0.5	0.0		-	-	0.0
SP-TB-09	0.0		Newly Present	No longer present		-	0.0				
SP-TB-10	0.1		Newly Present	-1.7		0.0	0.2				
SP-TB-11	0.2		Newly Present	-0.6		0.2					
SP-TB-12	-0.3		Newly Present	-3.7		-	0.0				
SP-TB-13	0.0		Newly Present	-0.8		0.8					
SP-TB-14	-0.1		Newly Present	-4.3		0.0	Newly Present				
SP-TB-15	0.0		Newly Present	-1.5		-	Newly Present				
SS-1	0.0			-		0.0	Newly Present		-	0.0	0.0
TH-301	0.5			Newly Present							
TH-302	0.0			Newly Present							
TH-304	0.0			Newly Present							
TH-305	0.0			0.0		0.0	0.0				
TH-307	0.0			Newly Present							
TH-308	0.0			Newly Present							
TH-311	0.0			Newly Present							
TH-312	0.0			Newly Present							
TH-313	0.0			Newly Present							
TH-314	0.0			Newly Present							
TH-315	0.0			Newly Present							
TH-316	0.0			Newly Present							
TH-318	0.0			Newly Present							

Table 2

Comparison of 2009 to 2004 Geologic Data

Well/Boring ID	Difference in Elevation (feet, NAVD88)										
	Base of Fill	**Top of Onondaga Lake Deposits**	**Top of Peat**	**Top of Marl**	**Top of Sand**	**Top of Silt/Clay**	**Top of Fine Sand/Silt**	**Top of Mixed Ninemile**	**Top of Sand/Gravel**	**Top of Till**	**Top of Bedrock**
TH-325	0.0			Newly Present							
TH-328	0.0			0.0							
TH-330	Newly Present			Newly Present							
TH-333	0.0			Newly Present							
TH-334	0.0			Newly Present							
TH-337	0.1			Newly Present							
WA-OW-03I	0.3			No longer present		No longer present	No longer present		No longer present	No longer present	
WA-OW-04D	-0.1			-0.1	Newly Present	0.0	0.0		0.0	0.0	
WA-OW-05D	0.0			0.0		0.0	0.0		0.0	0.0	
WA-OW-06D	0.0			0.0	Newly Present	0.0	0.0		0.0	0.0	
WA-OW-07D	0.0			0.0	Newly Present	0.0	-0.2		No longer present	No longer present	
WA-OW-10I	0.1			No longer present							
WA-WA-01D	0.0			0.0		0.0	0.0		0.0	No longer present	Newly Present
WA-WA-02D	0.0			0.0		0.0	2.0		-	No longer present	Newly Present
WA-WA-03D	0.0			0.0		0.0	1.0		0.0	No longer present	Newly Present
WA-WA-04D	-0.5		Newly Present	-1.5		0.2	0.2		-	0.2	
WA-WA-05D	0.0		Newly Present	-1.0		-	0.0		-	2.5	
WA-WA-06D	0.1		Newly Present	-		-1.4	4.6		Newly Present	-2.4	No longer present
WA-WA-07D	0.0		Newly Present	-1.0		No longer present	29.5		1.0	1.0	
WB18-B-85-02	0.0		Newly Present	-1.0		-	No longer present	Newly Present			
WB18-CM107	0.0			Newly Present							
WB18-CM108	-0.1			-		-	-	Newly Present			
WB18-CM109	0.0			-		-	-	Newly Present			
WB18-CM201	0.0		Newly Present								
WB18-DW101	0.0		Newly Present	-1.5		No longer present	18.0		0.0	Newly Present	No longer present
WB18-DW103	0.0		Newly Present	-0.1		No longer present	No longer present	Newly Present	0.0		
WB18-EB-01C	0.2			-		-	-	Newly Present			
WB18-EB-02	0.0			-		Newly Present					
WB18-EB-03	0.0			-		0.0	8.0				
WB18-EB-04	0.0			0.0	Newly Present						
WB18-EB-05	0.0		Newly Present	-		-	-	Newly Present			
WB18-EB-06	0.3		Newly Present	Newly Present		-	-	Newly Present			
WB18-EB-07	-0.2			-0.2							
WB18-EB-08	0.2			Newly Present							
WB18-EB-10	0.3		Newly Present								
WB18-EB-11	0.2		Newly Present	-1.5							
WB18-INC-01	0.0			-		No longer present	No longer present	Newly Present			
WB18-INC-02	0.0			No longer present		19.5	26.0				
WB18-MS104.1	0.0		Newly Present	-1.5		5.0					
WB18-MS105.1	0.0			0.0	Newly Present						
WB18-MS106.1	0.0			0.0	Newly Present						
WB18-TH-100	14.0			Newly Present		0.4	0.0		Newly Present		

Table 3

Model Cells Containing Multiple Borings

	Group	Row	Col	WellID	Elevation (feet, NAVD88)	Stratigraphic Unit Thickness (feet)														
						Fill/Solvay	Fill	Solvay	Onon. Lake Deposits	Peat	Marl	WB18 Sand	HB Sand	WA Sand	Silt/ Clay	Fine Sand and Silt	Ninemile	Sand and Gravel	Till	Bedrock
	1	8	3	NMDSA-GWS-17	365.8	4.0	-	-	-	0.5	11.5	-	-	-	-	-	-	-	-	-
x	1	8	3	NMDSA-SB-17	365.8	3.8	-	-	-	0.3	12.0	-	-	-	-	-	-	-	-	-
x	2	9	4	NMDSA-GWS-16	366.3	5.5	-	-	-	1.0	9.5	-	-	-	-	-	-	-	-	-
	2	9	4	NMDSA-SB-16	366.0	4.0	-	-	-	1.0	10.5	-	-	-	-	0.5	-	-	-	-
x	3	11	4	NMDSA-GWS-15	366.0	4.0	-	-	-	1.0	8.0	-	-	-	-	3.0	-	-	-	-
	3	11	4	NMDSA-SB-15	365.9	3.8	-	-	-	0.5	8.3	-	-	-	3.5	-	-	-	-	-
x	4	14	30	OL-VC-40022	341.8	-	-	-	10.0	-	-	-	-	-	-	-	-	-	-	-
	4	14	30	OL-VC-40024	340.7	-	-	-	6.6	-	3.4	-	-	-	-	-	-	-	-	-
	5	15	8	NMDSA-GWS-11	364.5	1.0	-	-	-	-	10.5	-	-	-	4.5	-	-	-	-	-
x	5	15	8	NMDSA-SB-11	364.0	1.0	-	-	-	-	11.0	-	-	-	2.0	2.0	-	-	-	-
x	6	16	7	NMDSA-GWS-12	364.4	3.3	-	-	-	-	8.8	-	-	-	1.0	3.0	-	-	-	-
	6	16	7	NMDSA-SB-12	364.1	1.0	-	-	-	-	10.8	-	-	-	1.3	3.0	-	-	-	-
	7	16	216	OL-VC-10051	346.2	-	-	13.1	6.7	-	-	-	-	-	-	-	-	-	-	-
x	7	16	216	OL-VC-10052	346.6	-	-	14.8	5.0	-	-	-	-	-	-	-	-	-	-	-
x	7	16	216	OL-VC-10096	347.0	-	-	16.6	3.2	-	-	-	-	-	-	-	-	-	-	-
x	8	17	9	NMDSA-GWS-10	364.8	1.0	-	-	-	-	11.0	-	-	-	4.0	-	-	-	-	-
	8	17	9	NMDSA-SB-10	364.0	1.0	-	-	-	-	13.0	-	-	-	2.0	-	-	-	-	-
x	9	17	232	OL-VC-70021	350.3	-	-	10.0	5.0	-	-	-	-	-	-	-	-	-	-	-
	9	17	232	OL-VC-70021A	350.3	-	-	9.7	6.8	-	-	-	-	-	-	-	-	-	-	-
x	9	17	232	OL-VC-70032	349.9	-	-	3.2	6.8	-	-	-	-	-	-	-	-	-	-	-
x	9	17	232	OL-VC-70033	350.8	-	-	4.5	7.0	-	-	-	-	-	-	-	-	-	-	-
x	10	20	226	OL-VC-10097	355.2	-	-	18.4	-	-	-	-	-	-	-	-	-	-	-	-
	10	20	226	OL-VC-10100	355.1	-	-	19.1	-	-	-	-	-	-	-	-	-	-	-	-

Table 3

Model Cells Containing Multiple Borings

	Group	Row	Col	WellID	Elevation (feet, NAVD88)	Stratigraphic Unit Thickness (feet)														
						Fill/Solvay	Fill	Solvay	Onon. Lake Deposits	Peat	Marl	WB18 Sand	HB Sand	WA Sand	Silt/ Clay	Fine Sand and Silt	Ninemile	Sand and Gravel	Till	Bedrock
x	11	20	227	OL-VC-10098	354.9	-	-	19.8	-	-	-	-	-	-	-	-	-	-	-	-
	11	20	227	OL-VC-10099	355.3	-	-	19.8	-	-	-	-	-	-	-	-	-	-	-	-
	12	21	42	WB18-MW-03BR	366.2	-	1.0	6.2	-	-	34.8	-	-	-	-	-	68.0	26.0	6.0	33.0
x	12	21	42	WB18-MW-03D	366.3	-	-	7.2	-	-	40.8	-	-	-	-	-	71.0	17.0	-	2.0
	13	21	50	WB18-MW-02D	366.3	-	-	6.5	-	-	26.5	-	-	-	20.5	16.5	-	27.7	-	0.3
x	13	21	50	WB18-MW-OW-04S	366.2	-	-	7.0	-	-	1.0	-	-	-	-	-	-	-	-	-
x	13	21	50	WB18-MW-TW-02S	366.2	-	-	5.5	-	-	0.5	-	-	-	-	-	-	-	-	-
	14	25	13	NMDSA-GWS-09	367.4	6.0	-	-	-	1.0	8.0	-	-	-	1.0	-	-	-	-	-
x	14	25	13	NMDSA-MW-06	370.1	9.0	-	-	-	-	7.0	-	-	-	-	-	-	-	-	-
x	15	25	64	OL-STA-30003-SB	357.9	-	-	28.0	-	-	6.0	-	-	-	-	-	-	-	-	-
	15	25	64	OL-STA-30004-SB	333.3	-	-	19.0	-	-	3.0	-	-	-	4.0	-	-	-	-	-
x	16	29	196	OL-STA-10010-VC	359.7	-	-	19.5	-	-	-	-	-	-	-	-	-	-	-	-
	16	29	196	OL-VC-10064	359.8	-	-	19.8	-	-	-	-	-	-	-	-	-	-	-	-
x	16	29	196	OL-VC-10067	360.9	-	-	19.1	-	-	-	-	-	-	-	-	-	-	-	-
	17	30	34	WB18-MW-04BR	389.0	-	1.0	25.8	-	-	11.1	21.8	-	-	-	-	86.4	8.0	16.5	33.5
x	17	30	34	WB18-MW-04D	388.7	-	-	26.8	-	-	11.0	20.3	-	-	-	-	65.5	30.0	0.5	-
x	17	30	34	WB18-MW-OW-02S	388.4	-	0.9	24.9	-	-	0.2	-	-	-	-	-	-	-	-	-
x	17	30	34	WB18-MW-OW-06G	388.2	-	-	25.8	-	-	15.2	9.0	-	-	-	-	-	-	-	-
x	17	30	34	WB18-MW-TW-01S	388.5	-	-	25.5	-	-	2.5	-	-	-	-	-	-	-	-	-
x	17	30	34	WB18-MW-TW-03G	388.5	-	-	28.3	-	-	11.8	10.0	-	-	-	-	4.0	-	-	-
	18	32	188	OL-SB-10131	357.4	-	-	52.0	-	-	32.0	-	-	-	21.0	6.5	-	2.0	-	-
x	18	32	188	OL-VC-10058	358.3	-	-	19.8	-	-	-	-	-	-	-	-	-	-	-	-

Table 3

Model Cells Containing Multiple Borings

	Group	Row	Col	WellID	Elevation (feet, NAVD88)	Stratigraphic Unit Thickness (feet)														
						Fill/Solvay	Fill	Solvay	Onon. Lake Deposits	Peat	Marl	WB18 Sand	HB Sand	WA Sand	Silt/ Clay	Fine Sand and Silt	Ninemile	Sand and Gravel	Till	Bedrock
x	19	33	41	WB18-EB-10	421.9	-	-	62.7	-	2.3	-	-	-	-	-	-	-	-	-	-
	19	33	41	WB18-SB-31NM	417.0	-	-	59.5	-	3.0	15.5	-	-	-	14.0	-	-	-	-	-
x	20	36	237	HB-OW-02S	364.1	-	-	11.5	-	-	2.5	-	-	-	-	-	-	-	-	-
	20	36	237	HB-OW-05S	363.9	11.8	-	-	-	-	2.2	-	-	-	-	-	-	-	-	-
x	20	36	237	HB-TW-02	364.3	11.8	-	-	-	-	2.2	-	-	-	-	-	-	-	-	-
	21	37	221	HB-SB-142	365.0	-	0.5	46.0	-	-	9.5	-	-	-	11.0	9.0	-	-	-	-
x	21	37	221	HB-SB-143	366.6	-	2.0	38.0	-	-	8.0	-	-	-	20.0	-	-	-	-	-
	22	43	247	HB-HB-04D	368.4	-	16.0	-	-	-	16.0	-	-	-	42.0	22.3	-	0.9	0.3	-
x	22	43	247	HB-SB-20	368.1	17.0	-	-	-	-	16.8	-	-	-	10.2	-	-	-	-	-
x	23	46	24	NMDSA-GWS-02	371.7	11.0	-	-	-	0.8	4.3	-	-	-	-	-	-	-	-	-
	23	46	24	OL-VC-40033	360.1	-	-	-	-	-	10.0	-	-	-	-	-	9.8	-	-	-
x	24	46	80	WB18-GWS-01	368.0	-	-	11.0	-	-	21.0	-	-	-	4.0	-	-	-	-	-
	24	46	80	WB18-MW-09D	368.1	-	-	8.0	-	-	22.0	-	-	-	18.9	9.9	-	2.0	2.2	-
	25	52	120	WA-TW-01D	369.8	14.0	-	-	-	-	10.0	-	-	10.0	11.0	29.0	-	22.0	1.0	-
x	25	52	120	WA-TW-03I	370.2	14.0	-	-	-	-	9.5	-	-	1.5	-	-	-	-	-	-
x	26	52	121	WA-OW-02D	370.1	14.0	-	-	-	-	10.0	-	-	9.5	16.5	14.0	-	-	-	-
x	26	52	121	WA-OW-03I	370.3	14.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	26	52	121	WA-OW-06D	370.0	14.0	-	-	-	-	10.0	-	-	11.0	10.0	29.0	-	28.0	-	-
x	26	52	121	WA-OW-10I	370.1	14.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
x	27	53	144	OL-STA-20010-VC	360.4	-	-	-	-	-	35.0	-	-	-	5.1	-	-	-	-	-
	27	53	144	OL-STA-20042	360.0	-	-	-	5.0	-	34.0	-	-	-	3.5	-	-	-	-	-
	28	54	166	WA-MW-02	372.6	24.0	-	-	-	-	12.0	-	-	-	12.0	44.0	-	-	1.0	-
x	28	54	166	WA-MW-05	367.1	22.0	-	-	-	-	9.0	-	-	-	1.0	-	-	-	-	-
	29	56	44	WB18-MW-23I	429.7	-	3.8	53.3	-	-	-	-	-	-	7.0	8.0	-	-	-	-
x	29	56	44	WB18-SB-51	429.8	-	3.8	53.3	-	-	-	-	-	-	7.0	5.7	-	-	-	-

Table 3

Model Cells Containing Multiple Borings

	Group	Row	Col	WellID	Elevation (feet, NAVD88)	Stratigraphic Unit Thickness (feet)														
						Fill/Solvay	Fill	Solvay	Onon. Lake Deposits	Peat	Marl	WB18 Sand	HB Sand	WA Sand	Silt/ Clay	Fine Sand and Silt	Ninemile	Sand and Gravel	Till	Bedrock
	30	56	159	WA-PW-02	371.6	24.0	-	-	-	-	21.0	-	-	-	20.0	28.0	-	-	-	-
x	30	56	159	WA-PW-03	370.7	17.0	-	-	-	-	21.0	-	-	-	3.0	-	-	-	-	-
x	31	56	251	HB-RISB-08	376.5	19.7	-	-	-	-	9.8	-	6.5	-	4.0	-	-	-	-	-
x	31	56	251	HB-RISB-14	374.2	13.4	-	-	-	1.8	8.8	-	-	-	-	-	-	-	-	-
	31	56	251	HB-SB-22	374.8	15.1	-	-	-	0.7	7.2	-	10.8	-	12.2	-	-	-	-	-
x	32	59	68	WB18-GWS-20	420.0	-	-	60.0	-	1.5	3.5	-	-	-	-	3.0	-	-	-	-
	32	59	68	WB18-MW-10D	420.2	-	4.8	54.4	-	5.9	-	-	-	-	-	21.7	-	15.1	2.6	-
x	33	59	237	HB-GP-33	389.5	27.9	-	-	-	-	14.1	-	-	-	2.0	-	-	-	-	-
	33	59	237	HB-HB-13D	389.5	-	18.6	9.3	-	-	11.4	-	12.3	-	31.5	-	-	2.0	0.9	-
x	34	60	251	HB-RISB-09	370.7	11.5	-	-	-	0.5	10.8	-	-	-	1.2	-	-	-	-	-
	34	60	251	HB-SB-23	370.0	8.8	-	-	-	-	11.2	-	-	-	16.0	-	-	-	-	-
x	35	64	36	WB18-B-85-02	411.0	54.0	-	-	-	1.0	12.0	-	-	-	-	-	35.0	-	-	-
x	35	64	36	WB18-GWS-14	411.5	-	-	54.5	-	2.5	-	-	-	-	-	-	7.0	-	-	-
	35	64	36	WB18-SB-46BR	411.5	-	-	57.0	-	3.0	-	-	-	-	-	-	78.7	10.1	8.1	0.1
x	36	64	227	HB-GP-35	390.3	-	-	25.6	-	-	9.5	-	-	-	-	-	-	3.9	1.0	-
	36	64	227	HB-HB-14D	390.3	-	17.6	8.0	-	-	9.5	-	-	-	-	-	-	3.9	1.0	-
x	37	71	212	DAF-08	399.0	-	-	9.5	-	-	-	-	-	-	-	-	-	-	-	-
	37	71	212	HB-GP-38	381.7	-	7.6	1.9	-	-	-	-	-	-	1.0	-	-	-	1.5	-
	38	78	148	WA-MC-B07	400.0	29.5	-	-	-	2.5	-	-	-	4.0	6.0	6.0	-	-	-	-
x	38	78	148	WA-MC-B08	400.0	30.0	-	-	-	2.5	-	-	-	-	-	5.5	-	-	-	-
x	38	78	148	WA-MC-B11	400.0	28.5	-	-	-	3.5	-	-	-	4.0	2.0	-	-	-	-	-
x	39	78	149	WA-MC-B12	400.0	28.1	-	-	-	3.9	-	-	-	-	-	2.0	-	-	-	-
	39	78	149	WA-MC-B13	400.0	28.2	-	-	-	2.7	-	-	-	5.1	2.0	-	-	-	-	-
x	40	79	148	WA-MC-B09	400.0	31.9	-	-	-	0.6	-	-	-	-	-	5.5	-	-	-	-
	40	79	148	WA-MC-B10	400.0	28.1	-	-	-	2.4	-	-	-	5.5	2.0	-	-	-	-	-

Table 3

Model Cells Containing Multiple Borings

	Group	Row	Col	WellID	Elevation (feet, NAVD88)	Stratigraphic Unit Thickness (feet)														
						Fill/Solvay	Fill	Solvay	Onon. Lake Deposits	Peat	Marl	WB18 Sand	HB Sand	WA Sand	Silt/ Clay	Fine Sand and Silt	Ninemile	Sand and Gravel	Till	Bedrock
	41	89	135	SP-SB-05	386.5	12.0	-	-	-	-	-	-	-	-	-	12.7	-	-	1.0	-
x	41	89	135	SP-TB-01	387.1	-	22.5	-	-	-	-	-	-	-	-	-	-	-	12.5	-
x	42	90	121	SP-SB-09	383.4	19.0	-	-	-	0.5	-	-	-	-	10.5	-	-	-	-	-
	42	90	121	SP-TB-05	383.7	16.0	-	-	-	-	-	-	-	-	-	24.0	-	7.5	-	-
	43	90	124	CB-21	377.5	-	2.5	-	-	-	-	-	-	-	-	-	-	-	9.0	8.9
x	43	90	124	SP-SB-08	383.3	15.0	-	-	-	1.0	-	-	-	-	-	14.0	-	-	-	-
	44	100	140	PSA-SB-03	397.8	-	3.7	-	-	-	-	-	-	-	-	-	-	-	33.7	0.1
x	44	100	140	WA-PS-02	394.3	-	0.3	-	-	-	-	-	-	-	-	-	-	-	13.2	-
x	45	101	138	MPS-MW-104	401.6	-	11.0	-	-	-	-	-	-	-	-	-	-	-	7.0	-
x	45	101	138	PSA-SB-05	397.8	-	10.3	-	-	-	-	-	-	-	-	-	-	-	25.0	5.3
	45	101	138	PSA-SB-06	410.0	-	4.0	-	-	-	-	-	-	-	-	-	-	-	35.5	1.0
x	46	109	38	SB915-MW-40S	431.9	-	-	54.0	-	-	-	-	-	-	-	-	-	-	-	-
	46	109	38	SB915-SB-40	431.5	-	-	66.0	-	-	-	-	-	-	8.0	30.0	-	38.0	18.0	2.1
x	47	109	67	#7	381.3	7.0	-	-	-	-	-	-	-	-	-	18.0	-	19.8	0.2	-
	47	109	67	DH-06	384.2	7.0	-	-	-	-	-	-	-	-	-	20.0	-	15.0	19.5	-
x	48	109	161	MPS-A-10MW	419.7	-	7.0	-	-	-	-	-	-	-	-	-	-	16.5	1.1	-
	48	109	161	MPS-SB-23	417.2	-	2.0	-	-	-	-	-	-	-	-	-	-	24.0	12.5	2.0
x	49	109	164	MPS-A-11B	420.4	-	4.0	-	-	-	-	-	-	-	-	-	-	11.0	5.0	-
	49	109	164	MPS-SB-20	419.0	-	20.0	-	-	-	-	-	-	-	-	-	-	-	20.0	0.6
	50	110	162	MPS-SB-21A	421.0	-	17.0	-	-	-	-	-	-	-	-	-	-	-	21.0	2.4
x	50	110	162	MPS-SB-22	421.4	-	24.0	-	-	-	-	-	-	-	-	-	-	-	12.0	2.5
	51	111	67	#3	383.8	6.5	-	-	-	-	-	-	-	-	-	30.0	-	10.5	14.5	-
x	51	111	67	CB-13	383.7	2.0	-	-	-	-	-	-	-	-	4.0	11.0	-	-	-	-
x	52	114	31	SB915-MW-43S	432.0	-	6.0	48.0	-	-	-	-	-	-	-	-	-	-	-	-
	52	114	31	SB915-SB-43	435.0	-	-	70.0	-	-	-	-	-	-	-	-	10.0	-	-	-

Table 3

Model Cells Containing Multiple Borings

	Group	Row	Col	WellID	Elevation (feet, NAVD88)	Stratigraphic Unit Thickness (feet)														
						Fill/Solvay	Fill	Solvay	Onon. Lake Deposits	Peat	Marl	WB18 Sand	HB Sand	WA Sand	Silt/ Clay	Fine Sand and Silt	Ninemile	Sand and Gravel	Till	Bedrock
	53	114	109	MPS-MW-02BR	410.2	-	13.4	-	-	-	-	-	-	-	-	-	-	-	2.6	38.0
x	53	114	109	MPS-SB-01	410.1	-	8.0	-	-	-	-	-	-	-	-	-	-	-	7.5	3.3
	54	114	118	MPS-MW-01BR	409.4	-	1.5	-	-	-	-	-	-	-	-	-	-	-	-	32.5
x	54	114	118	MPS-SB-05	409.1	-	2.0	-	-	-	-	-	-	-	-	-	-	-	-	3.0
	55	114	120	MPS-A-01MW	414.9	7.5	-	-	-	-	-	-	-	-	-	-	-	-	-	9.5
x	55	114	120	MPS-SB-04	410.6	-	1.6	-	-	-	-	-	-	-	-	-	-	-	-	1.4
	56	115	36	SB915-MW-42D	431.0	-	-	69.8	-	-	-	-	-	-	16.2	27.0	-	19.0	1.0	-
x	56	115	36	SB915-SB-42	430.8	-	-	69.8	-	-	-	-	-	-	16.2	27.0	-	18.8	0.2	-
x	57	115	45	L64	368.2	-	-	-	-	-	-	-	-	-	19.0	24.0	-	37.0	-	5.0
	57	115	45	L67	368.6	-	-	-	-	-	-	-	-	-	19.0	41.0	-	9.0	11.0	5.0
x	58	115	61	LCP-MW-26D	384.0	8.0	-	-	-	-	-	-	-	-	4.0	28.0	-	-	-	-
	58	115	61	LCP-MW-28D	382.3	-	2.0	-	-	-	-	-	-	-	3.0	35.0	-	-	-	-
x	59	115	62	LCP-B-1	385.0	4.0	-	-	-	-	-	-	-	-	13.0	13.0	-	-	-	-
x	59	115	62	LCP-MW-20S	389.7	-	7.3	-	-	-	-	-	-	-	0.7	-	-	-	-	-
	59	115	62	LCP-MW-29D	385.7	-	2.5	-	-	-	-	-	-	-	3.5	34.0	-	-	-	-
	60	115	63	LCP-MW-12D	386.5	-	2.0	-	-	-	-	-	-	-	2.0	36.0	-	-	-	-
x	60	115	63	LCP-MW-19D	389.4	6.0	-	-	-	-	-	-	-	-	8.0	26.0	-	-	-	-
x	60	115	63	LCP-MW-30D	385.3	-	4.5	-	-	-	-	-	-	-	1.5	32.0	-	2.0	-	-
	61	115	64	LCP-DB-03	390.2	6.0	-	-	-	-	-	-	-	-	8.0	29.0	-	8.0	5.0	-
x	61	115	64	LCP-DB-04	390.2	6.5	-	-	-	-	-	-	-	-	5.5	28.0	-	2.0	-	-
x	61	115	64	LCP-MW-27S	387.1	-	6.5	-	-	-	-	-	-	-	-	2.5	-	-	-	-
x	61	115	64	LCP-MW-33D	390.2	-	8.0	-	-	-	-	-	-	-	6.0	17.5	-	17.8	0.2	-
	62	115	65	LCP-DB-01	388.9	4.0	-	-	-	-	-	-	-	-	8.0	32.0	-	8.0	1.0	-
x	62	115	65	LCP-DB-02	390.1	-	6.5	-	-	-	-	-	-	-	7.5	30.0	-	3.5	0.5	-
x	62	115	65	LCP-DB-05	387.8	5.0	-	-	-	-	-	-	-	-	7.0	23.5	-	4.5	-	-

Table 3

Model Cells Containing Multiple Borings

	Group	Row	Col	WellID	Elevation (feet, NAVD88)	Stratigraphic Unit Thickness (feet)														
						Fill/Solvay	Fill	Solvay	Onon. Lake Deposits	Peat	Marl	WB18 Sand	HB Sand	WA Sand	Silt/ Clay	Fine Sand and Silt	Ninemile	Sand and Gravel	Till	Bedrock
	63	116	25	SB915-SB-54A	429.1	-	2.0	62.0	-	-	-	-	-	-	-	-	10.0	10.0	-	-
x	63	116	25	SB915-SB-54B	371.6	-	2.0	5.0	-	-	-	-	-	-	-	-	23.0	-	-	-
	64	116	61	LCP-MW-24D	386.7	-	3.0	-	-	-	-	-	-	-	7.0	30.0	-	-	-	-
x	64	116	61	LCP-MW-6A	390.4	2.0	-	-	-	-	-	-	-	-	18.0	-	-	-	-	-
x	64	116	61	LCP-W-01	390.5	-	3.5	-	-	-	-	-	-	-	15.5	1.0	-	-	-	-
x	64	116	61	LCP-W-05	393.4	8.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
x	64	116	61	LCP-W-06	389.5	5.0	-	-	-	-	-	-	-	-	5.0	-	-	-	-	-
x	64	116	61	LCP-W-07	391.2	4.0	-	-	-	-	-	-	-	-	6.0	-	-	-	-	-
	65	116	63	LCP-MW-10D	383.2	2.5	-	-	-	-	-	-	-	-	8.5	27.0	-	-	-	-
x	65	116	63	LCP-MW-3AR	391.8	-	4.0	-	-	-	-	-	-	-	16.0	-	-	-	-	-
	66	116	67	LCP-DB-08	390.8	4.5	-	-	-	-	-	-	-	-	9.5	22.0	-	4.0	-	-
x	66	116	67	LCP-MW-23S	391.1	4.5	-	-	-	-	-	-	-	-	3.5	-	-	-	-	-
	67	117	33	SB915-WB-07L	377.5	-	-	7.0	-	-	-	-	-	-	13.0	20.0	-	27.0	36.0	9.4
x	67	117	33	SB915-WB-11U	377.5	-	3.0	-	-	-	-	-	-	-	18.0	4.0	-	-	-	-
x	68	117	45	CB-05	373.7	4.5	-	-	-	-	-	-	-	-	12.5	-	-	-	-	-
	68	117	45	L51	373.2	-	-	-	-	-	-	-	-	-	-	43.0	-	-	37.0	5.5
x	69	117	61	LCP-MW-5A	392.3	4.0	-	-	-	-	-	-	-	-	16.0	-	-	-	-	-
	69	117	61	LCP-W-02	392.5	-	6.0	-	-	-	-	-	-	-	15.0	1.0	-	-	-	-
x	70	118	24	SB915-MW-50S	431.6	-	2.0	46.0	-	-	-	-	-	-	-	-	-	-	-	-
	70	118	24	SB915-SB-50	430.0	-	2.0	71.0	-	-	-	-	-	-	-	-	21.0	72.0	18.0	2.0
x	71	118	25	SB915-MW-51S	433.8	-	2.0	46.0	-	-	-	-	-	-	-	-	-	-	-	-
	71	118	25	SB915-SB-51	434.0	-	4.0	56.0	-	-	-	-	-	-	-	-	4.0	-	-	-
	72	119	21	SB915-MW-53D	431.1	-	2.0	69.5	-	-	-	-	-	-	-	-	27.5	23.0	4.9	-
x	72	119	21	SB915-SB-53	431.0	-	2.0	69.5	-	-	-	-	-	-	-	-	26.5	24.0	5.0	-

Table 3

Model Cells Containing Multiple Borings

	Group	Row	Col	WellID	Elevation (feet, NAVD88)	Stratigraphic Unit Thickness (feet)														
						Fill/Solvay	Fill	Solvay	Onon. Lake Deposits	Peat	Marl	WB18 Sand	HB Sand	WA Sand	Silt/ Clay	Fine Sand and Silt	Ninemile	Sand and Gravel	Till	Bedrock
x	73	119	23	SB915-SB-56A	429.8	-	4.0	61.0	-	-	-	-	-	-	-	-	15.0	-	-	-
	73	119	23	SB915-SB-60	374.5	-	2.0	4.0	-	-	-	-	-	-	-	-	24.0	-	-	-
x	73	119	23	SB915-SB-62	373.5	-	8.0	-	-	-	-	-	-	-	-	-	22.0	-	-	-
x	73	119	23	SB915-SB-63	373.8	-	4.0	-	-	-	-	-	-	-	-	-	18.0	-	-	-
x	74	119	24	SB915-SB-64	372.9	-	2.0	-	-	-	-	-	-	-	-	-	20.0	-	-	-
	74	119	24	SB915-SB-65	372.6	-	8.0	-	-	-	-	-	-	-	-	-	22.0	-	-	-
x	75	119	25	SB915-SB-67	374.9	-	3.0	-	-	-	-	-	-	-	-	-	27.0	-	-	-
	75	119	25	SB915-SB-68	384.6	-	4.5	-	-	-	-	-	-	-	-	-	29.5	6.0	-	-
x	75	119	25	SB915-SB-70	378.9	-	3.0	-	-	-	-	-	-	-	-	-	27.0	-	-	-
x	76	120	46	7-3	406.0	-	-	-	-	-	-	-	-	-	-	-	-	-	11.5	60.5
	76	120	46	7-4	409.6	-	-	-	-	-	-	-	-	-	-	-	-	-	20.0	62.0
x	77	122	31	SB915-PZ-03	447.3	-	-	71.8	-	-	-	-	-	-	-	-	-	-	-	-
	77	122	31	SB915-SB-16	447.0	-	-	71.8	-	-	-	-	-	-	-	-	8.2	-	-	-
x	78	123	30	SB915-PZ-07D	445.3	-	2.7	63.8	-	-	-	-	-	-	-	-	-	-	-	-
	78	123	30	SB915-PZ-07N	445.3	-	-	66.5	-	-	-	-	-	-	-	-	11.5	-	-	-
	79	123	38	SB915-SB-19	390.0	-	-	-	-	-	-	-	-	-	6.0	24.0	-	-	-	-
x	79	123	38	SB915-SB-20	434.0	-	18.0	27.2	-	-	-	-	-	-	-	10.8	-	-	-	-
	80	128	20	SB915-PZ-02D	430.1	-	-	66.5	-	-	-	-	-	-	-	-	7.0	12.5	-	-
x	80	128	20	SB915-PZ-02N	430.1	-	-	65.5	-	-	-	-	-	-	-	-	8.0	12.5	-	-
	81	130	25	SB915-MW-36D	449.3	-	-	61.8	-	-	-	-	-	-	35.2	16.0	-	-	5.0	-
x	81	130	25	SB915-SB-36	449.0	-	-	61.8	-	-	-	-	-	-	35.2	16.0	-	-	5.0	-

Notes: "-" - stratigraphic unit not present in boring

"x" - (first column) indicates boring not used to define model layer elevations

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
493		67	62	-4	- -		2	2	- -	4
494		63	62	-6	-2		-5	-5	- -	-1
495		59	62	6	- -		-6	-7	-8	-8
7-4	Yes	120	46							
#1		112	68	- -			2	- -	- -	- -
#10		105	69	- -	- -		2	2	2	2
#11		116	100							
#12		115	92							
#13		115	91	- -			-1		-2	-2
#14	Yes	116	95							
#15	Yes	115	86	- -			- -		- -	- -
#3		111	67	-1			-2	0	- -	- -
#5		110	67	-3			0	1	- -	- -
#8		109	70	0			-1	-1	- -	- -
BF-BFMW-01D		65	175	0	0		0		- -	- -
BF-BFMW-02I	Yes	63	181	1	0		0		- -	- -
BF-BFMW-03I		63	190	1	0				- -	- -
BF-BFMW-04D		61	205	1	0	0		0	- -	- -
BF-BFMW-05I		67	197	1	0				- -	- -
BF-BFMW-06I		74	175	2	0	0			- -	- -
BF-BFMW-07S		77	185	-1	- -				- -	- -
CB-03		118	41	0		- -	- -		- -	- -
CB-04		118	43	4		- -	- -		- -	- -
CB-06		116	48	1		- -	- -	- -	- -	- -
CB-07		116	51	0		0	- -	- -	- -	- -
CB-08		115	53	-2		0	- -	- -	- -	- -
CB-09		114	56	-4		-1	- -	- -	- -	- -
CB-10		114	58	-2		0	- -	- -	- -	- -
CB-11		113	60	-4		0	- -	- -	- -	- -
CB-12		112	63	-2		0	- -	- -	- -	- -
CB-19		102	108	-2	- -		2		- -	- -
CB-20		99	119	-3	- -		- -		7	8
CB-21		90	124	4	- -		- -		10	10
CB-22		90	107	8	2	- -	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
DAF-02		45	270	-1	0	0	1	- -	- -	- -
DAF-03		41	277	-8	1	-1	-4	-3	-2	- -
DAF-06	Yes	72	202	- -	- -				- -	- -
DAF-07	Yes	72	207	- -	- -				- -	- -
DAF-09	Yes	71	217	- -	- -			- -	- -	- -
DAF-10		46	272	5	- -	- -	- -	- -	- -	- -
DAF-29	Yes	75	173	- -	- -	- -	- -		- -	- -
DAF-31		64	83	-6	1	0	- -	- -	- -	- -
DAF-34		60	63	-3	- -		- -	- -	- -	- -
DH-06		109	67	-9			0	2	- -	- -
DH-09		107	68	- -			2	2	- -	- -
DNF-01		49	271	-13	0	0	-1	0	- -	- -
HB-GP-02	Yes	45	188	1	- -	- -	- -	- -	- -	- -
HB-GP-03	Yes	46	195	0	- -	- -	- -	- -	- -	- -
HB-GP-04	Yes	44	200	0	- -	- -	- -	- -	- -	- -
HB-GP-05		43	219	0	- -	- -	- -	- -	- -	- -
HB-GP-06		39	228	0	- -	- -	- -	- -	- -	- -
HB-GP-07		39	232	1	- -	- -	- -	- -	- -	- -
HB-GP-08		54	181	1	- -		- -		- -	- -
HB-GP-09		54	187	1	0		- -		- -	- -
HB-GP-10	Yes	53	193	0	- -		- -	- -	- -	- -
HB-GP-11	Yes	53	200	0	- -	- -		- -	- -	- -
HB-GP-13		50	212	0	- -	- -		- -	- -	- -
HB-GP-14		50	217	1	- -	- -		- -	- -	- -
HB-GP-15	Yes	50	223	1	- -	- -		- -	- -	- -
HB-GP-16	Yes	49	229	1	- -	- -	- -	- -	- -	- -
HB-GP-17	Yes	46	235	0	- -	- -	- -	- -	- -	- -
HB-GP-18		44	241	1	- -	- -	- -	- -	- -	- -
HB-GP-19		44	247	1	- -	- -	- -	- -	- -	- -
HB-GP-20	Yes	45	248	4	- -	- -	- -	- -	- -	- -
HB-GP-25		63	247	0	0	- -		- -	- -	- -
HB-GP-26		61	248	8	-1	- -		- -	- -	- -
HB-GP-27		66	240	1	0			- -	- -	- -
HB-GP-28		68	234	1	-1			- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
HB-GP-29		71	228	0	0			- -	- -	- -
HB-GP-30		72	236	- -	- -			2	- -	- -
HB-GP-32		57	238	-1	0	- -		- -	- -	- -
HB-GP-34		61	234	0	-1	- -		- -	- -	- -
HB-GP-36		67	222	0	0	- -		- -	- -	- -
HB-GP-38		71	212	-1	- -	1			- -	- -
HB-GP-39		69	207	-1	- -				- -	- -
HB-HB-01D		37	197	1	-2	-6	- -	-6	- -	- -
HB-HB-02I		37	237	0	0	- -	- -	- -	- -	- -
HB-HB-03S		46	181	0	- -	- -	- -		- -	- -
HB-HB-04D	Yes	43	247	1	-1	1	1	0	- -	- -
HB-HB-05D	Yes	39	222	1	-1	1	-1	-1	- -	- -
HB-HB-07S		71	253	- -	- -			2	- -	- -
HB-HB-08D		58	247	0	1	2		- -	0	0
HB-HB-09S		72	223	-1	0			-1	- -	- -
HB-HB-10		62	207	-1	- -	- -		- -	- -	- -
HB-HB-11I		60	216	0	0	1		0	- -	- -
HB-HB-12D		57	232	-1	0	1		- -	- -	- -
HB-HB-13D		59	237	1	1	-1		-1	- -	- -
HB-HB-14D		64	227	0	1			1	- -	- -
HB-HB-16D		46	236	0	0	-1	0	-1	- -	- -
HB-HB-17D		58	226	0	0	0		0	- -	- -
HB-HB-18S	Yes	37	256	-1	-2	- -	- -	- -	- -	- -
HB-HB-19S	Yes	36	251	-1	-1	- -	- -	- -	- -	- -
HB-HB-20D		29	255	-1	-1	1	0	0	- -	- -
HB-HB-21I		55	253	3	- -	- -	- -	- -	- -	- -
HB-MW-212D	Yes	43	186	-1	0	- -	2	- -	- -	- -
HB-MW-213D	Yes	42	183	1	-2		0		- -	- -
HB-OW-05S	Yes	36	237	0	- -	- -	- -	- -	- -	- -
HB-OW-08D	Yes	42	219	0	1	0	-1	-1	- -	- -
HB-RISB-01	Yes	36	211	-1	0	- -	- -	- -	- -	- -
HB-RISB-02	Yes	37	216	-1	-3	- -	- -	- -	- -	- -
HB-RISB-04	Yes	25	257	-1	1	- -	- -	- -	- -	- -
HB-RISB-05	Yes	33	261	0	0	- -	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
HB-RISB-06	Yes	26	264	-1	-3	- -	- -	- -	- -	- -
HB-RISB-07	Yes	22	265	1	-1	- -	- -	- -	- -	- -
HB-RISB-10	Yes	59	254	0	0	- -		- -	- -	- -
HB-RISB-11	Yes	42	251	0	-11	- -	- -	- -	- -	- -
HB-SB-01	Yes	52	166	1	2	- -	- -	- -	- -	- -
HB-SB-02	Yes	50	169	2	1	- -	- -	- -	- -	- -
HB-SB-03	Yes	51	172	1	1	- -	- -		- -	- -
HB-SB-04	Yes	45	177	2	2	0	-3		-1	-2
HB-SB-05	Yes	46	183	-1	1		- -		- -	- -
HB-SB-07	Yes	41	193	0	1	- -	- -	- -	- -	- -
HB-SB-08	Yes	35	196	2	1	- -	- -	- -	- -	- -
HB-SB-09	Yes	43	199	0	1	- -	- -	- -	- -	- -
HB-SB-10	Yes	36	208	0	-1	0	0	0	-2	-2
HB-SB-100	Yes	39	261	-1	-1	- -	- -	- -	- -	- -
HB-SB-101	Yes	35	260	3	3	- -	- -	- -	- -	- -
HB-SB-102	Yes	34	258	-1	-4	- -	- -	- -	- -	- -
HB-SB-103	Yes	33	257	-1	2	- -	- -	- -	- -	- -
HB-SB-104	Yes	31	260	-1	0	- -	- -	- -	- -	- -
HB-SB-105	Yes	30	265	1	-1	- -	- -	- -	- -	- -
HB-SB-106	Yes	30	262	0	1	- -	- -	- -	- -	- -
HB-SB-107	Yes	30	262	-1	1	- -	- -	- -	- -	- -
HB-SB-108	Yes	29	259	-1	0	- -	- -	- -	- -	- -
HB-SB-109	Yes	24	264	0	2	- -	- -	- -	- -	- -
HB-SB-11	Yes	38	213	0	1	- -	- -	- -	- -	- -
HB-SB-110	Yes	24	263	0	3	- -	- -	- -	- -	- -
HB-SB-111	Yes	24	262	0	-3	- -	- -	- -	- -	- -
HB-SB-112	Yes	48	174	2	-1	-1	- -		- -	- -
HB-SB-113	Yes	49	176	1	0	1	- -		- -	- -
HB-SB-114	Yes	48	178	1	-1	1	- -		- -	- -
HB-SB-115	Yes	54	179	1	-1		-1		- -	- -
HB-SB-116	Yes	46	180	0	-1	0	0		- -	- -
HB-SB-117	Yes	45	182	0	0		-2		- -	- -
HB-SB-118	Yes	45	185	-1	1		2		- -	- -
HB-SB-119	Yes	43	186	0	0	- -	3	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
HB-SB-12	Yes	37	217	-1	1	- -	- -	- -	- -	- -
HB-SB-120	Yes	44	187	2	-2		-1	- -	- -	- -
HB-SB-121	Yes	48	189	0	-1		0	-1	- -	- -
HB-SB-122	Yes	43	189	0	1	0	0	1	- -	- -
HB-SB-123	Yes	41	191	1	1	0	1	- -	0	1
HB-SB-124	Yes	38	193	2	-3	-1	- -	- -	- -	- -
HB-SB-125	Yes	41	194	0	-1	-1	- -	- -	- -	- -
HB-SB-126	Yes	41	196	0	-1	-2	-2	- -	- -	- -
HB-SB-127	Yes	37	198	1	0	- -	- -	- -	- -	- -
HB-SB-128	Yes	41	199	0	0	- -	- -	- -	- -	- -
HB-SB-129	Yes	46	200	0	0	0	0	0	- -	- -
HB-SB-13	Yes	37	220	-1	5	- -	- -	- -	- -	- -
HB-SB-130	Yes	40	201	1	-1	0	- -	- -	- -	- -
HB-SB-131	Yes	41	201	-2	1	- -	- -	- -	- -	- -
HB-SB-132	Yes	40	204	2	0	1	- -	- -	- -	- -
HB-SB-133	Yes	39	206	-1	1	- -	- -	- -	- -	- -
HB-SB-134	Yes	40	206	0	0	- -	- -	- -	- -	- -
HB-SB-135	Yes	40	209	-1	2	- -	- -	- -	- -	- -
HB-SB-136	Yes	39	211	-1	2	- -	- -	- -	- -	- -
HB-SB-137	Yes	39	214	0	0	- -	- -	- -	- -	- -
HB-SB-138	Yes	42	213	0	0	- -	- -	- -	- -	- -
HB-SB-139	Yes	45	212	0	-1	- -	- -	- -	- -	- -
HB-SB-14	Yes	35	226	0	- -	- -	- -	- -	- -	- -
HB-SB-140	Yes	38	216	0	0	- -	- -	- -	- -	- -
HB-SB-141	Yes	38	219	0	-2	- -	- -	- -	- -	- -
HB-SB-142	Yes	37	221	0	-4	-5	- -	- -	- -	- -
HB-SB-144	Yes	43	222	0	1	-1	- -	- -	- -	- -
HB-SB-145	Yes	37	224	-1	1	- -	- -	- -	- -	- -
HB-SB-146	Yes	37	226	-1	-1	- -	- -	- -	- -	- -
HB-SB-147	Yes	39	226	1	-2	-1	- -	- -	- -	- -
HB-SB-148	Yes	36	228	3	4	- -	- -	- -	- -	- -
HB-SB-149	Yes	36	231	0	-1	- -	- -	- -	- -	- -
HB-SB-15	Yes	35	230	-2	0	1	0	0	0	0
HB-SB-150	Yes	35	233	0	-1	- -	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
HB-SB-151	Yes	35	236	0	2	- -	- -	- -	- -	- -
HB-SB-152	Yes	34	238	0	1	- -	- -	- -	- -	- -
HB-SB-153	Yes	34	241	0	0	- -	- -	- -	- -	- -
HB-SB-154	Yes	33	243	-1	1	- -	- -	- -	- -	- -
HB-SB-155	Yes	33	246	-1	-5	- -	- -	- -	- -	- -
HB-SB-156	Yes	37	214	-3	1	-2	- -	- -	- -	- -
HB-SB-16	Yes	33	238	-1	-2	- -	- -	- -	- -	- -
HB-SB-17	Yes	39	239	-2	0	- -	- -	- -	- -	- -
HB-SB-18	Yes	32	244	-1	0	1	2	2	2	3
HB-SB-19	Yes	38	245	-1	-1	- -	- -	- -	- -	- -
HB-SB-201	Yes	36	248	0	1	- -	- -	- -	- -	- -
HB-SB-202	Yes	41	249	0	0	- -	- -	- -	- -	- -
HB-SB-203	Yes	43	249	5	3	- -	- -	- -	- -	- -
HB-SB-204	Yes	42	251	1	2	- -	- -	- -	- -	- -
HB-SB-205	Yes	44	252	-2	-1	- -	- -	- -	- -	- -
HB-SB-206	Yes	39	255	2	1	- -	- -	- -	- -	- -
HB-SB-207	Yes	36	257	-2	1	- -	- -	- -	- -	- -
HB-SB-208	Yes	27	262	-1	0	- -	- -	- -	- -	- -
HB-SB-209	Yes	25	263	-1	2	- -	- -	- -	- -	- -
HB-SB-21	Yes	48	248	3	0	0	0	- -	1	1
HB-SB-210	Yes	22	264	0	8	- -	- -	- -	- -	- -
HB-SB-211	Yes	20	265	-1	3	- -	- -	- -	- -	- -
HB-SB-214	Yes	39	188	1	0	2	1	0	- -	- -
HB-SB-215	Yes	46	176	2	2	0	1		- -	- -
HB-SB-216	Yes	45	178	2	0	0	1		- -	- -
HB-SB-217	Yes	44	181	2	1	0	-2		- -	- -
HB-SB-218	Yes	41	185	0	0	1	0	- -	- -	- -
HB-SB-219	Yes	38	189	2	1	0	0	- -	- -	- -
HB-SB-22	Yes	56	251	10	0	- -	- -	- -	- -	- -
HB-SB-220	Yes	41	188	-6	-1	-1	-1	- -	- -	- -
HB-SB-221	Yes	43	185	-4	4		-5		- -	- -
HB-SB-222	Yes	44	183	-4	0		0		- -	- -
HB-SB-223	Yes	37	192	4	1	1	1	- -	- -	- -
HB-SB-23	Yes	60	251	6	0	- -		- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
HB-SB-24	Yes	62	252	7	0	0		- -	0	0
HB-SB-25	Yes	33	251	0	-2	- -	- -	- -	- -	- -
HB-SB-26	Yes	25	260	-1	0	- -	- -	- -	- -	- -
HB-SB-27	Yes	30	262	-1	-5	- -	- -	- -	- -	- -
HB-SB-28	Yes	19	266	-1	-3	- -	- -	- -	- -	- -
HB-SB-91	Yes	33	246	-1	4	- -	- -	- -	- -	- -
HB-SB-92	Yes	39	246	0	0	- -	- -	- -	- -	- -
HB-SB-93	Yes	39	247	0	0	- -	- -	- -	- -	- -
HB-SB-94	Yes	38	248	-1	0	- -	- -	- -	- -	- -
HB-SB-95	Yes	38	249	-1	1	- -	- -	- -	- -	- -
HB-SB-95A	Yes	38	249	-1	- -	- -	- -	- -	- -	- -
HB-SB-96	Yes	40	253	1	-2	- -	- -	- -	- -	- -
HB-SB-98	Yes	38	252	-1	2	- -	- -	- -	- -	- -
HB-SB-99	Yes	38	255	-1	1	- -	- -	- -	- -	- -
HB-WA-08D		48	212	0	0	0	0	-2	- -	- -
HB-WB-01		25	211	2	0	- -	- -	- -	- -	- -
HB-WB-02		32	211	1	-1	- -	- -	- -	- -	- -
HB-WB-03		40	211	1	- -	4	1	1	- -	- -
HB-WB-04		42	210	1	2	1	3	- -	- -	- -
HB-WB-08		40	196	0	- -	- -	- -	- -	- -	- -
HB-WB-BL	Yes	51	220	1	0	0		- -	- -	- -
L11		124	52							
L12		122	49							
L128		93	41	- -	- -	4	3	-1	- -	- -
L150		92	42	- -	- -	0	- -	7	-1	1
L152		91	43	- -	- -	-3	-5	-8	-1	-5
L2		130	62							
L46	Yes	127	58							
L51		117	45	- -		- -	2		1	-2
L67		115	45	- -		-4	-7	-8	0	3
L74		112	44	-5		0	-1	- -	- -	- -
L91		109	44	- -		2	2	- -	2	3
LCP-DB-01	Yes	115	65	3		4	1	1	- -	- -
LCP-DB-03	Yes	115	64	4		2	0	1	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
LCP-DB-06	Yes	116	65	0		2	-1	- -	- -	- -
LCP-DB-07	Yes	116	66	0		-1	-1	0	- -	- -
LCP-DB-08	Yes	116	67	0		1	0	- -	- -	- -
LCP-MW-10D	Yes	116	63	-6		-4	- -	- -	- -	- -
LCP-MW-11D	Yes	114	64	5		1	- -	- -	- -	- -
LCP-MW-12D	Yes	115	63	4		5	- -	- -	- -	- -
LCP-MW-13D	Yes	115	68	2			1	- -	- -	- -
LCP-MW-14D	Yes	116	72	1		0	-1	-2	- -	- -
LCP-MW-15D	Yes	117	68	-5		-2	-1	-5	- -	- -
LCP-MW-16D	Yes	115	67	3		3	6	- -	- -	- -
LCP-MW-17D	Yes	116	64	2		-3	- -	- -	- -	- -
LCP-MW-18D	Yes	115	66	3		-3	- -	- -	- -	- -
LCP-MW-24D	Yes	116	61	1		2	- -	- -	- -	- -
LCP-MW-25S	Yes	116	62	4		- -	- -	- -	- -	- -
LCP-MW-28D	Yes	115	61	2		3	- -	- -	- -	- -
LCP-MW-29D	Yes	115	62	5		5	- -	- -	- -	- -
LCP-MW-31S	Yes	114	62	5		0	- -	- -	- -	- -
LCP-MW-32S	Yes	114	65	3			- -	- -	- -	- -
LCP-W-02	Yes	117	61	1		-1	- -	- -	- -	- -
LCP-W-03	Yes	116	60	0		1	- -	- -	- -	- -
LP1		72	60	-9	2		-1	-6	-5	-5
LP2		74	60	-13	- -		0	- -	- -	- -
MPS-A-01MW		114	120							
MPS-A-02MW		110	135							
MPS-A-03MW		111	143							
MPS-A-07MW		109	135							
MPS-A-12MW		103	170	2	- -			-1	- -	- -
MPS-A-13MW		103	183							
MPS-A-15MW		97	184							
MPS-A-16B		93	164	1	- -		0	0	- -	- -
MPS-A-18MW		90	159	0	- -	1	- -	-3	-3	-3
MPS-BG-1		114	94	41			- -		- -	42
MPS-BG-2		109	137							
MPS-Boring19/BH-19		97	114	3	- -		- -		14	14

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
MPS-H-2		107	136							
MPS-H-5MW		111	116							
MPS-H-8MW		113	112							
MPS-MW-01BR	Yes	114	118							
MPS-MW-02BR	Yes	114	109							
MPS-MW-107		100	145							
MPS-MW-108		98	147	-4	- -		- -		- -	- -
MPS-R-13		106	166							
MPS-R-14MW		108	161							
MPS-R-2		100	154							
MPS-R-8MW		101	161	3	- -		-1	-2	- -	- -
MPS-SB-02	Yes	114	116							
MPS-SB-03	Yes	114	119							
MPS-SB-06	Yes	114	110							
MPS-SB-07	Yes	114	112							
MPS-SB-08	Yes	102	137							
MPS-SB-09	Yes	103	137							
MPS-SB-10	Yes	109	133							
MPS-SB-11	Yes	109	134							
MPS-SB-12	Yes	108	135							
MPS-SB-13	Yes	95	163	-1	- -		-1	- -	- -	0
MPS-SB-14	Yes	97	161	0	- -		0		- -	0
MPS-SB-15	Yes	99	153	0	- -		- -		-1	-1
MPS-SB-16	Yes	99	148							
MPS-SB-17	Yes	98	150	-5	- -		- -		-4	-16
MPS-SB-18	Yes	97	152	0	- -		- -		0	0
MPS-SB-19	Yes	101	137							
MPS-SB-20	Yes	109	164							
MPS-SB-21	Yes	110	163							
MPS-SB-21A	Yes	110	162							
MPS-SB-23	Yes	109	161							
NMDSA-GWS-01	Yes	50	25	0	- -	- -	- -	- -	- -	- -
NMDSA-GWS-03	Yes	41	23	7	- -	- -	- -	- -	- -	- -
NMDSA-GWS-04	Yes	40	19	-2	-2	- -	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
	Boring	Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
NMDSA-GWS-05	Yes	35	17	2	- -	- -	- -	- -	- -	- -
NMDSA-GWS-06	Yes	31	16	1	1	- -	- -	- -	- -	- -
NMDSA-GWS-07	Yes	27	15	1	- -	- -	- -	- -	- -	- -
NMDSA-GWS-08	Yes	26	14	2	- -	- -	- -	- -	- -	- -
NMDSA-GWS-09	Yes	25	13	-1	0	- -	- -	- -	- -	- -
NMDSA-GWS-11	Yes	15	8	-1	3	- -	- -	- -	- -	- -
NMDSA-GWS-13	Yes	13	6	1	2	- -	- -	- -	- -	- -
NMDSA-GWS-14	Yes	12	5	0	2	- -	- -	- -	- -	- -
NMDSA-GWS-17	Yes	8	3	2	- -	- -	- -	- -	- -	- -
NMDSA-MW-01	Yes	47	24	3	- -	- -	- -	- -	- -	- -
NMDSA-MW-02	Yes	52	23	2	- -	- -	- -	- -	- -	- -
NMDSA-MW-03	Yes	43	23	4	- -	- -	- -	- -	- -	- -
NMDSA-MW-04	Yes	34	17	1	- -	- -	- -	- -	- -	- -
NMDSA-MW-05	Yes	34	15	5	-1	- -	- -	- -	- -	- -
NMDSA-MW-07	Yes	14	7	3	- -	- -	- -	- -	- -	- -
NMDSA-MW-08	Yes	10	3	0	- -	- -	- -	- -	- -	- -
NMDSA-MW-09	Yes	10	4	1	1	- -	- -	- -	- -	- -
NMDSA-SB-01	Yes	51	25	1	- -	- -	- -	- -	- -	- -
NMDSA-SB-02	Yes	51	23	2	- -	- -	- -	- -	- -	- -
NMDSA-SB-03	Yes	47	22	-2	2	- -	- -	- -	- -	- -
NMDSA-SB-04	Yes	41	19	-3	3	- -	- -	- -	- -	- -
NMDSA-SB-05	Yes	36	17	0	- -	- -	- -	- -	- -	- -
NMDSA-SB-06	Yes	33	16	0	0	- -	- -	- -	- -	- -
NMDSA-SB-07	Yes	31	15	-1	0	- -	- -	- -	- -	- -
NMDSA-SB-08	Yes	27	14	-1	1	- -	- -	- -	- -	- -
NMDSA-SB-09	Yes	26	13	0	0	- -	- -	- -	- -	- -
NMDSA-SB-10	Yes	17	9	1	2	- -	- -	- -	- -	- -
NMDSA-SB-12	Yes	16	7	-2	-1	-1	- -	- -	- -	- -
NMDSA-SB-13	Yes	14	6	1	0	- -	- -	- -	- -	- -
NMDSA-SB-14	Yes	13	5	0	0	- -	- -	- -	- -	- -
NMDSA-SB-15	Yes	11	4	0	0	- -	- -	- -	- -	- -
NMDSA-SB-16	Yes	9	4	1	1	- -	- -	- -	- -	- -
OL-SB-10115	Yes	51	161	-1	0	- -	- -	- -	- -	- -
OL-SB-10121	Yes	47	173	-1	1	- -	- -		- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
OL-SB-10124	Yes	46	172	0	-1	- -	- -	- -	- -	- -
OL-SB-10129	Yes	40	174	0	0	- -	- -	- -	- -	- -
OL-SB-10130	Yes	34	171	1	0	- -	- -	- -	- -	- -
OL-SB-10131	Yes	32	188	0	0	-2	-1	- -	- -	- -
OL-SB-10132	Yes	23	183	0	1	- -	- -	- -	- -	- -
OL-SB-10133	Yes	32	207	0	0	- -	- -	- -	- -	- -
OL-SB-10134	Yes	24	204	1	- -	- -	- -	- -	- -	- -
OL-SB-10135	Yes	19	201	1	1	- -	- -	- -	- -	- -
OL-SB-20067	Yes	52	137	1	0	- -	- -	- -	- -	- -
OL-SB-20068	Yes	52	146	-1	- -	- -	- -	- -	- -	- -
OL-SB-40146	Yes	22	31	1	0	- -	- -	- -	- -	- -
OL-SB-40147	Yes	20	33	-2	-1	- -	- -	- -	- -	- -
OL-SB-60001-VC	Yes	1	202	0	- -	- -	- -	- -	- -	- -
OL-SB-60002-VC	Yes	1	208	0	- -	- -	- -	- -	- -	- -
OL-SB-60003-VC	Yes	1	217	-1	- -	- -	- -	- -	- -	- -
OL-SB-60004-VC	Yes	2	220	0	- -	- -	- -	- -	- -	- -
OL-SB-60005-VC	Yes	3	232	0	- -	- -	- -	- -	- -	- -
OL-SB-60006-VC	Yes	4	237	0	- -	- -	- -	- -	- -	- -
OL-SB-60007-VC	Yes	5	243	-2	- -	- -	- -	- -	- -	- -
OL-SB-60008-VC	Yes	5	247	-1	- -	- -	- -	- -	- -	- -
OL-SB-60009-VC	Yes	6	251	-2	- -	- -	- -	- -	- -	- -
OL-SB-60010-VC	Yes	6	255	0	- -	- -	- -	- -	- -	- -
OL-SB-60011-VC	Yes	8	259	0	- -	- -	- -	- -	- -	- -
OL-SB-60012-VC	Yes	9	261	-2	- -	- -	- -	- -	- -	- -
OL-SB-60013-VC	Yes	11	263	-2	- -	- -	- -	- -	- -	- -
OL-SB-60014-VC	Yes	12	259	0	- -	- -	- -	- -	- -	- -
OL-SB-60015-VC	Yes	13	260	0	- -	- -	- -	- -	- -	- -
OL-SB-70001-VC	Yes	20	262	0	- -	- -	- -	- -	- -	- -
OL-SB-70002-VC	Yes	19	258	0	- -	- -	- -	- -	- -	- -
OL-SB-70003-VC	Yes	17	263	0	- -	- -	- -	- -	- -	- -
OL-SB-70004-VC	Yes	17	260	0	- -	- -	- -	- -	- -	- -
OL-SB-80052	Yes	24	164	0	0	-1	-1	-1	- -	0
OL-SB-80053	Yes	18	177	0	-1	-2	-2	- -	- -	-1
OL-SB-80054	Yes	15	199	1	0	-1	-1	-2	- -	-1

Table 4

Model Representation of Geologic Units

Well ID	New	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
	Boring	Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
OL-STA-10001-VC	Yes	36	158	- -	- -	- -	- -	- -	- -	- -
OL-STA-10002-VC	Yes	26	177	- -	- -	- -	- -	- -	- -	- -
OL-STA-10003-VC	Yes	21	191	- -	- -	- -	- -	- -	- -	- -
OL-STA-10004-VC	Yes	19	188	- -	- -	- -	- -	- -	- -	- -
OL-STA-10005-VC	Yes	18	208	- -	- -	- -	- -	- -	- -	- -
OL-STA-10006-VC	Yes	15	205	- -	- -	- -	- -	- -	- -	- -
OL-STA-10007-VC	Yes	17	222	- -	- -	- -	- -	- -	- -	- -
OL-STA-10008-VC	Yes	47	163	- -	- -	- -	- -	- -	- -	- -
OL-STA-10009-VC	Yes	35	181	- -	- -	- -	- -	- -	- -	- -
OL-STA-10011-VC	Yes	26	212	- -	- -	- -	- -	- -	- -	- -
OL-STA-10013-SB	Yes	31	169	- -	- -	- -	- -	- -	- -	- -
OL-STA-10014-SB	Yes	22	181	-1	0	- -	- -	- -	- -	- -
OL-STA-10015-SB	Yes	17	200	- -	- -	- -	- -	- -	- -	- -
OL-STA-10016-SB	Yes	17	214	- -	- -	- -	- -	- -	- -	- -
OL-STA-10017-SB	Yes	14	212	- -	- -	- -	- -	- -	- -	- -
OL-STA-10018-SB	Yes	43	176	-1	-2	- -	- -	- -	- -	- -
OL-STA-10019-SB	Yes	37	172	0	1	- -	- -	- -	- -	- -
OL-STA-10020-SB	Yes	36	189	-1	- -	- -	- -	- -	- -	- -
OL-STA-10021-SB	Yes	30	186	- -	- -	- -	- -	- -	- -	- -
OL-STA-10022-SB	Yes	25	185	- -	- -	- -	- -	- -	- -	- -
OL-STA-10023-SB	Yes	29	205	0	- -	- -	- -	- -	- -	- -
OL-STA-10024-SB	Yes	21	202	0	- -	- -	- -	- -	- -	- -
OL-STA-10025-SB	Yes	26	218	- -	- -	- -	- -	- -	- -	- -
OL-STA-10026-SB	Yes	20	215	0	- -	- -	- -	- -	- -	- -
OL-STA-10108	Yes	20	186	-1	0	0	0	0	-1	-2
OL-STA-20001-SB	Yes	51	140	2	0	- -	- -	- -	- -	- -
OL-STA-20002-VC	Yes	48	139	0	-2	- -	- -	- -	- -	- -
OL-STA-20003-VC	Yes	50	144	-2	-1	- -	- -	- -	- -	- -
OL-STA-20004-SB	Yes	53	148	0	- -	- -	- -	- -	- -	- -
OL-STA-20005-VC	Yes	48	148	0	0	- -	- -	- -	- -	- -
OL-STA-20006-VC	Yes	51	152	0	0	- -	- -	- -	- -	- -
OL-STA-20007-SB	Yes	54	156	-2	-3	- -	- -		- -	- -
OL-STA-20008-VC	Yes	49	155	0	0	- -	- -	- -	- -	- -
OL-STA-20009-VC	Yes	50	139	-2	1	- -	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
	Boring	Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
OL-STA-20011-VC	Yes	49	144	0	-1	- -	- -	- -	- -	- -
OL-STA-20012-VC	Yes	50	148	0	- -	- -	- -	- -	- -	- -
OL-STA-20013-VC	Yes	53	152	-2	-1	- -	- -	- -	- -	- -
OL-STA-20014-VC	Yes	49	152	0	0	- -	- -	- -	- -	- -
OL-STA-20015-VC	Yes	51	156	0	0	- -	- -	- -	- -	- -
OL-STA-20016-SB	Yes	51	112	-2	0	-1	-3	-1	- -	1
OL-STA-20017-SB	Yes	50	124	-2	0	0	-1	-3	- -	-6
OL-STA-20018-SB	Yes	51	136	-1	0	-4	- -	- -	- -	- -
OL-STA-20021-VC	Yes	52	148	0	-1	- -	- -	- -	- -	- -
OL-STA-20022-VC	Yes	52	152	0	0	- -	- -	- -	- -	- -
OL-STA-20023-VC	Yes	53	156	-1	1	- -	- -	- -	- -	- -
OL-STA-20034	Yes	53	141	-1	- -	- -	- -	- -	- -	- -
OL-STA-20036	Yes	53	147	-1	- -	- -	- -	- -	- -	- -
OL-STA-20038	Yes	53	154	0	0	- -	- -	- -	- -	- -
OL-STA-20042	Yes	53	144	-2	2	- -	- -	- -	- -	- -
OL-STA-20052	Yes	53	160	1	0	- -	- -		- -	- -
OL-STA-20053	Yes	53	153	0	- -	- -	- -	- -	- -	- -
OL-STA-20054	Yes	51	164	1	- -	- -	- -	- -	- -	- -
OL-STA-20056	Yes	48	168	- -	- -	- -	- -	- -	- -	- -
OL-STA-20058	Yes	52	142	0	- -	- -	- -	- -	- -	- -
OL-STA-30001-SB	Yes	18	40	2	5	- -	- -	- -	- -	- -
OL-STA-30002-SB	Yes	16	42	0	- -	- -	- -	- -	- -	- -
OL-STA-30004-SB	Yes	25	64	-3	- -	- -	- -	- -	- -	- -
OL-STA-30005-VC	Yes	14	34	2	- -	- -	- -	- -	- -	- -
OL-STA-30006-VC	Yes	13	37	-1	- -	- -	- -	- -	- -	- -
OL-STA-30007-VC	Yes	15	38	-2	- -	- -	- -	- -	- -	- -
OL-STA-30008-VC	Yes	17	39	0	- -	- -	- -	- -	- -	- -
OL-STA-30009-VC	Yes	20	43	- -	- -	- -	- -	- -	- -	- -
OL-STA-30010-VC	Yes	22	46	0	- -	- -	- -	- -	- -	- -
OL-STA-30011-VC	Yes	19	48	- -	- -	- -	- -	- -	- -	- -
OL-STA-30012-VC	Yes	20	51	1	- -	- -	- -	- -	- -	- -
OL-STA-30013-VC	Yes	21	53	2	- -	- -	- -	- -	- -	- -
OL-STA-30014-VC	Yes	20	56	- -	- -	- -	- -	- -	- -	- -
OL-STA-30015-VC	Yes	22	58	- -	- -	- -	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
OL-STA-30016-VC	Yes	25	60	- -	- -	- -	- -	- -	- -	- -
OL-STA-30017-VC	Yes	37	66	- -	- -	- -	- -	- -	- -	- -
OL-STA-30018-VC	Yes	39	74	0	- -	- -	- -	- -	- -	- -
OL-STA-30019-VC	Yes	43	84	- -	- -	- -	- -	- -	- -	- -
OL-STA-30033	Yes	20	60	0	-2	-2	-1	0	-1	0
OL-STA-40001-VC	Yes	41	30	0	- -	- -	- -	- -	- -	- -
OL-STA-40002-SB	Yes	28	32	0	- -	- -	- -	- -	- -	- -
OL-STA-40003-SB	Yes	18	33	-2	- -	- -	- -	- -	- -	- -
OL-STA-60016-SB	Yes	2	228	-2	- -	- -	- -	- -	- -	- -
OL-STA-60017-SB	Yes	3	225	-1	- -	- -	- -	- -	- -	- -
OL-STA-60018-SB	Yes	7	256	-1	- -	- -	- -	- -	- -	- -
OL-STA-60019-SB	Yes	7	252	0	- -	- -	- -	- -	- -	- -
OL-STA-70005-SB	Yes	20	255	0	- -	- -	- -	- -	- -	- -
OL-STA-70006-SB	Yes	20	252	0	- -	- -	- -	- -	- -	- -
OL-STA-70007-SB	Yes	16	260	0	- -	- -	- -	- -	- -	- -
OL-STA-70008-SB	Yes	15	258	0	- -	- -	- -	- -	- -	- -
OL-VC-10034	Yes	51	159	0	- -	- -	- -	- -	- -	- -
OL-VC-10035	Yes	46	157	0	- -	- -	- -	- -	- -	- -
OL-VC-10036	Yes	45	160	0	- -	- -	- -	- -	- -	- -
OL-VC-10037	Yes	41	158	0	- -	- -	- -	- -	- -	- -
OL-VC-10038	Yes	47	167	- -	- -	- -	- -	- -	- -	- -
OL-VC-10039	Yes	42	168	- -	- -	- -	- -	- -	- -	- -
OL-VC-10040	Yes	37	163	- -	- -	- -	- -	- -	- -	- -
OL-VC-10041	Yes	44	172	- -	- -	- -	- -	- -	- -	- -
OL-VC-10042	Yes	32	163	- -	- -	- -	- -	- -	- -	- -
OL-VC-10043	Yes	28	168	- -	- -	- -	- -	- -	- -	- -
OL-VC-10044	Yes	30	170	- -	- -	- -	- -	- -	- -	- -
OL-VC-10046	Yes	36	176	- -	- -	- -	- -	- -	- -	- -
OL-VC-10047	Yes	26	172	- -	- -	- -	- -	- -	- -	- -
OL-VC-10048	Yes	31	177	- -	- -	- -	- -	- -	- -	- -
OL-VC-10049	Yes	34	180	- -	- -	- -	- -	- -	- -	- -
OL-VC-10050	Yes	16	217	- -	- -	- -	- -	- -	- -	- -
OL-VC-10051	Yes	16	216	- -	- -	- -	- -	- -	- -	- -
OL-VC-10053	Yes	36	187	- -	- -	- -	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
	Boring	Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
OL-VC-10054	Yes	35	185	- -	- -	- -	- -	- -	- -	- -
OL-VC-10055	Yes	24	176	- -	- -	- -	- -	- -	- -	- -
OL-VC-10056	Yes	29	181	- -	- -	- -	- -	- -	- -	- -
OL-VC-10057	Yes	25	181	- -	- -	- -	- -	- -	- -	- -
OL-VC-10059	Yes	32	192	- -	- -	- -	- -	- -	- -	- -
OL-VC-10060	Yes	28	192	- -	- -	- -	- -	- -	- -	- -
OL-VC-10061	Yes	22	186	- -	- -	- -	- -	- -	- -	- -
OL-VC-10062	Yes	25	190	- -	- -	- -	- -	- -	- -	- -
OL-VC-10063	Yes	20	184	- -	- -	- -	- -	- -	- -	- -
OL-VC-10064	Yes	29	196	- -	- -	- -	- -	- -	- -	- -
OL-VC-10065	Yes	29	197	- -	- -	- -	- -	- -	- -	- -
OL-VC-10066	Yes	30	197	- -	- -	- -	- -	- -	- -	- -
OL-VC-10068	Yes	24	194	- -	- -	- -	- -	- -	- -	- -
OL-VC-10069	Yes	25	198	- -	- -	- -	- -	- -	- -	- -
OL-VC-10070	Yes	31	203	- -	- -	- -	- -	- -	- -	- -
OL-VC-10071	Yes	17	192	- -	- -	- -	- -	- -	- -	- -
OL-VC-10072	Yes	19	194	- -	- -	- -	- -	- -	- -	- -
OL-VC-10073	Yes	21	197	- -	- -	- -	- -	- -	- -	- -
OL-VC-10074	Yes	23	202	- -	- -	- -	- -	- -	- -	- -
OL-VC-10075	Yes	31	210	- -	- -	- -	- -	- -	- -	- -
OL-VC-10076	Yes	25	208	- -	- -	- -	- -	- -	- -	- -
OL-VC-10077	Yes	19	200	- -	- -	- -	- -	- -	- -	- -
OL-VC-10078	Yes	20	206	- -	- -	- -	- -	- -	- -	- -
OL-VC-10079	Yes	21	209	- -	- -	- -	- -	- -	- -	- -
OL-VC-10080	Yes	32	220	- -	- -	- -	- -	- -	- -	- -
OL-VC-10081	Yes	23	214	- -	- -	- -	- -	- -	- -	- -
OL-VC-10082	Yes	15	201	- -	- -	- -	- -	- -	- -	- -
OL-VC-10083	Yes	17	206	- -	- -	- -	- -	- -	- -	- -
OL-VC-10084	Yes	21	216	- -	- -	- -	- -	- -	- -	- -
OL-VC-10085	Yes	25	222	- -	- -	- -	- -	- -	- -	- -
OL-VC-10086	Yes	28	225	- -	- -	- -	- -	- -	- -	- -
OL-VC-10087	Yes	32	227	- -	- -	- -	- -	- -	- -	- -
OL-VC-10088	Yes	18	213	- -	- -	- -	- -	- -	- -	- -
OL-VC-10089	Yes	22	221	- -	- -	- -	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
	Boring	Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
OL-VC-10090	Yes	15	210	- -	- -	- -	- -	- -	- -	- -
OL-VC-10091	Yes	17	218	- -	- -	- -	- -	- -	- -	- -
OL-VC-10092	Yes	19	220	- -	- -	- -	- -	- -	- -	- -
OL-VC-10093	Yes	24	229	- -	- -	- -	- -	- -	- -	- -
OL-VC-10094	Yes	30	234	- -	- -	- -	- -	- -	- -	- -
OL-VC-10095	Yes	14	208	- -	- -	- -	- -	- -	- -	- -
OL-VC-10099	Yes	20	227	- -	- -	- -	- -	- -	- -	- -
OL-VC-10100	Yes	20	226	- -	- -	- -	- -	- -	- -	- -
OL-VC-10101	Yes	15	216	- -	- -	- -	- -	- -	- -	- -
OL-VC-10102	Yes	18	224	- -	- -	- -	- -	- -	- -	- -
OL-VC-10103	Yes	21	232	- -	- -	- -	- -	- -	- -	- -
OL-VC-10104	Yes	25	238	- -	- -	- -	- -	- -	- -	- -
OL-VC-10105	Yes	22	236	- -	- -	- -	- -	- -	- -	- -
OL-VC-10106	Yes	27	242	- -	- -	- -	- -	- -	- -	- -
OL-VC-10107	Yes	28	249	- -	- -	- -	- -	- -	- -	- -
OL-VC-20067	Yes	41	96	- -	- -	- -	- -	- -	- -	- -
OL-VC-20068	Yes	45	100	- -	- -	- -	- -	- -	- -	- -
OL-VC-20069	Yes	51	101	0	0	- -	- -	- -	- -	- -
OL-VC-20070	Yes	52	106	0	0	- -	- -	- -	- -	- -
OL-VC-20072	Yes	46	131	1	- -	- -	- -	- -	- -	- -
OL-VC-20073	Yes	41	135	0	- -	- -	- -	- -	- -	- -
OL-VC-20074	Yes	41	140	0	- -	- -	- -	- -	- -	- -
OL-VC-20075	Yes	44	140	0	- -	- -	- -	- -	- -	- -
OL-VC-20076	Yes	40	147	0	- -	- -	- -	- -	- -	- -
OL-VC-20077	Yes	44	147	0	- -	- -	- -	- -	- -	- -
OL-VC-20078	Yes	40	152	0	- -	- -	- -	- -	- -	- -
OL-VC-20079	Yes	44	152	0	- -	- -	- -	- -	- -	- -
OL-VC-20080	Yes	51	109	0	3	- -	- -	- -	- -	- -
OL-VC-20081	Yes	51	111	- -	- -	- -	- -	- -	- -	- -
OL-VC-20082	Yes	51	110	- -	3	- -	- -	- -	- -	- -
OL-VC-30034	Yes	15	44	- -	- -	- -	- -	- -	- -	- -
OL-VC-30035	Yes	16	46	- -	- -	- -	- -	- -	- -	- -
OL-VC-30036	Yes	17	52	1	- -	- -	- -	- -	- -	- -
OL-VC-30037	Yes	17	54	- -	- -	- -	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
OL-VC-30038	Yes	32	71	- -	- -	- -	- -	- -	- -	- -
OL-VC-30039	Yes	18	45	- -	- -	- -	- -	- -	- -	- -
OL-VC-30040	Yes	19	52	0	- -	- -	- -	- -	- -	- -
OL-VC-30041	Yes	22	44	- -	- -	- -	- -	- -	- -	- -
OL-VC-30042	Yes	20	45	- -	- -	- -	- -	- -	- -	- -
OL-VC-30043	Yes	21	47	0	- -	- -	- -	- -	- -	- -
OL-VC-40016	Yes	27	25	0	- -	- -	- -	- -	- -	- -
OL-VC-40017	Yes	37	25	- -	- -	- -	- -	- -	- -	- -
OL-VC-40018	Yes	31	25	-1	- -	- -	- -	- -	- -	- -
OL-VC-40019	Yes	25	26	- -	- -	- -	- -	- -	- -	- -
OL-VC-40021	Yes	17	27	- -	- -	- -	- -	- -	- -	- -
OL-VC-40023	Yes	14	29	0	- -	- -	- -	- -	- -	- -
OL-VC-40024	Yes	14	30	0	- -	- -	- -	- -	- -	- -
OL-VC-40025	Yes	43	26	-3	- -	- -	- -	- -	- -	- -
OL-VC-40026	Yes	36	26	- -	- -	- -	- -	- -	- -	- -
OL-VC-40027	Yes	29	26	- -	- -	- -	- -	- -	- -	- -
OL-VC-40028	Yes	23	27	- -	- -	- -	- -	- -	- -	- -
OL-VC-40029	Yes	20	28	- -	- -	- -	- -	- -	- -	- -
OL-VC-40030	Yes	20	31	-1	- -	- -	- -	- -	- -	- -
OL-VC-40031	Yes	17	30	1	- -	- -	- -	- -	- -	- -
OL-VC-40032	Yes	15	31	0	- -	- -	- -	- -	- -	- -
OL-VC-40033	Yes	46	24	0	-1	- -	- -	- -	- -	- -
OL-VC-40034	Yes	48	25	-2	- -	- -	- -	- -	- -	- -
OL-VC-40035	Yes	48	27	1	- -	- -	- -	- -	- -	- -
OL-VC-40036	Yes	42	27	- -	- -	- -	- -	- -	- -	- -
OL-VC-40038	Yes	43	29	1	- -	- -	- -	- -	- -	- -
OL-VC-40039	Yes	29	28	- -	- -	- -	- -	- -	- -	- -
OL-VC-40040	Yes	36	29	- -	- -	- -	- -	- -	- -	- -
OL-VC-40041	Yes	33	31	0	- -	- -	- -	- -	- -	- -
OL-VC-40042	Yes	20	32	- -	- -	- -	- -	- -	- -	- -
OL-VC-40133	Yes	39	31	1	- -	- -	- -	- -	- -	- -
OL-VC-60054	Yes	3	192	- -	- -	- -	- -	- -	- -	- -
OL-VC-60055	Yes	4	199	- -	- -	- -	- -	- -	- -	- -
OL-VC-60056	Yes	6	207	- -	- -	- -	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
OL-VC-60057	Yes	9	214	- -	- -	- -	- -	- -	- -	- -
OL-VC-60058	Yes	11	217	- -	- -	- -	- -	- -	- -	- -
OL-VC-60059	Yes	2	195	3	- -	- -	- -	- -	- -	- -
OL-VC-60060	Yes	3	207	- -	- -	- -	- -	- -	- -	- -
OL-VC-60061	Yes	4	218	- -	- -	- -	- -	- -	- -	- -
OL-VC-60062	Yes	5	224	- -	- -	- -	- -	- -	- -	- -
OL-VC-60063	Yes	6	229	- -	- -	- -	- -	- -	- -	- -
OL-VC-60064	Yes	8	236	- -	- -	- -	- -	- -	- -	- -
OL-VC-60065	Yes	11	234	- -	- -	- -	- -	- -	- -	- -
OL-VC-60066	Yes	2	204	0	- -	- -	- -	- -	- -	- -
OL-VC-60067	Yes	2	212	0	4	- -	- -	- -	- -	- -
OL-VC-60068	Yes	5	232	- -	- -	- -	- -	- -	- -	- -
OL-VC-60069	Yes	6	240	- -	- -	- -	- -	- -	- -	- -
OL-VC-60070	Yes	11	249	- -	- -	- -	- -	- -	- -	- -
OL-VC-70016	Yes	13	213	- -	- -	- -	- -	- -	- -	- -
OL-VC-70017	Yes	15	220	- -	- -	- -	- -	- -	- -	- -
OL-VC-70018	Yes	16	226	- -	- -	- -	- -	- -	- -	- -
OL-VC-70019	Yes	15	232	- -	- -	- -	- -	- -	- -	- -
OL-VC-70020	Yes	18	238	- -	- -	- -	- -	- -	- -	- -
OL-VC-70021A	Yes	17	232	- -	- -	- -	- -	- -	- -	- -
OL-VC-70022	Yes	16	243	0	- -	- -	- -	- -	- -	- -
OL-VC-70023	Yes	21	240	- -	- -	- -	- -	- -	- -	- -
OL-VC-70024	Yes	19	245	- -	- -	- -	- -	- -	- -	- -
OL-VC-70025	Yes	23	255	0	- -	- -	- -	- -	- -	- -
OL-VC-70026	Yes	20	258	0	- -	- -	- -	- -	- -	- -
OL-VC-70027	Yes	21	261	0	- -	- -	- -	- -	- -	- -
OL-VC-70028	Yes	18	264	-1	- -	- -	- -	- -	- -	- -
OL-VC-70029	Yes	16	264	0	- -	- -	- -	- -	- -	- -
OL-VC-70030	Yes	14	264	0	- -	- -	- -	- -	- -	- -
OL-VC-70031	Yes	14	225	- -	- -	- -	- -	- -	- -	- -
OL-VC-70034	Yes	17	231	- -	- -	- -	- -	- -	- -	- -
OL-VC-80028	Yes	36	155	- -	- -	- -	- -	- -	- -	- -
OL-VC-80029	Yes	25	168	- -	- -	- -	- -	- -	- -	- -
OL-VC-80030	Yes	19	181	- -	- -	- -	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
OL-VC-80031	Yes	16	193	- -	- -	- -	- -	- -	- -	- -
OL-VC-80032	Yes	13	208	- -	- -	- -	- -	- -	- -	- -
OL-VC-80033	Yes	25	158	- -	- -	- -	- -	- -	- -	- -
OL-VC-80034	Yes	20	170	- -	- -	- -	- -	- -	- -	- -
OL-VC-80035	Yes	16	183	- -	- -	- -	- -	- -	- -	- -
OL-VC-80036	Yes	13	193	- -	- -	- -	- -	- -	- -	- -
OL-VC-80050	Yes	18	160	0	- -	- -	- -	- -	- -	- -
OL-VC-80051	Yes	13	183	- -	- -	- -	- -	- -	- -	- -
PP-1		107	59	-1			0	0	- -	- -
PSA-SB-01	Yes	101	142							
PSA-SB-02	Yes	101	140							
PSA-SB-03	Yes	100	140							
PSA-SB-04	Yes	100	142							
PSA-SB-06	Yes	101	138							
SB915-MW-34S	Yes	132	23	- -		- -	- -	- -	- -	- -
SB915-MW-35S	Yes	134	26	- -		- -	- -		- -	- -
SB915-MW-36D	Yes	130	25	-4		5	-6		- -	- -
SB915-MW-42D	Yes	115	36	-6		-1	-1	-3	- -	- -
SB915-MW-53D	Yes	119	21	-5		-4	- -	-10	- -	- -
SB915-MWB-01D	Yes	120	25	10		14	- -	- -	- -	- -
SB915-PZ-01D	Yes	125	23	- -		- -	- -	- -	- -	- -
SB915-PZ-02D	Yes	128	20	0		-4	- -	- -	- -	- -
SB915-PZ-04	Yes	125	34							
SB915-PZ-05	Yes	125	26	8		- -	- -	- -	- -	- -
SB915-PZ-07N	Yes	123	30	0		- -	- -	- -	- -	- -
SB915-SB-01	Yes	134	20	-12		9	7	- -	- -	- -
SB915-SB-03	Yes	131	18	-5		24	- -	- -	- -	- -
SB915-SB-05	Yes	128	18	- -		31	- -	- -	- -	- -
SB915-SB-07	Yes	125	21	- -		0	- -	- -	- -	- -
SB915-SB-09	Yes	123	23	- -		9	- -	- -	- -	- -
SB915-SB-11	Yes	122	26	-7		- -	- -	- -	- -	- -
SB915-SB-12	Yes	123	26	14		- -	- -	- -	- -	- -
SB915-SB-13	Yes	121	28	- -		- -	- -	- -	- -	- -
SB915-SB-14	Yes	122	29	-1		- -	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
SB915-SB-15	Yes	121	30	-12		-1	- -	- -	- -	- -
SB915-SB-16	Yes	122	31	16		- -	- -	- -	- -	- -
SB915-SB-18	Yes	122	34	3		- -	- -	- -	- -	- -
SB915-SB-19	Yes	123	38	- -			- -		- -	- -
SB915-SB-21	Yes	128	24	0		- -	- -	- -	- -	- -
SB915-SB-22	Yes	130	23	1		- -	- -	- -	- -	- -
SB915-SB-30	Yes	129	25	-21		-7	- -	- -	- -	- -
SB915-SB-31	Yes	130	27	-16		- -	- -		- -	- -
SB915-SB-32	Yes	131	24	-15		- -	- -	- -	- -	- -
SB915-SB-33	Yes	133	26	-11		- -	- -		- -	- -
SB915-SB-34	Yes	133	22	-18		- -	- -	- -	- -	- -
SB915-SB-35	Yes	135	25	-15		- -	- -		- -	- -
SB915-SB-37	Yes	131	25	-4		5	-6		-4	-11
SB915-SB-40	Yes	109	38	-5		1	1	0	-1	-1
SB915-SB-41	Yes	110	35	-4		1	- -	- -	- -	- -
SB915-SB-43	Yes	114	31	-3		- -	- -	- -	- -	- -
SB915-SB-44A	Yes	115	27	0		- -	- -	- -	- -	- -
SB915-SB-44B	Yes	116	27	-28		- -	- -	- -	- -	- -
SB915-SB-45A	Yes	116	34	1		1	- -	- -	- -	- -
SB915-SB-45B	Yes	116	32	-36		3	- -	- -	- -	- -
SB915-SB-46B	Yes	115	38	-11		8	- -	- -	- -	- -
SB915-SB-48A	Yes	107	37	0		1	- -	- -	- -	- -
SB915-SB-49A	Yes	114	28	9		- -	- -	- -	- -	- -
SB915-SB-50	Yes	118	24	-8		-5	- -	-7	-11	-12
SB915-SB-51	Yes	118	25	3		- -	- -	- -	- -	- -
SB915-SB-52	Yes	118	22	7		- -	- -	- -	- -	- -
SB915-SB-54A	Yes	116	25	7		0	- -	- -	- -	- -
SB915-SB-55A	Yes	117	29	-1		- -	- -	- -	- -	- -
SB915-SB-57A	Yes	119	20	16		- -	- -	- -	- -	- -
SB915-SB-58A	Yes	117	23	9		- -	- -	- -	- -	- -
SB915-SB-60	Yes	119	23	-25		- -	- -	- -	- -	- -
SB915-SB-61	Yes	120	23	-17		- -	- -	- -	- -	- -
SB915-SB-65	Yes	119	24	-31		- -	- -	- -	- -	- -
SB915-SB-68	Yes	119	25	-15		9	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
SB915-TH-07A		127	37							
SB915-TH-08A		126	40							
SB915-WB-01L	Yes	142	19	- -		7	6	-3	- -	- -
SB915-WB-02L	Yes	133	20	-11		- -	7	8	-7	-4
SB915-WB-03L	Yes	129	15	19		19	- -	16	- -	- -
SB915-WB-04L	Yes	124	22	- -		2	- -	- -	- -	- -
SB915-WB-05R	Yes	119	27	-4		18	- -	19	16	17
SB915-WB-07L		117	33	-10		13	13	8	8	5
SB915-WB-09U		109	42	13		17	- -	- -	- -	- -
SB915-WB-10U		114	39	2		- -	- -	- -	- -	- -
SB915-WB-12U	Yes	119	32	4		- -	- -	- -	- -	- -
SB915-WB-15A	Yes	137	25							
SP-M-201	Yes	53	110	1	- -	0	1	-1	-1	-3
SP-M-202	Yes	52	145	8	1	0	1	0	-1	-1
SP-R-01	Yes	101	135							
SP-R-02	Yes	101	132	1	- -		- -		- -	- -
SP-R-03	Yes	101	125	2	- -		0		0	0
SP-R-04	Yes	101	123	1	0		0		- -	- -
SP-R-05	Yes	100	120	2	-1		-2		-5	-2
SP-R-06	Yes	100	118	4	-2		-2		-3	-6
SP-R-07	Yes	99	116	0	- -		0		0	0
SP-R-08	Yes	97	113	0	- -		-6		-11	- -
SP-R-09	Yes	78	114	-1	- -	0	0	- -	- -	- -
SP-R-10	Yes	75	120	-2	2	- -	4	- -	0	-4
SP-R-11	Yes	80	132	-1	0		0		- -	- -
SP-SB-02	Yes	88	147	0	0	- -	- -	- -	- -	- -
SP-SB-04	Yes	88	139	8	- -		0		- -	- -
SP-SB-05	Yes	89	135	11	- -		2		- -	- -
SP-SB-06	Yes	89	132	8	- -		0		- -	- -
SP-SB-10	Yes	90	117	9	- -	- -	- -	- -	- -	- -
SP-SB-11	Yes	89	114	3	0	-1	- -	- -	- -	- -
SP-SB-12	Yes	89	106	9	-4	-4	- -	- -	- -	- -
SP-SB-13	Yes	90	110	8	0	0	- -	- -	- -	- -
SP-SB-14	Yes	87	103	9	0	1	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
SP-SB-15	Yes	84	101	12	0	0	- -	- -	- -	- -
SP-SB-16	Yes	81	99	2	0	0	- -	- -	- -	- -
SP-SB-17	Yes	77	100	4	- -	0	- -	- -	- -	- -
SP-SB-18	Yes	67	103	5	0	- -	- -	- -	- -	- -
SP-SB-19	Yes	63	104	5	0	- -	- -	- -	- -	- -
SP-SP-02A		93	116	0	- -		-1		- -	- -
SP-SP-03C		73	141	0	-1	-1	-1	0	- -	- -
SP-SP-04C		75	121	2	-1	-2	-3	1	- -	2
SP-SP-05C		70	99	-1	0		0	0	0	0
SP-SP-06C		60	135	3	0	0	-1	0	- -	- -
SP-SP-07C		60	124	1	0	0	0	0	- -	- -
SP-SP-08C		61	111	2	0	-1	-1	-1	- -	-1
SP-SP-09C		91	99	1	0	-1	- -	-1	- -	-1
SP-SP-10BR	Yes	88	106	11	- -	3	0	0	0	-1
SP-SP-11BR	Yes	87	140	23	-1		-1		1	0
SP-SP-12BR	Yes	79	170	1	0		0		- -	0
SP-TB-02		87	135	2	- -		- -		- -	- -
SP-TB-03		88	129	7	- -		1		- -	- -
SP-TB-04		89	129	8	- -		- -		1	1
SP-TB-05		90	121	8	- -		0		- -	- -
SP-TB-07		87	105	4	- -	1	0	- -	- -	0
SP-TB-09		78	101	8	0	- -	- -	- -	- -	- -
SP-TB-10		73	101	21	0	0	- -	- -	- -	- -
SP-TB-11		64	105	15	0	- -	- -	- -	- -	- -
SP-TB-12		69	101	14	0		- -	- -	- -	- -
SP-TB-13		61	112	1	0	- -	- -	- -	- -	- -
SP-TB-14		62	113	1	0	0	- -	- -	- -	- -
SP-TB-15		60	112	0	1	- -	- -	- -	- -	- -
SS-1		111	53	0		0	0	- -	6	7
SY-2	Yes	1	221	0	0	- -	0	- -	- -	- -
TH-301		15	274	2	- -	- -	- -	- -	- -	- -
TH-302		14	273	2	- -	- -	- -	- -	- -	- -
TH-304		9	270	2	- -	- -	- -	- -	- -	- -
TH-305		10	272	0	-1	0	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
TH-307		13	277	1	- -	- -	- -	- -	- -	- -
TH-308		10	274	2	- -	- -	- -	- -	- -	- -
TH-311		7	277	8	- -	- -	- -	- -	- -	- -
TH-312		13	270	1	- -	- -	- -	- -	- -	- -
TH-313		10	270	0	- -	- -	- -	- -	- -	- -
TH-314		8	267	2	- -	- -	- -	- -	- -	- -
TH-315		9	274	0	- -	- -	- -	- -	- -	- -
TH-316		14	272	2	- -	- -	- -	- -	- -	- -
TH-318		11	269	1	- -	- -	- -	- -	- -	- -
TH-325		8	273	2	- -	- -	- -	- -	- -	- -
TH-328		11	277	2	- -	- -	- -	- -	- -	- -
TH-330		12	266	7	- -	- -	- -	- -	- -	- -
TH-332	Yes	18	269	- -	- -	- -	- -	- -	- -	- -
TH-333		17	269	0	- -	- -	- -	- -	- -	- -
TH-334		16	268	4	- -	- -	- -	- -	- -	- -
TH-337		17	273	0	- -	- -	- -	- -	- -	- -
USGS-Ley Creek	Yes	1	236	0	0	- -	0	0	- -	0
USGS-Midway	Yes	32	14	1	-3	-4	-7	-8	-8	-8
USGS-Outlet	Yes	4	3	3	2	- -	2	0	0	-5
USGS-Parkway	Yes	2	129	- -	5	6	15	- -	16	16
USGS-Saddle	Yes	6	36	-3	-2	1	- -	- -	- -	- -
USGS-Spencer Street	Yes	9	287	0	- -	- -	0	-1	-1	-1
USGS-West Trail	Yes	35	23	- -	0	-3	-8	- -	-3	-4
WA-HR-01	Yes	108	137							
WA-MC-B01	Yes	79	145	1	- -	- -	2	1	- -	- -
WA-MC-B02	Yes	80	148	0	0	- -	2	2	- -	- -
WA-MC-B03	Yes	81	150	2	1	- -	- -	- -	- -	- -
WA-MC-B04A	Yes	77	148	0	1	- -	2	2	- -	- -
WA-MC-B05	Yes	79	151	0	-1	-1	-1	0	- -	- -
WA-MC-B06	Yes	77	146	1	0	- -	0	-1	- -	- -
WA-MC-B07	Yes	78	148	0	-1	-1	- -	- -	- -	- -
WA-MC-B10	Yes	79	148	0	0	- -	- -	- -	- -	- -
WA-MC-B13	Yes	78	149	0	0	- -	- -	- -	- -	- -
WA-MC-B14	Yes	78	150	0	1	- -	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
WA-MW-01	Yes	62	158	1	1	1	1		- -	- -
WA-MW-02	Yes	54	166	0	-1	0	0	- -	- -	- -
WA-MW-03	Yes	55	151	3	-4	-1	-4	- -	- -	- -
WA-MW-04	Yes	118	39	-4		- -	- -	- -	- -	- -
WA-MW-100BR	Yes	55	97	0	0		0	0	-1	0
WA-OW-01D	Yes	53	120	0	0	0	0	0	- -	- -
WA-OW-04D		53	114	0	0	0	1	1	- -	- -
WA-OW-05D		54	107	1	0	0	-1	-1	- -	- -
WA-OW-06D		52	121	1	0	1	1	2	- -	- -
WA-OW-07D		52	129	1	0	0	- -	- -	- -	- -
WA-OW-08S	Yes	56	163	-1	- -	- -	- -		- -	- -
WA-OW-09I	Yes	55	163	0	- -	- -	- -		- -	- -
WA-OW-11D	Yes	52	130	1	0	0	0	0	- -	- -
WA-PS-01	Yes	103	142							
WA-PS-03D	Yes	96	149	0	- -		- -		0	-1
WA-PW-01	Yes	62	160	1	-1	0	0		- -	- -
WA-PW-02	Yes	56	159	1	0	-2	-2		- -	- -
WA-TW-01D	Yes	52	120	1	0	0	0	0	- -	- -
WA-WA-01D		55	152	0	6	2	4	0	- -	-7
WA-WA-02D		55	162	0	0	0	0		- -	1
WA-WA-03D		53	169	0	0	1	0	1	- -	1
WA-WA-04D		69	168	0	0	0	-1		- -	- -
WA-WA-05D		80	164	0	0		0		- -	- -
WA-WA-06D		86	145	2	0	-1	-1	-1	- -	- -
WA-WA-07D		68	156	0	0	- -	0	0	- -	- -
WB18-CM107		35	37	-1	- -	- -	- -	- -	- -	- -
WB18-CM108		39	34	1	- -	- -	- -	- -	- -	- -
WB18-CM109		61	37	2	- -	- -	- -	- -	- -	- -
WB18-CM201		34	38	2	- -	- -	- -	- -	- -	- -
WB18-DW101		38	51	0	0		2	-4	- -	- -
WB18-DW103		61	35	1	0	-2	- -	- -	- -	- -
WB18-EB-01C		49	37	-3	- -	- -	- -	- -	- -	- -
WB18-EB-02		62	41	1	- -	- -	- -	- -	- -	- -
WB18-EB-03		68	41	0	- -	2	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
WB18-EB-04		47	39	-2	- -	- -	- -	- -	- -	- -
WB18-EB-05		52	35	-1	0	- -	- -	- -	- -	- -
WB18-EB-06		54	33	1	0	- -	- -	- -	- -	- -
WB18-EB-07		40	38	-1	- -	- -	- -	- -	- -	- -
WB18-EB-08		30	38	2	- -	- -	- -	- -	- -	- -
WB18-EB-11		25	42	6	- -	- -	- -	- -	- -	- -
WB18-GWS-02	Yes	36	63	2	1	- -	- -	- -	- -	- -
WB18-GWS-03	Yes	25	59	2	0	- -	- -	- -	- -	- -
WB18-GWS-04	Yes	22	54	0	0	- -	- -	- -	- -	- -
WB18-GWS-05	Yes	21	49	3	1	- -	- -	- -	- -	- -
WB18-GWS-06	Yes	22	43	1	1	- -	- -	- -	- -	- -
WB18-GWS-07	Yes	19	40	-1	0	- -	- -	- -	- -	- -
WB18-GWS-08	Yes	16	35	-3	- -	- -	- -	- -	- -	- -
WB18-GWS-09	Yes	21	34	0	- -	- -	- -	- -	- -	- -
WB18-GWS-10	Yes	27	34	2	- -	- -	- -	- -	- -	- -
WB18-GWS-11	Yes	40	33	4	- -	- -	- -	- -	- -	- -
WB18-GWS-12	Yes	59	30	0	- -	- -	- -	- -	- -	- -
WB18-GWS-13	Yes	64	34	1	0	- -	- -	- -	- -	- -
WB18-GWS-15	Yes	67	39	3	2	- -	- -	- -	- -	- -
WB18-GWS-16	Yes	78	46	-2	- -	1	- -	- -	- -	- -
WB18-GWS-17	Yes	80	49	1	- -	0	0	- -	- -	- -
WB18-GWS-18	Yes	80	56	2	- -	0	- -	- -	- -	- -
WB18-GWS-19	Yes	80	59	-2	- -	1	- -	- -	- -	- -
WB18-INC-01		62	37	2	- -	- -	- -	- -	- -	- -
WB18-INC-02		61	40	-2	- -	2	- -	- -	- -	- -
WB18-MS104.1		50	42	0	0	- -	- -	- -	- -	- -
WB18-MS105.1		58	39	-1	- -	- -	- -	- -	- -	- -
WB18-MS106.1		41	36	-2	- -	- -	- -	- -	- -	- -
WB18-MW-01D	Yes	31	61	3	0	0	-2	-2	- -	1
WB18-MW-02D	Yes	21	50	3	1	-1	-2	0	- -	1
WB18-MW-03BR	Yes	21	42	1	2	8	- -	1	2	2
WB18-MW-04BR	Yes	30	34	7	1	0	- -	-13	-10	-12
WB18-MW-05D	Yes	49	31	-1	0	0	- -	0	- -	- -
WB18-MW-06BR	Yes	49	51	0	0		-2	2	1	0

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
WB18-MW-06D	Yes	49	50	0	0		-1	2	- -	- -
WB18-MW-07D	Yes	52	59	-2	0		0	3	2	2
WB18-MW-08D	Yes	80	52	1	- -		0	0	- -	- -
WB18-MW-09BR	Yes	46	79	0	0	0	1	- -	1	0
WB18-MW-09D	Yes	46	80	0	1	1	-1	0	- -	- -
WB18-MW-10D	Yes	59	68	0	-1		-1	-1	- -	- -
WB18-MW-11I	Yes	64	35	6	- -	- -	- -	- -	- -	- -
WB18-MW-12S	Yes	52	84	-1	- -	- -	- -	- -	- -	- -
WB18-MW-13BR2	Yes	81	62	4	- -	3	3	2	3	2
WB18-MW-13D	Yes	78	62	-5	- -	4	0	1	- -	- -
WB18-MW-14BR	Yes	83	42	-2	- -	1	3	3	2	0
WB18-MW-14D	Yes	80	42	-4	- -	2	0	- -	- -	- -
WB18-MW-15S	Yes	62	32	- -	- -	- -	- -	- -	- -	- -
WB18-MW-16D	Yes	50	41	0	0	-1	-1	-1	-1	-1
WB18-MW-17D	Yes	23	38	-5	-1	0	- -	1	- -	- -
WB18-MW-18D	Yes	63	38	8	-2	-3	- -	3	-1	1
WB18-MW-19BR2	Yes	40	66	-2	0	0	1	0	0	0
WB18-MW-20BR	Yes	22	55	1	1	1	-1	1	5	1
WB18-MW-21D	Yes	35	50	-2	-1	0	-3	-2	- -	- -
WB18-MW-22D2	Yes	42	60	0	0		0	- -	- -	- -
WB18-MW-23I	Yes	56	44	-1	- -	2	- -	- -	- -	- -
WB18-MW-OW-01S	Yes	31	34	7	- -	- -	- -	- -	- -	- -
WB18-MW-OW-03S	Yes	22	50	2	- -	- -	- -	- -	- -	- -
WB18-MW-OW-05G	Yes	32	34	2	0	- -	- -	- -	- -	- -
WB18-MW-TW-04D	Yes	31	62	2	1	-2	-5	-2	- -	- -
WB18-OB-01	Yes	50	57	-3	- -		1	- -	-1	- -
WB18-OB-02	Yes	47	56	-1	- -	0	-2	- -	0	- -
WB18-SB-01	Yes	49	84	0	0	- -	- -	- -	- -	- -
WB18-SB-02	Yes	42	71	1	0	- -	- -	- -	- -	- -
WB18-SB-03	Yes	32	62	2	-1	- -	- -	- -	- -	- -
WB18-SB-04	Yes	27	60	2	2	- -	- -	- -	- -	- -
WB18-SB-05	Yes	23	57	3	2	- -	- -	- -	- -	- -
WB18-SB-06	Yes	22	53	1	2	- -	- -	- -	- -	- -
WB18-SB-07	Yes	21	51	2	1	- -	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
WB18-SB-08	Yes	21	48	3	2	- -	- -	- -	- -	- -
WB18-SB-09BR	Yes	25	46	-2	6	3	2	3	2	2
WB18-SB-10	Yes	21	43	2	-1	- -	- -	- -	- -	- -
WB18-SB-11	Yes	20	40	1	2	- -	- -	- -	- -	- -
WB18-SB-12	Yes	17	38	8	-2	- -	- -	- -	- -	- -
WB18-SB-13BR	Yes	15	37	4	-1	-3	- -	-9	-8	-8
WB18-SB-14	Yes	15	35	-1	-1	- -	- -	- -	- -	- -
WB18-SB-15	Yes	18	34	2	0	- -	- -	- -	- -	- -
WB18-SB-16BR	Yes	25	33	-1	1	-2	- -	1	0	1
WB18-SB-17	Yes	35	33	5	-1	- -	- -	- -	- -	- -
WB18-SB-18	Yes	47	31	7	- -	- -	- -	- -	- -	- -
WB18-SB-19BR	Yes	39	66	19	0	0	-3	-3	-3	-3
WB18-SB-20	Yes	61	29	5	14	- -	- -	- -	- -	- -
WB18-SB-21	Yes	65	31	2	2	- -	- -	- -	- -	- -
WB18-SB-22	Yes	67	33	4	2	- -	- -	- -	- -	- -
WB18-SB-23	Yes	67	35	2	2	- -	- -	- -	- -	- -
WB18-SB-25	Yes	71	40	5	10	- -	- -	- -	- -	- -
WB18-SB-26	Yes	55	84	7	0	- -	- -	- -	- -	- -
WB18-SB-27NM	Yes	42	32	1	- -	- -	- -	- -	- -	- -
WB18-SB-28NM	Yes	39	33	-13	2	- -	- -	- -	- -	- -
WB18-SB-29NM	Yes	20	34	-2	1	- -	- -	- -	- -	- -
WB18-SB-30NM	Yes	31	35	-3	0	- -	- -	- -	- -	- -
WB18-SB-31NM	Yes	33	41	-2	0	- -	- -	- -	- -	- -
WB18-SB-32	Yes	57	76	-1	0		- -	- -	- -	- -
WB18-SB-33	Yes	54	67	1	0		- -	- -	- -	- -
WB18-SB-34	Yes	56	62	0	-1		- -	- -	- -	- -
WB18-SB-35	Yes	60	59	1	1		- -	- -	- -	- -
WB18-SB-36	Yes	49	58	1	0		- -	- -	- -	- -
WB18-SB-37	Yes	51	54	1	0	0	- -	- -	- -	- -
WB18-SB-38	Yes	41	55	2	-1		- -	- -	- -	- -
WB18-SB-39	Yes	39	50	1	0		- -	- -	- -	- -
WB18-SB-40	Yes	49	48	0	0		- -	- -	- -	- -
WB18-SB-41	Yes	21	41	1	0	- -	- -	- -	- -	- -
WB18-SB-42	Yes	18	39	-2	3	- -	- -	- -	- -	- -

Table 4

Model Representation of Geologic Units

Well ID	New Boring	Model Location		Difference between Observed and Modeled Unit Tops (feet)						
		Column	Row	Layer 1	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8
WB18-SB-43	Yes	72	50	0	- -		- -	- -	- -	- -
WB18-SB-44	Yes	73	58	0	- -	0	- -	- -	- -	- -
WB18-SB-46BR	Yes	64	36	0	-1	0	- -	-2	-1	-1
WB18-SB-47	Yes	47	35	2	0	- -	- -	- -	- -	- -
WB18-SB-48	Yes	33	38	-2	- -	- -	- -	- -	- -	- -
WB18-SB-49	Yes	33	44	1	- -	- -	- -	- -	- -	- -
WB18-SB-50	Yes	34	54	2	1		- -	- -	- -	- -
WB18-SB-73	Yes	24	50	0	-1	- -	- -	- -	- -	- -
WB18-SB-75	Yes	26	45	3	0	- -	- -	- -	- -	- -
WB18-TH-100		54	102	0	0	-1	0	- -	- -	- -

Notes: "__" (Blank) - The model layer is not defined at the borehole location.

"--" - The model layer is defined at this location, but the unit was not observed in the boring log, or there is no comparable hydrogeologic unit to compare to the model layer top (i.e., in the area of the Mixed Ninemile unit for Layer 5).

-1 - A negative number indicates that the model layer elevation is lower than the elevation of the top of stratigraphic unit in the boring.

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
BF-BFMW-01D	1.00	Density-Marl	7-Jul-08	3	53
BF-BFMW-01D	1.00	Density-Marl	7-Aug-03	3	53
BF-BFMW-01D	1.00	Density-Marl	24-Feb-03	3	53
BF-BFMW-01D	1.00	Density-Marl	27-Dec-05	3	53
BF-BFMW-01I	1.00	Density-Marl	6-Aug-03	3	49
BF-BFMW-01I	1.00	Density-Marl	20-Feb-03	3	49
BF-BFMW-01S	1.00	Density-Solvay	7-Aug-03	2	17
BF-BFMW-01S	1.00	Density-Solvay	21-Feb-03	2	17
BF-BFMW-01S	1.00	Density-Solvay	27-Dec-05	2	17
BF-BFMW-02I	1.00	Density-Marl	28-Dec-05	3	50
BF-BFMW-02S2	1.00	Density-Solvay	28-Dec-05	2	25
BF-BFMW-03I	1.00	Density-Marl	18-Aug-03	3	53
BF-BFMW-03I	1.00	Density-Marl	25-Feb-03	3	53
BF-BFMW-03I	1.00	Density-Marl	28-Dec-05	3	53
BF-BFMW-03S	1.00	Density-Solvay	26-Feb-03	2	23
BF-BFMW-03S	1.00	Density-Solvay	28-Dec-05	2	23
BF-BFMW-04D	1.00	Density-Till	19-Aug-03	7	67
BF-BFMW-04D	1.00	Density-Till	28-Feb-03	7	67
BF-BFMW-04I	1.00	Density-Marl	19-Aug-03	3	47
BF-BFMW-04I	1.00	Density-Marl	3-Mar-03	3	47
BF-BFMW-04I	1.00	Density-Marl	29-Dec-05	3	47
BF-BFMW-04S	1.00	Density-Solvay	4-Mar-03	2	17
BF-BFMW-04S	1.00	Density-Solvay	29-Dec-05	2	17
BF-BFMW-05I	1.00	Density-Marl	20-Aug-03	3	42
BF-BFMW-05I	1.00	Density-Marl	27-Feb-03	3	42
BF-BFMW-05S	1.00	Density-Solvay	27-Feb-03	2	21
BF-BFMW-06I	1.02	Density-Marl	8-Aug-03	3	47
BF-BFMW-06I	1.02	Density-Marl	7-Mar-03	3	47
BF-BFMW-06I	1.02	Density-Marl	28-Dec-05	3	47
BF-BFMW-06S	1.00	Density-Solvay	5-Aug-03	2	17
BF-BFMW-06S	1.00	Density-Solvay	7-Mar-03	2	17

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
BF-BFMW-07S	1.00	Density-Solvay	18-Aug-03	2	9
BF-BFMW-07S	1.00	Density-Solvay	19-Feb-03	2	9
BF-BFMW-07S	1.00	Density-Solvay	28-Dec-05	2	9
BF-BFMW-08S	1.00	Density-Solvay	28-Dec-05	2	20
HB-HB-01D	1.05	Density-Sand and Gravel	12-Mar-07	6	89
HB-HB-01S	1.00	Density-Fill	31-Mar-05	2	7
HB-HB-01S	1.00	Density-Fill	12-Mar-07	2	7
HB-HB-02I	1.06	Density-HB Sand	31-Mar-05	3	27
HB-HB-02I	1.06	Density-HB Sand	15-Mar-07	3	27
HB-HB-02S	1.00	Density-Fill	31-Mar-05	2	9
HB-HB-02S	1.00	Density-Fill	15-Mar-07	2	9
HB-HB-03S	1.00	Density-Fill	31-Mar-05	2	10
HB-HB-03S	1.00	Density-Fill	8-Mar-07	2	10
HB-HB-04D	1.03	Density-Fine Sand/Silt	14-Mar-07	5	93
HB-HB-04S	1.01	Density-Fill	14-Mar-07	2	14
HB-HB-05D	1.07	Density-Sand and Gravel	13-Mar-07	6	103
HB-HB-05I	1.00	Density-Solvay	13-Mar-07	2	49
HB-HB-05S	1.00	Density-Solvay	13-Mar-07	2	12
HB-HB-06S	1.01	Density-Solvay	20-Mar-07	2	8
HB-HB-07S	1.00	Density-Till	19-Mar-07	7	6
HB-HB-08D	1.02	Density-Silt/Clay	19-Mar-07	4	63
HB-HB-08I	1.00	Density-Marl	19-Mar-07	3	17
HB-HB-08S	1.00	Density-Fill	19-Mar-07	2	8
HB-HB-09S	1.00	Density-Solvay	19-Mar-07	2	10
HB-HB-11I	1.00	Density-Marl	15-Mar-07	3	40
HB-HB-11S	1.00	Density-Solvay	15-Mar-07	2	9
HB-HB-12D	1.00	Density-Silt/Clay	16-Mar-07	4	83
HB-HB-12I	1.00	Density-Marl	16-Mar-07	3	43
HB-HB-12S	1.00	Density-Solvay	16-Mar-07	2	11
HB-HB-13D	1.01	Density-Silt/Clay	16-Mar-07	4	81
HB-HB-16D	1.06	Density-Fine Sand/Silt	13-Mar-07	5	102

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
HB-HB-17D	1.00	Density-Silt/Clay	16-Mar-07	4	72
HB-HB-18S	1.00	Density-Fill	20-Mar-07	2	9
HB-HB-19S	1.00	Density-Fill	20-Mar-07	2	9
HB-HB-20D	1.11	Density-Sand and Gravel	22-Mar-07	6	130
HB-HB-20I	1.02	Density-Marl	22-Mar-07	3	33
HB-HB-20S	1.00	Density-Fill	22-Mar-07	2	9
HB-HB-21I	1.00	Density-Marl	20-Mar-07	3	25
HB-MW-22	1.00	Density-Marl	5-Mar-07	3	9
HB-MW-23	1.01	Density-Marl	5-Mar-07	3	9
HB-MW-24	1.01	Density-Fill	7-Mar-07	2	9
HB-MW-25	1.00	Density-Fill	7-Mar-07	2	9
HB-MW-26	1.00	Density-Fill	5-Mar-07	2	10
HB-MW-27	1.00	Density-Marl	7-Mar-07	3	9
HB-WA-08S	1.00	Density-Fill Solvay	5-Mar-07	2	14
HB-WB-BL	1.01	Density-Till	14-Mar-07	7	83
MPS-MW-01BR	1.00	Density-Bedrock	23-Jun-08	8	22
MPS-MW-02BR	1.00	Density-Bedrock	24-Jun-08	8	40
OL-STA-10108	1.10	Density-Silt/Clay	11-Oct-06	8	63
OL-STA-10108	1.10	Density-Silt/Clay	11-Oct-06	8	63
OL-STA-10108	1.08	Density-Silt/Clay	10-Oct-06	8	63
OL-STA-10108	1.08	Density-Silt/Clay	12-Oct-06	8	71
OL-STA-10108	1.13	Density-Fine Sand/Silt	18-Oct-06	8	131
OL-STA-10108	1.06	Density-Sand and Gravel	20-Oct-06	8	142
OL-STA-10108	1.06	Density-Sand and Gravel	20-Oct-06	8	146
OL-STA-10108	1.11	Density-Bedrock	2-Nov-06	8	174
OL-STA-10108	1.11	Density-Bedrock	2-Nov-06	8	174
OL-STA-20087	1.05	Density-Pore Water		2	10
OL-STA-30033	1.08	Density-Marl	19-Sep-06	8	21
OL-STA-30033	1.13	Density-Silt/Clay	20-Sep-06	8	46
OL-STA-30033	1.12	Density-Silt/Clay	20-Sep-06	8	50
OL-STA-30033	1.11	Density-Silt/Clay	20-Sep-06	8	54

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
OL-STA-30033	1.04	Density-Fine Sand/Silt	21-Sep-06	8	62
OL-STA-30033	1.05	Density-Fine Sand/Silt	22-Sep-06	8	66
OL-STA-30033	1.05	Density-Fine Sand/Silt	22-Sep-06	8	70
OL-STA-30033	1.06	Density-Sand and Gravel	26-Sep-06	8	80
OL-STA-30033	1.06	Density-Sand and Gravel	27-Sep-06	8	102
OL-STA-30033	1.07	Density-Bedrock	27-Sep-06	8	116
OL-STA-40002-SB	1.10	Density-Pore Water		2	5
OL-STA-40003-SB	1.09	Density-Pore Water		2	5
OL-STA-40055	1.07	Density-Pore Water		2	10
OL-STA-40056	1.02	Density-Pore Water		2	10
OL-STA-40057	1.00	Density-Pore Water		2	9
OL-STA-60016-SB	1.01	Density-Pore Water		2	5
OL-STA-60017-SB	1.04	Density-Pore Water		2	5
OL-STA-60018-SB	1.00	Density-Pore Water		2	5
OL-STA-60019-SB	1.00	Density-Pore Water		2	5
OL-STA-60072	1.04	Density-Pore Water		2	9
OL-STA-60078	1.03	Density-Pore Water		2	9
OL-STA-60081	1.05	Density-Pore Water		2	10
OL-STA-60087	1.02	Density-Pore Water		2	10
OL-STA-60090	1.00	Density-Pore Water		2	9
OL-STA-60096	1.01	Density-Pore Water		2	8
OL-STA-70005-SB	1.02	Density-Pore Water		2	5
OL-STA-70006-SB	1.02	Density-Pore Water		2	5
OL-STA-70007-SB	1.07	Density-Pore Water		2	5
OL-STA-70008-SB	1.04	Density-Pore Water		2	5
OL-STA-70040	1.05	Density-Pore Water		2	8
OL-STA-70042	1.00	Density-Pore Water		2	9
OL-STA-70043	1.00	Density-Pore Water		2	9
OL-VC-20111	1.03	Density-Pore Water		2	5
OL-VC-20113	1.05	Density-Pore Water		2	9
OL-VC-20118	1.02	Density-Pore Water		2	6

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
OL-VC-20119	1.04	Density-Pore Water		2	8
OL-VC-20133	1.08	Density-Pore Water		2	8
OL-VC-40083	1.07	Density-Pore Water		2	8
OL-VC-40084	1.05	Density-Pore Water		2	8
OL-VC-40085	1.06	Density-Pore Water		2	8
OL-VC-40087	1.05	Density-Pore Water		2	8
OL-VC-40088	1.05	Density-Pore Water		2	8
OL-VC-40089	1.06	Density-Pore Water		2	8
OL-VC-40091	1.06	Density-Pore Water		2	8
OL-VC-40092	1.06	Density-Pore Water		2	8
OL-VC-40093	1.06	Density-Pore Water		2	8
OL-VC-40126	1.06	Density-Pore Water		2	8
OL-VC-40127	1.06	Density-Pore Water		2	8
OL-VC-40128	1.06	Density-Pore Water		2	8
OL-VC-40129	1.08	Density-Pore Water		2	8
OL-VC-40130	1.08	Density-Pore Water		2	8
OL-VC-40131	1.08	Density-Pore Water		2	8
OL-VC-40149	1.01	Density-Pore Water		2	6
OL-VC-40151	1.01	Density-Pore Water		2	9
OL-VC-40154	1.02	Density-Pore Water		2	9
OL-VC-40157	1.02	Density-Pore Water		2	9
OL-VC-40165	1.04	Density-Pore Water		2	9
OL-VC-40168	1.00	Density-Pore Water		2	5
OL-VC-40172	1.01	Density-Pore Water		2	8
OL-VC-40179	1.02	Density-Pore Water		2	8
OL-VC-40184	1.05	Density-Pore Water		2	5
OL-VC-60125	1.01	Density-Pore Water		2	9
OL-VC-60127	1.01	Density-Pore Water		2	8
OL-VC-60129	1.04	Density-Pore Water		2	9
OL-VC-60150	1.01	Density-Pore Water		2	9
OL-VC-60152	1.00	Density-Pore Water		2	8

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
OL-VC-60154	1.02	Density-Pore Water		2	9
OL-VC-60162	1.01	Density-Pore Water		2	9
OL-VC-60168	1.01	Density-Pore Water		2	9
OL-VC-60171	1.01	Density-Pore Water		2	9
OL-VC-60179	1.02	Density-Pore Water		2	6
OL-VC-60181	1.01	Density-Pore Water		2	9
OL-VC-60191	1.04	Density-Pore Water		2	8
OL-VC-70057	1.02	Density-Pore Water		2	8
OL-VC-70058	1.02	Density-Pore Water		2	8
OL-VC-70059	1.02	Density-Pore Water		2	8
OL-VC-70061	1.05	Density-Pore Water		2	8
OL-VC-70062	1.04	Density-Pore Water		2	8
OL-VC-70063	1.04	Density-Pore Water		2	8
OL-VC-70089	1.00	Density-Pore Water		2	9
OL-VC-70093	1.01	Density-Pore Water		2	9
OL-VC-70100	1.01	Density-Pore Water		2	9
OL-VC-70102	1.04	Density-Pore Water		2	8
P1	1.00	Density-Pore Water		1	2
P10	1.00	Density-Pore Water		1	2
P11	1.00	Density-Pore Water		1	2
P12	1.00	Density-Pore Water		1	3
P15	1.00	Density-Pore Water		1	6
P16	1.01	Density-Pore Water		1	2
P18	1.00	Density-Pore Water		1	2
P19	1.00	Density-Pore Water		1	3
P20	1.00	Density-Pore Water		1	2
P22	1.00	Density-Pore Water		1	4
P23	1.00	Density-Pore Water		1	4
P24	1.00	Density-Pore Water		1	4
P25	1.01	Density-Pore Water		1	4
P27	1.01	Density-Pore Water		1	4

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
P29	1.00	Density-Pore Water		1	4
P3	1.00	Density-Pore Water		1	4
P30	1.01	Density-Pore Water		1	4
P31	1.01	Density-Pore Water		1	4
P32	1.01	Density-Pore Water		1	4
P33	1.01	Density-Pore Water		1	3
P36	1.03	Density-Pore Water		1	2
P38	1.03	Density-Pore Water		1	2
P39	1.02	Density-Pore Water		1	4
P4	1.00	Density-Pore Water		1	4
P40	1.02	Density-Pore Water		1	3
P41	1.02	Density-Pore Water		1	3
P42	1.01	Density-Pore Water		1	3
P43	1.01	Density-Pore Water		1	3
P44	1.01	Density-Pore Water		1	3
P46	1.02	Density-Pore Water		1	2
P49	1.02	Density-Pore Water		1	3
P50	1.01	Density-Pore Water		1	3
P51	1.01	Density-Pore Water		1	3
P52	1.01	Density-Pore Water		1	3
P53	1.04	Density-Pore Water		1	2
P57	1.02	Density-Pore Water		1	5
P58	1.01	Density-Pore Water		1	3
P59	1.01	Density-Pore Water		1	3
P6	1.01	Density-Pore Water		1	2
P63	1.01	Density-Pore Water		1	3
P64	1.01	Density-Pore Water		1	4
P65	1.01	Density-Pore Water		1	4
P66	1.00	Density-Pore Water		1	2
P69	1.01	Density-Pore Water		1	3
P70	1.02	Density-Pore Water		1	3

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
P73	1.01	Density-Pore Water		1	2
P78	1.01	Density-Pore Water		1	3
P79	1.01	Density-Pore Water		1	2
P8	1.00	Density-Pore Water		1	6
P80	1.01	Density-Pore Water		1	3
P81	1.00	Density-Pore Water		1	2
P83	1.00	Density-Pore Water		1	4
P84	1.00	Density-Pore Water		1	4
P85	1.01	Density-Pore Water		1	4
P9	1.00	Density-Pore Water		1	4
SB915-MW-34S	1.00	Density-Solvay	19-Sep-06	2	13
SB915-MW-35S	1.01	Density-Solvay	19-Sep-06	2	13
SB915-MW-36D	1.00	Density-Till	18-Sep-06	7	113
SB915-MW-36D	1.00	Density-Till	18-Sep-06	7	113
SB915-MW-36I	1.07	Density-Solvay	18-Sep-06	2	57
SB915-MW-40S	1.00	Density-Solvay	15-Sep-06	2	40
SB915-MW-42D	1.05	Density-Sand and Gravel	14-Sep-06	6	127
SB915-MW-42I	1.05	Density-Solvay	14-Sep-06	2	64
SB915-MW-53D	1.00	Density-Sand and Gravel	14-Sep-06	6	115
SB915-MW-53I	1.07	Density-Solvay	14-Sep-06	2	67
SB915-PZ-01D	1.02	Density-Solvay	19-Sep-06	2	55
SB915-PZ-01I	1.04	Density-Solvay	19-Sep-06	2	40
SB915-PZ-02D	1.06	Density-Solvay	20-Sep-06	2	55
SB915-PZ-02I	1.04	Density-Solvay	20-Sep-06	2	40
SB915-PZ-02N	1.01	Density-Sand and Gravel	20-Sep-06	6	81
SB915-PZ-07D	1.04	Density-Solvay	21-Sep-06	2	58
SB915-PZ-07D	1.04	Density-Solvay	21-Sep-06	2	58
SB915-PZ-07I	1.04	Density-Solvay	21-Sep-06	2	35
SB915-PZ-07N	1.04	Density-Mixed 9 mile	21-Sep-06	5	73
SB915-PZ-07S	1.00	Density-Solvay	21-Sep-06	2	13
SB915-WB-01L	1.00	Density-Till	19-Sep-06	7	72

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
SB915-WB-01U	1.00	Density-Fine Sand/Silt	19-Sep-06	5	37
SB915-WB-02L	1.05	Density-Sand and Gravel	13-Sep-06	6	99
SB915-WB-02U	1.00	Density-Sand and Gravel	13-Sep-06	6	38
SB915-WB-04L	1.01	Density-Sand and Gravel	13-Sep-06	6	94
SB915-WB-04U	1.00	Density-Mixed 9 mile	13-Sep-06	4	34
SB915-WB-05L	1.07	Density-Sand and Gravel	12-Sep-06	6	115
SB915-WB-05M	1.01	Density-Sand and Gravel	8-Sep-06	6	60
SB915-WB-05R	1.13	Density-Bedrock	8-Sep-06	8	151
SB915-WB-05U	1.01	Density-Solvay	8-Sep-06	2	9
SB915-WB-07L	1.04	Density-Till	8-Sep-06	7	75
SB915-WB-07U	1.01	Density-Sand and Gravel	8-Sep-06	6	51
SB915-WB-10U	1.02	Density-Fine Sand/Silt	11-Sep-06	5	10
SB915-WB-11U	1.02	Density-Silt/Clay	8-Sep-06	4	18
SP-SP-03B	1.00	Density-Silt/Clay	29-Mar-06	4	39
SP-SP-03C	1.01	Density-Sand and Gravel	1-Jul-08	6	71
SP-SP-03C	1.01	Density-Sand and Gravel	29-Mar-06	6	71
SP-SP-04B	1.02	Density-Fine Sand/Silt	30-Mar-06	5	57
SP-SP-04C	1.06	Density-Fine Sand/Silt	1-Jul-08	5	81
SP-SP-04C	1.07	Density-Fine Sand/Silt	30-Mar-06	5	81
SP-SP-06C	1.04	Density-Sand and Gravel	1-Jul-08	6	101
SP-SP-07B	1.01	Density-Fine Sand/Silt	31-Mar-06	5	49
SP-SP-07C	1.00	Density-Sand and Gravel	1-Jul-08	6	93
SP-SP-07C	1.00	Density-Sand and Gravel	31-Mar-06	6	93
SP-SP-08B	1.00	Density-Fine Sand/Silt	30-Mar-06	5	53
SP-SP-08C	1.00	Density-Sand and Gravel	30-Jun-08	6	83
SP-SP-08C	1.02	Density-Sand and Gravel	30-Mar-06	6	83
SP-SP-09C	1.00	Density-Sand and Gravel	17-Jul-08	6	47
SP-SP-10BR	1.01	Density-Bedrock	30-Jun-08	8	79
SP-SP-11BR	1.01	Density-Bedrock	27-Jun-08	8	90
SP-SP-12BR	1.01	Density-Bedrock	25-Jun-08	8	58
USGS-Ley Creek	1.01	Density-Marl	30-Nov-04	5	15

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
USGS-Ley Creek	1.01	Density-Marl	30-Nov-04	5	17
USGS-Ley Creek	1.02	Density-Marl	30-Nov-04	5	20
USGS-Ley Creek	1.03	Density-Marl	30-Nov-04	5	21
USGS-Ley Creek	1.04	Density-Marl	30-Nov-04	5	24
USGS-Ley Creek	1.04	Density-Marl	30-Nov-04	5	26
USGS-Ley Creek	1.03	Density-Silt/Clay	30-Nov-04	5	29
USGS-Ley Creek	1.04	Density-Silt/Clay	30-Nov-04	5	31
USGS-Ley Creek	1.06	Density-Silt/Clay	30-Nov-04	5	35
USGS-Ley Creek	1.05	Density-Silt/Clay	30-Nov-04	5	37
USGS-Ley Creek	1.06	Density-Silt/Clay	30-Nov-04	5	40
USGS-Ley Creek	1.05	Density-Silt/Clay	30-Nov-04	5	42
USGS-Ley Creek	1.05	Density-Silt/Clay	30-Nov-04	5	44
USGS-Ley Creek	1.04	Density-Fine Sand/Silt	30-Nov-04	5	46
USGS-Ley Creek	1.03	Density-Fine Sand/Silt	30-Nov-04	5	49
USGS-Ley Creek	1.03	Density-Fine Sand/Silt	30-Nov-04	5	51
USGS-Ley Creek	1.01	Density-Fine Sand/Silt	30-Nov-04	5	55
USGS-Ley Creek	1.00	Density-Fine Sand/Silt	30-Nov-04	5	60
USGS-Ley Creek	1.00	Density-Fine Sand/Silt	30-Nov-04	5	64
USGS-Ley Creek	1.00	Density-Fine Sand/Silt	30-Nov-04	5	69
USGS-Ley Creek	1.00	Density-Fine Sand/Silt	30-Nov-04	5	75
USGS-Ley Creek	1.01	Density-Sand and Gravel	30-Nov-04	5	80
USGS-Ley Creek	1.03	Density-Sand and Gravel	30-Nov-04	5	84
USGS-Ley Creek	1.06	Density-Sand and Gravel	30-Nov-04	5	89
USGS-Ley Creek	1.05	Density-Sand and Gravel	30-Nov-04	5	94
USGS-Ley Creek	1.06	Density-Sand and Gravel	30-Nov-04	5	97
USGS-Ley Creek	1.06	Density-Sand and Gravel	30-Nov-04	5	100
USGS-Ley Creek	1.06	Density-Sand and Gravel	30-Nov-04	5	102
USGS-Ley Creek	1.05	Density-Sand and Gravel	30-Nov-04	5	105
USGS-Midway	1.00	Density-Marl	30-Nov-04	5	12
USGS-Midway	1.00	Density-Marl	30-Nov-04	5	16
USGS-Midway	1.00	Density-Silt/Clay	30-Nov-04	5	21

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
USGS-Midway	1.00	Density-Silt/Clay	30-Nov-04	5	25
USGS-Midway	1.00	Density-Fine Sand/Silt	30-Nov-04	5	36
USGS-Midway	1.00	Density-Fine Sand/Silt	30-Nov-04	5	40
USGS-Midway	1.00	Density-Fine Sand/Silt	30-Nov-04	5	45
USGS-Midway	1.00	Density-Sand and Gravel	30-Nov-04	5	50
USGS-Midway	1.00	Density-Till	30-Nov-04	5	56
USGS-Midway	1.01	Density-Till	30-Nov-04	5	61
USGS-Outlet	1.00	Density-Marl		5	16
USGS-Outlet	1.00	Density-Marl		5	22
USGS-Outlet	1.00	Density-Marl		5	27
USGS-Outlet	1.01	Density-Marl		5	33
USGS-Outlet	1.01	Density-Marl		5	38
USGS-Outlet	1.01	Density-Marl		5	42
USGS-Outlet	1.02	Density-Fine Sand/Silt		5	63
USGS-Outlet	1.03	Density-Fine Sand/Silt		5	67
USGS-Outlet	1.03	Density-Fine Sand/Silt		5	72
USGS-Outlet	1.10	Density-Fine Sand/Silt		5	78
USGS-Outlet	1.09	Density-Fine Sand/Silt		5	83
USGS-Outlet	1.16	Density-Fine Sand/Silt		5	87
USGS-Outlet	1.12	Density-Fine Sand/Silt		5	92
USGS-Outlet	1.17	Density-Sand and Gravel		5	103
USGS-Outlet	1.11	Density-Sand and Gravel		5	107
USGS-Outlet	1.19	Density-Sand and Gravel		5	112
USGS-Outlet	1.15	Density-Sand and Gravel		5	118
USGS-Outlet	1.06	Density-till		5	147
USGS-Outlet-D	1.14	Density-Bedrock	12-Nov-02	7	155
USGS-Outlet-S	1.10	Density-Sand and Gravel	15-Nov-02	6	115
USGS-Parkway	1.06	Density-Marl	1-Sep-03	3	25
USGS-Parkway	1.07	Density-Marl	1-Sep-03	3	26
USGS-Parkway	1.08	Density-Marl	1-Sep-03	3	29
USGS-Parkway	1.00	Density-Marl	1-Sep-03	3	31

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
USGS-Parkway	1.08	Density-Marl	1-Sep-03	3	34
USGS-Parkway	1.00	Density-Marl	1-Sep-03	3	37
USGS-Parkway	1.09	Density-Marl	1-Sep-03	3	40
USGS-Parkway	1.00	Density-Marl	1-Sep-03	3	42
USGS-Parkway	1.08	Density-Marl	1-Sep-03	3	45
USGS-Parkway	1.09	Density-Marl	1-Sep-03	3	46
USGS-Parkway	1.10	Density-Marl	1-Sep-03	3	49
USGS-Parkway	1.10	Density-Marl	1-Sep-03	3	51
USGS-Parkway	1.10	Density-Marl	1-Sep-03	3	54
USGS-Parkway	1.09	Density-Marl	1-Sep-03	3	56
USGS-Parkway	1.10	Density-Marl	1-Sep-03	3	60
USGS-Parkway	1.10	Density-Marl	1-Sep-03	3	62
USGS-Parkway	1.09	Density-Silt/Clay	1-Sep-03	3	65
USGS-Parkway	1.09	Density-Silt/Clay	1-Sep-03	3	66
USGS-Parkway	1.08	Density-Silt/Clay	1-Sep-03	3	69
USGS-Parkway	1.09	Density-Silt/Clay	1-Sep-03	3	71
USGS-Parkway-BR	1.10	Density-Bedrock	30-Oct-03	8	116
USGS-Parkway-D	1.08	Density-Bedrock	30-Oct-03	8	93
USGS-Saddle	1.04	Density-Onondaga Lake Deposits	1-Oct-03	5	17
USGS-Saddle	1.03	Density-Onondaga Lake Deposits	1-Oct-03	5	20
USGS-Saddle	1.05	Density-Marl	1-Oct-03	5	21
USGS-Saddle	1.04	Density-Marl	1-Oct-03	5	23
USGS-Saddle	1.06	Density-Silt/Clay	1-Oct-03	5	27
USGS-Saddle	1.05	Density-Silt/Clay	1-Oct-03	5	30
USGS-Saddle	1.07	Density-Silt/Clay	1-Oct-03	5	32
USGS-Saddle	1.06	Density-Silt/Clay	1-Oct-03	5	35
USGS-Saddle	1.08	Density-Silt/Clay	1-Oct-03	5	37
USGS-Saddle	1.09	Density-Silt/Clay	1-Oct-03	5	43
USGS-Saddle	1.07	Density-Silt/Clay	1-Oct-03	5	46
USGS-Saddle	1.09	Density-Silt/Clay	1-Oct-03	5	48
USGS-Saddle	1.08	Density-Silt/Clay	1-Oct-03	5	50

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
USGS-Saddle	1.11	Density-Silt/Clay	1-Oct-03	5	52
USGS-Saddle	1.08	Density-Silt/Clay	1-Oct-03	5	55
USGS-Saddle	1.10	Density-Silt/Clay	1-Oct-03	5	57
USGS-Saddle	1.09	Density-Silt/Clay	1-Oct-03	5	61
USGS-Saddle	1.11	Density-Silt/Clay	1-Oct-03	5	63
USGS-Saddle	1.10	Density-Silt/Clay	1-Oct-03	5	66
USGS-Saddle	1.10	Density-Silt/Clay	1-Oct-03	5	70
USGS-Saddle	1.11	Density-Silt/Clay	1-Oct-03	5	72
USGS-Saddle	1.10	Density-Silt/Clay	1-Oct-03	5	75
USGS-Saddle	1.10	Density-Silt/Clay	1-Oct-03	5	77
USGS-Saddle	1.11	Density-Silt/Clay	1-Oct-03	5	83
USGS-Saddle	1.10	Density-Silt/Clay	1-Oct-03	5	86
USGS-Saddle	1.12	Density-Silt/Clay	1-Oct-03	5	88
USGS-Saddle	1.11	Density-Silt/Clay	1-Oct-03	5	92
USGS-Saddle	1.11	Density-Silt/Clay	1-Oct-03	5	97
USGS-Saddle	1.12	Density-Silt/Clay	1-Oct-03	5	100
USGS-Saddle	1.12	Density-Silt/Clay	1-Oct-03	5	103
USGS-Saddle	1.10	Density-Fine Sand/Silt	1-Oct-03	5	110
USGS-Saddle	1.12	Density-Fine Sand/Silt	1-Oct-03	5	112
USGS-Saddle	1.11	Density-Fine Sand/Silt	1-Oct-03	5	120
USGS-Saddle	1.12	Density-Fine Sand/Silt	1-Oct-03	5	123
USGS-Saddle	1.11	Density-Fine Sand/Silt	1-Oct-03	5	130
USGS-Saddle	1.13	Density-Fine Sand/Silt	1-Oct-03	5	132
USGS-Saddle	1.12	Density-Fine Sand/Silt	1-Oct-03	5	160
USGS-Saddle	1.12	Density-Fine Sand/Silt	1-Oct-03	5	162
USGS-Spencer Street	1.00	Density-Fine Sand/Silt		5	31
USGS-Spencer Street	1.07	Density-Fine Sand/Silt		5	56
USGS-Spencer Street	1.09	Density-Fine Sand/Silt		5	65
USGS-Spencer Street	1.06	Density-Fine Sand/Silt		5	75
USGS-Spencer Street	1.00	Density-Fine Sand/Silt		5	132
USGS-Spencer Street	1.15	Density-Fine Sand/Silt		5	152

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
USGS-Spencer Street	1.11	Density-Fine Sand/Silt		5	158
USGS-Spencer Street	1.19	Density-Fine Sand/Silt		5	163
USGS-Spencer Street	1.19	Density-Fine Sand/Silt		5	172
USGS-Spencer Street	1.07	Density-Fine Sand/Silt		5	177
USGS-Spencer Street	1.18	Density-Fine Sand/Silt		5	183
USGS-Spencer Street	1.13	Density-Fine Sand/Silt		5	188
USGS-Spencer Street	1.14	Density-Fine Sand/Silt		5	192
USGS-Spencer Street	1.13	Density-Fine Sand/Silt		5	197
USGS-Spencer Street	1.18	Density-Fine Sand/Silt		5	208
USGS-Spencer Street	1.12	Density-Fine Sand/Silt		5	212
USGS-Spencer Street	1.08	Density-Fine Sand/Silt		5	223
USGS-Spencer Street	1.13	Density-Fine Sand/Silt		5	228
USGS-Spencer Street	1.19	Density-Fine Sand/Silt		5	232
USGS-Spencer Street	1.15	Density-Fine Sand/Silt		5	237
USGS-Spencer Street	1.11	Density-Fine Sand/Silt		5	243
USGS-Spencer Street	1.14	Density-Fine Sand/Silt		5	248
USGS-Spencer Street	1.11	Density-Fine Sand/Silt		5	252
USGS-Spencer Street	1.16	Density-Fine Sand/Silt		5	263
USGS-Spencer Street	1.12	Density-Fine Sand/Silt		5	268
USGS-Spencer Street	1.12	Density-Fine Sand/Silt		5	277
USGS-Spencer Street	1.12	Density-Fine Sand/Silt		5	282
USGS-Spencer Street	1.11	Density-Fine Sand/Silt		5	288
USGS-Spencer Street	1.12	Density-Sand and Gravel		5	292
USGS-Spencer Street	1.12	Density-Sand and Gravel		5	297
USGS-Spencer Street	1.14	Density-Sand and Gravel		5	299
USGS-Spencer Street	1.09	Density-Sand and Gravel		5	302
USGS-Spencer Street	1.11	Density-Sand and Gravel		5	308
USGS-Spencer Street	1.10	Density-Sand and Gravel		5	313
USGS-Spencer Street	1.12	Density-Sand and Gravel		5	322
USGS-Spencer Street	1.14	Density-Sand and Gravel		5	328
USGS-Spencer Street	1.13	Density-Sand and Gravel		5	337

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
USGS-Spencer Street	1.12	Density-Sand and Gravel		5	342
USGS-Spencer Street	1.14	Density-Sand and Gravel		5	348
USGS-Spencer Street	1.12	Density-Sand and Gravel		5	353
USGS-Spencer Street	1.14	Density-Till		5	357
USGS-Spencer Street	1.08	Density-Till		5	362
USGS-Spencer Street	1.03	Density-Till		5	368
USGS-Spencer Street-D	1.13	Density-Sand and Gravel	15-Nov-02	6	303
USGS-Spencer Street-S	1.08	Density-Fine Sand/Silt	15-Nov-02	5	93
USGS-West Trail	1.11	Density-Marl	15-Sep-03	5	14
USGS-West Trail	1.07	Density-Marl	15-Sep-03	5	19
USGS-West Trail	1.07	Density-Marl	15-Sep-03	5	23
USGS-West Trail	1.07	Density-Silt/Clay	15-Sep-03	5	28
USGS-West Trail	1.08	Density-Silt/Clay	15-Sep-03	5	31
USGS-West Trail	1.08	Density-Silt/Clay	15-Sep-03	5	34
USGS-West Trail	1.08	Density-Silt/Clay	15-Sep-03	5	39
USGS-West Trail	1.09	Density-Silt/Clay	15-Sep-03	5	40
USGS-West Trail	1.08	Density-Silt/Clay	15-Sep-03	5	43
USGS-West Trail	1.09	Density-Silt/Clay	15-Sep-03	5	45
USGS-West Trail	1.00	Density-Silt/Clay	15-Sep-03	5	48
USGS-West Trail	1.07	Density-Silt/Clay	15-Sep-03	5	50
USGS-West Trail	1.03	Density-Silt/Clay	15-Sep-03	5	54
USGS-West Trail	1.03	Density-Silt/Clay	15-Sep-03	5	59
USGS-West Trail	1.03	Density-Silt/Clay	15-Sep-03	5	60
USGS-West Trail	1.03	Density-Silt/Clay	15-Sep-03	5	64
USGS-West Trail	1.02	Density-Fine Sand/Silt	15-Sep-03	5	68
USGS-West Trail	1.00	Density-Fine Sand/Silt	15-Sep-03	5	70
USGS-West Trail	1.03	Density-Fine Sand/Silt	15-Sep-03	5	74
USGS-West Trail-BR	1.06	Density-Bedrock	8-Oct-03	8	116
USGS-West Trail-D	1.05	Density-Till	8-Oct-03	7	88
WA-MW-100BR	1.04	Density-Bedrock	3-Jul-08	8	75
WA-MW-100BR	1.04	Density-Bedrock	11-May-07	8	75

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
WA-MW-100BR	1.05	Density-Bedrock	4-Apr-06	8	75
WA-MW-100BR	1.05	Density-Bedrock	10-May-05	8	75
WA-MW-100D	1.03	Density-Sand and Gravel	3-Jul-08	6	65
WA-MW-100D	1.04	Density-Sand and Gravel	11-May-07	6	65
WA-MW-100D	1.03	Density-Sand and Gravel	4-Apr-06	6	65
WA-MW-100D	1.04	Density-Sand and Gravel	11-May-05	6	65
WA-OW-01D	1.04	Density-Sand and Gravel	7-Jul-08	6	93
WA-OW-02D	1.03	Density-Fine Sand/Silt	28-Mar-06	5	59
WA-OW-02D	1.03	Density-Fine Sand/Silt	28-Mar-06	5	59
WA-OW-04D	1.04	Density-Sand and Gravel	29-Mar-06	6	77
WA-OW-04D	1.04	Density-Sand and Gravel	29-Mar-06	6	77
WA-OW-05D	1.04	Density-Sand and Gravel	29-Mar-06	6	67
WA-OW-05D	1.04	Density-Sand and Gravel	29-Mar-06	6	67
WA-OW-06D	1.06	Density-Sand and Gravel	28-Mar-06	6	97
WA-OW-06D	1.06	Density-Sand and Gravel	28-Mar-06	6	97
WA-OW-07D	1.06	Density-Fine Sand/Silt	28-Mar-06	5	69
WA-OW-07D	1.06	Density-Fine Sand/Silt	28-Mar-06	5	69
WA-OW-11D	1.05	Density-Sand and Gravel	28-Mar-06	6	106
WA-PS-01	1.00	Density-Till	27-Jun-08	7	7
WA-PS-01	1.00	Density-Till	27-Jun-08	7	7
WA-PS-03D	1.00	Density-Till	26-Jun-08	7	21
WA-WA-01D	1.04	Density-Sand and Gravel	2-Jul-08	6	102
WA-WA-01D	1.05	Density-Sand and Gravel	28-Mar-06	6	102
WA-WA-01D	1.05	Density-Sand and Gravel	28-Mar-06	6	102
WA-WA-02D	1.02	Density-Fine Sand/Silt	7-Jul-08	5	79
WA-WA-02D	1.02	Density-Fine Sand/Silt	28-Mar-06	5	79
WA-WA-02D	1.02	Density-Fine Sand/Silt	28-Mar-06	5	79
WA-WA-03D	1.02	Density-Fine Sand/Silt	8-Mar-07	5	59
WA-WA-03I	1.03	Density-Silt/Clay	8-Mar-07	4	25
WA-WA-03S	1.00	Density-Fill Solvay	8-Mar-07	2	8
WA-WA-04D	1.02	Density-Fine Sand/Silt	2-Jul-08	5	65

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
WA-WA-05D	1.00	Density-Fine Sand/Silt	2-Jul-08	5	45
WA-WA-06D	1.00	Density-Fine Sand/Silt	2-Jul-08	5	41
WA-WA-06D	1.00	Density-Fine Sand/Silt	31-Mar-06	5	41
WA-WA-06D	1.00	Density-Fine Sand/Silt	31-Mar-06	5	41
WA-WA-07D	1.01	Density-Fine Sand/Silt	1-Jul-08	5	75
WA-WA-07D	1.01	Density-Fine Sand/Silt	29-Mar-06	5	75
WA-WA-07D	1.01	Density-Fine Sand/Silt	29-Mar-06	5	75
WB18-MW-01D	1.05	Density-Sand and Gravel	16-Jul-08	6	90
WB18-MW-01D	1.05	Density-Sand and Gravel	9-May-07	6	90
WB18-MW-01D	1.05	Density-Sand and Gravel	3-Apr-06	6	90
WB18-MW-01D	1.05	Density-Sand and Gravel	9-May-05	6	90
WB18-MW-01D	1.05	Density-Sand and Gravel	11-Nov-04	6	90
WB18-MW-01I	1.08	Density-Marl	9-May-07	3	30
WB18-MW-01I	1.08	Density-Marl	3-Apr-06	3	30
WB18-MW-01I	1.08	Density-Marl	9-May-05	3	30
WB18-MW-01I	1.05	Density-Marl	10-Nov-04	3	30
WB18-MW-01S	1.03	Density-Solvay	9-May-07	2	8
WB18-MW-01S	1.03	Density-Solvay	3-Apr-06	2	8
WB18-MW-01S	1.03	Density-Solvay	9-May-05	2	8
WB18-MW-01S	1.02	Density-Solvay	10-Nov-04	2	8
WB18-MW-02D	1.06	Density-Sand and Gravel	16-Jul-08	6	93
WB18-MW-02D	1.06	Density-Sand and Gravel	8-May-07	6	93
WB18-MW-02D	1.06	Density-Sand and Gravel	3-Apr-06	6	93
WB18-MW-02D	1.06	Density-Sand and Gravel	6-May-05	6	93
WB18-MW-02D	1.05	Density-Sand and Gravel	11-Nov-04	6	93
WB18-MW-02I	1.07	Density-Marl	16-Jul-08	3	28
WB18-MW-02I	1.07	Density-Marl	8-May-07	3	28
WB18-MW-02I	1.07	Density-Marl	3-Apr-06	3	28
WB18-MW-02I	1.08	Density-Marl	6-May-05	3	28
WB18-MW-02I	1.08	Density-Marl	10-Nov-04	3	28
WB18-MW-02S	1.00	Density-Marl	8-May-07	3	8

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
WB18-MW-02S	1.00	Density-Marl	3-Apr-06	3	8
WB18-MW-02S	1.00	Density-Marl	6-May-05	3	8
WB18-MW-02S	1.00	Density-Marl	10-Nov-04	3	8
WB18-MW-03BR	1.10	Density-Bedrock	10-Jul-08	8	151
WB18-MW-03BR	1.10	Density-Bedrock	7-May-07	8	151
WB18-MW-03D	1.07	Density-Sand and Gravel	10-Jul-08	6	133
WB18-MW-03D	1.06	Density-Sand and Gravel	8-May-07	6	133
WB18-MW-03D	1.06	Density-Sand and Gravel	27-Mar-06	6	133
WB18-MW-03D	1.06	Density-Sand and Gravel	6-May-05	6	133
WB18-MW-03D	1.06	Density-Sand and Gravel	11-Nov-04	6	133
WB18-MW-03I	1.11	Density-Mixed 9 mile	7-May-07	4	45
WB18-MW-03I	1.08	Density-Mixed 9 mile	27-Mar-06	4	45
WB18-MW-03I	1.08	Density-Mixed 9 mile	6-May-05	4	45
WB18-MW-03I	1.06	Density-Mixed 9 mile	10-Nov-04	4	45
WB18-MW-03S	1.03	Density-Marl	7-May-07	3	9
WB18-MW-03S	1.03	Density-Marl	27-Mar-06	3	9
WB18-MW-03S	1.03	Density-Marl	6-May-05	3	9
WB18-MW-03S	1.03	Density-Marl	10-Nov-04	3	9
WB18-MW-04BR	1.12	Density-Bedrock	25-May-07	8	178
WB18-MW-04D	1.07	Density-Sand and Gravel	1-May-07	6	149
WB18-MW-04D	1.07	Density-Sand and Gravel	22-Mar-06	6	149
WB18-MW-04D	1.01	Density-Sand and Gravel	4-May-05	6	149
WB18-MW-04D	1.00	Density-Sand and Gravel	12-Nov-04	6	149
WB18-MW-04G	1.06	Density-WB Sand	1-May-07	3	45
WB18-MW-04G	1.06	Density-WB Sand	8-Jun-06	3	45
WB18-MW-04G	1.06	Density-WB Sand	5-Jun-06	3	45
WB18-MW-04G	1.06	Density-WB Sand	22-Mar-06	3	45
WB18-MW-04G	1.05	Density-WB Sand	4-May-05	3	45
WB18-MW-04G	1.05	Density-WB Sand	9-Nov-04	3	45
WB18-MW-04I	1.00	Density-Marl	1-May-07	3	27
WB18-MW-04I	1.00	Density-Marl	22-Mar-06	3	27

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
WB18-MW-04I	1.00	Density-Marl	4-May-05	3	27
WB18-MW-04I	1.00	Density-Marl	9-Nov-04	3	27
WB18-MW-04S	1.00	Density-Solvay	1-May-07	2	12
WB18-MW-04S	1.00	Density-Solvay	22-Mar-06	2	12
WB18-MW-04S	1.00	Density-Solvay	4-May-05	2	12
WB18-MW-04S	1.00	Density-Solvay	9-Nov-04	2	12
WB18-MW-05D	1.06	Density-Sand and Gravel	2-May-07	6	123
WB18-MW-05D	1.04	Density-Sand and Gravel	23-Mar-06	6	123
WB18-MW-05D	1.06	Density-Sand and Gravel	5-May-05	6	123
WB18-MW-05D	1.05	Density-Sand and Gravel	12-Nov-04	6	123
WB18-MW-05I	1.00	Density-solvay peat marl	2-May-07	2	32
WB18-MW-05I	1.00	Density-solvay peat marl	23-Mar-06	2	32
WB18-MW-05I	1.00	Density-solvay peat marl	5-May-05	2	32
WB18-MW-05I	1.00	Density-solvay peat marl	12-Nov-04	2	32
WB18-MW-05S	1.00	Density-Solvay	2-May-07	2	20
WB18-MW-05S	1.00	Density-Solvay	23-Mar-06	2	20
WB18-MW-05S	1.00	Density-Solvay	5-May-05	2	20
WB18-MW-05S	1.00	Density-Solvay	12-Nov-04	2	20
WB18-MW-06BR	1.05	Density-Bedrock	14-Jul-08	8	160
WB18-MW-06BR	1.06	Density-Bedrock	15-May-07	8	160
WB18-MW-06D	1.06	Density-Sand and Gravel	9-Jul-08	6	113
WB18-MW-06D	1.01	Density-Sand and Gravel	15-May-07	6	113
WB18-MW-06D	1.06	Density-Sand and Gravel	27-Mar-06	6	113
WB18-MW-06D	1.06	Density-Sand and Gravel	11-May-05	6	113
WB18-MW-06D	1.06	Density-Sand and Gravel	18-Nov-04	6	113
WB18-MW-06I	1.04	Density-solvay peat marl	15-May-07	2	69
WB18-MW-06I	1.06	Density-solvay peat marl	27-Mar-06	2	69
WB18-MW-06I	1.07	Density-solvay peat marl	11-May-05	2	69
WB18-MW-06I	1.06	Density-solvay peat marl	15-Nov-04	2	69
WB18-MW-06S	1.00	Density-Solvay	15-May-07	2	38
WB18-MW-06S	1.00	Density-Solvay	24-Mar-06	2	38

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
WB18-MW-06S	1.00	Density-Solvay	11-May-05	2	38
WB18-MW-06S	1.00	Density-Solvay	15-Nov-04	2	38
WB18-MW-07D	1.04	Density-Sand and Gravel	16-May-07	6	101
WB18-MW-07D	1.04	Density-Sand and Gravel	21-Mar-06	6	101
WB18-MW-07D	1.05	Density-Sand and Gravel	3-May-05	6	101
WB18-MW-07D	1.03	Density-Sand and Gravel	18-Nov-04	6	101
WB18-MW-07I	1.00	Density-solvay peat marl	16-May-07	2	59
WB18-MW-07I	1.01	Density-solvay peat marl	21-Mar-06	2	59
WB18-MW-07I	1.01	Density-solvay peat marl	3-May-05	2	59
WB18-MW-07I	1.00	Density-solvay peat marl	15-Nov-04	2	59
WB18-MW-07S	1.00	Density-Solvay	16-May-07	2	35
WB18-MW-07S	1.00	Density-Solvay	21-Mar-06	2	35
WB18-MW-07S	1.00	Density-Solvay	3-May-05	2	35
WB18-MW-07S	1.02	Density-Solvay	15-Nov-04	2	35
WB18-MW-08D	1.03	Density-Sand and Gravel	21-May-07	6	79
WB18-MW-08D	1.03	Density-Sand and Gravel	17-Mar-06	6	79
WB18-MW-08D	1.03	Density-Sand and Gravel	2-May-05	6	79
WB18-MW-08D	1.03	Density-Sand and Gravel	17-Nov-04	6	79
WB18-MW-08I	1.00	Density-Solvay	21-May-07	2	25
WB18-MW-08I	1.00	Density-Solvay	17-Mar-06	2	25
WB18-MW-08I	1.00	Density-Solvay	2-May-05	2	25
WB18-MW-08I	1.00	Density-Solvay	16-Nov-04	2	25
WB18-MW-08S	1.00	Density-Solvay	21-May-07	2	15
WB18-MW-08S	1.00	Density-Solvay	17-Mar-06	2	15
WB18-MW-08S	1.00	Density-Solvay	2-May-05	2	15
WB18-MW-09BR	1.10	Density-Bedrock	17-Jul-08	8	117
WB18-MW-09BR	1.07	Density-Bedrock	10-May-07	8	117
WB18-MW-09D	1.04	Density-Fine Sand/Silt	17-Jul-08	5	56
WB18-MW-09D	1.04	Density-Fine Sand/Silt	10-May-07	5	56
WB18-MW-09D	1.04	Density-Fine Sand/Silt	5-Apr-06	5	56
WB18-MW-09I	1.02	Density-Marl	10-May-07	3	15

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
WB18-MW-09I	1.02	Density-Marl	5-Apr-06	3	15
WB18-MW-09I	1.02	Density-Marl	5-May-05	3	15
WB18-MW-09I	1.02	Density-Marl	11-Nov-04	3	15
WB18-MW-09S	1.02	Density-solvay marl	10-May-07	2	8
WB18-MW-09S	1.01	Density-solvay marl	5-Apr-06	2	8
WB18-MW-10D	1.02	Density-Sand and Gravel	25-May-07	6	99
WB18-MW-10D	1.02	Density-Sand and Gravel	20-Mar-06	6	99
WB18-MW-10I	1.03	Density-solvay peat	25-May-07	2	60
WB18-MW-10I	1.03	Density-solvay peat	20-Mar-06	2	60
WB18-MW-10I	1.04	Density-solvay peat	3-May-05	2	60
WB18-MW-10I	1.04	Density-solvay peat	16-Nov-04	2	60
WB18-MW-10S	1.00	Density-Solvay	25-May-07	2	30
WB18-MW-10S	1.00	Density-Solvay	20-Mar-06	2	30
WB18-MW-11I	1.01	Density-Solvay	4-May-07	2	53
WB18-MW-11I	1.01	Density-Solvay	24-Mar-06	2	53
WB18-MW-11I	1.01	Density-Solvay	5-May-05	2	53
WB18-MW-11I	1.01	Density-Solvay	8-Nov-04	2	53
WB18-MW-12S	1.02	Density-Marl	11-May-07	3	8
WB18-MW-12S	1.02	Density-Marl	5-Apr-06	3	8
WB18-MW-13BR2	1.06	Density-Bedrock	8-Jul-08	8	91
WB18-MW-13BR2	1.05	Density-Bedrock	23-May-07	8	91
WB18-MW-13D	1.00	Density-Sand and Gravel	8-Jul-08	6	49
WB18-MW-13D	1.00	Density-Sand and Gravel	23-May-07	6	49
WB18-MW-13D	1.00	Density-Sand and Gravel	16-Mar-06	6	49
WB18-MW-13I	1.02	Density-Fine Sand/Silt	23-May-07	5	20
WB18-MW-13I	1.02	Density-Fine Sand/Silt	15-Mar-06	5	20
WB18-MW-13S	1.02	Density-Silt/Clay	23-May-07	4	8
WB18-MW-13S	1.00	Density-Silt/Clay	2-May-07	4	8
WB18-MW-13S	1.01	Density-Silt/Clay	15-Mar-06	4	8
WB18-MW-14BR	1.10	Density-Bedrock	8-Jul-08	8	115
WB18-MW-14BR	1.08	Density-Bedrock	22-May-07	8	115

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
WB18-MW-14D	1.04	Density-Fine Sand/Silt	7-Jul-08	5	55
WB18-MW-14D	1.04	Density-Fine Sand/Silt	22-May-07	5	55
WB18-MW-14D	1.03	Density-Fine Sand/Silt	15-Mar-06	5	55
WB18-MW-14I	1.00	Density-Fine Sand/Silt	22-May-07	5	27
WB18-MW-14I	1.00	Density-Fine Sand/Silt	15-Mar-06	5	27
WB18-MW-14S	1.00	Density-Fine Sand/Silt	22-May-07	5	15
WB18-MW-14S	1.00	Density-Fine Sand/Silt	15-Mar-06	5	15
WB18-MW-15S	1.00	Density-Solvay	22-Mar-06	2	20
WB18-MW-16D	1.05	Density-Sand and Gravel	9-Jul-08	6	128
WB18-MW-16D	1.05	Density-Sand and Gravel	14-May-07	6	128
WB18-MW-16D	1.05	Density-Sand and Gravel	21-Mar-06	6	128
WB18-MW-16I	1.07	Density-solvay peat marl	14-May-07	2	68
WB18-MW-16I	1.07	Density-solvay peat marl	21-Mar-06	2	68
WB18-MW-16S	1.00	Density-Solvay	14-May-07	2	39
WB18-MW-16S	1.00	Density-Solvay	20-Mar-06	2	39
WB18-MW-17D	1.06	Density-Sand and Gravel	15-Jul-08	6	180
WB18-MW-17D	1.07	Density-Sand and Gravel	4-May-07	6	180
WB18-MW-17D	1.10	Density-Sand and Gravel	23-Mar-06	6	180
WB18-MW-17I	1.01	Density-Marl	4-May-07	3	52
WB18-MW-17I	1.02	Density-Marl	23-Mar-06	3	52
WB18-MW-17S	1.00	Density-Solvay	4-May-07	2	40
WB18-MW-17S	1.00	Density-Solvay	23-Mar-06	2	40
WB18-MW-18D	1.06	Density-Sand and Gravel	3-May-07	6	141
WB18-MW-18D	1.05	Density-Sand and Gravel	16-Mar-06	6	141
WB18-MW-18G	1.03	Density-WB Sand	3-May-07	3	80
WB18-MW-18G	1.03	Density-WB Sand	16-Mar-06	3	80
WB18-MW-18I	1.02	Density-Solvay	3-May-07	2	67
WB18-MW-18I	1.02	Density-Solvay	16-Mar-06	2	67
WB18-MW-18S	1.00	Density-Solvay	3-May-07	2	39
WB18-MW-18S	1.00	Density-Solvay	16-Mar-06	2	39
WB18-MW-19BR2	1.06	Density-Sand and Gravel	17-Jul-08	6	91

Table 5

Density Data and Model Layer Assignment for Groundwater Sample Locations

Sample ID	Density	Parameter	Sample Date	Model Layer	Depth of Middle of Screen or Sample Interval (feet, BGS)
WB18-MW-19BR2	1.06	Density-Sand and Gravel	9-May-07	6	114
WB18-MW-19BR2	1.06	Density-Sand and Gravel	4-Apr-06	6	114
WB18-MW-20BR	1.06	Density-Fine Sand/Silt	16-Jul-08	5	79
WB18-MW-20BR	1.06	Density-Fine Sand/Silt	8-May-07	5	144
WB18-MW-20BR	1.07	Density-Fine Sand/Silt	4-Apr-06	5	144
WB18-MW-21D	1.06	Density-Sand and Gravel	17-May-07	6	129
WB18-MW-21I	1.00	Density-Solvay	17-May-07	2	67
WB18-MW-21S	1.00	Density-Solvay	17-May-07	2	35
WB18-MW-22D2	1.05	Density-Fine Sand/Silt	24-May-07	5	121
WB18-MW-22I	1.07	Density-Solvay	24-May-07	2	69
WB18-MW-22S	1.00	Density-Solvay	24-May-07	2	39
WB18-MW-23I	1.00	Density-Fine Sand/Silt	21-May-07	5	68
WB18-TW-01S	1.00	Density-Solvay	25-May-06	2	20
WB18-TW-01S	1.00	Density-Solvay	23-May-06	2	20
WB18-TW-02S	1.00	Density-Marl	18-May-06	3	8
WB18-TW-02S	1.00	Density-Marl	15-May-06	3	8

Table 6

Parameters in Groundwater Model with Initial Values

Layer	Parameter Zone	Description	Parameter Type	Version 3.01 Values			Version 3.0 Values		Version 3.0 Initial Values		Parameter Sensitivity[1]		Acceptable Range of Parameter	Version 1.0 Values	
				Kh (feet/day)	Kv (feet/day)	Kh/Kv	Kh (feet/day)	Kh/Kv	Kh (feet/day)	Kh/Kv	Kh	Kv	Kh (feet/day)	Kh (feet/day)	Kv (feet/day)
1 and 2	2-1	Lake deposits	Zone	5	0.33	15	5	15	10	50	3	3	0.1 - 20	20	0.2
	2-2	In-lake Solvay deposits	Zone	0.3	0.01	21	0.3	21	0.02	14	3	3	0.01 - 5	20	0.2
	2-3	Solvay deposits -- SB12-15	Zone	0.3	0.00	200	0.3	200	0.02	14	1	1	0.01 - 5	0.4	0.004
	2-4A	Solvay deposits -- SB11	Zone	0.5	0.00	1270	0.4	1500	0.02	14	1	1	0.01 - 5	0.4	0.004
	2-4B	Solvay deposits -- SB9-10	Zone	0.3	0.00	350	0.4	700	0.02	14	2	1	0.01 - 5	0.4	0.004
	2-5A	Solvay deposits -- SB1-6	Zone	0.3	0.00	250	0.3	250	0.3	109	1	1	0.01 - 5	0.4	0.004
	2-5B	Solvay deposits -- shoreline	Zone	0.3	0.06	5	0.3	5	0.3	109	3	3	0.01 - 5	0.4	0.004
	2-5C	Solvay deposits -- WB7-8	Zone	0.5	0.00	660	0.3	521	0.3	109	2	3	0.01 - 5	0.4	0.004
	2-6	Solvay deposits -- Settling Basin B	Zone	0.3	0.30	1	0.8	1	0.7	200	2	3	0.01 - 5	2	0.2
	2-7	Solvay deposits --Settling Basin A	Zone	0.1	0.00	310	0.3	231	0.9	240	2	3	0.01 - 5	0.6	0.006
	2-8	Fill -- south of lake and northern area	Pilot points	10	0.11	94	10	100	25	625	2	3	0.1 - 20	1 - 12	0.1 - 1.2
	2-9	Near surface sediments --Ninemile Creek Valley	Zone	3.8	0.27	14	10	20	25	625	1	3	1-50	1.4	0.14
	2-10	Near surface sediments -- LCP-Matthews Avenue Area	Zone	8.1	0.16	51	5	50	25	625	1	3	1-50	11	0.11
	2-11	Fill Main Plant area and Railroad Area	Zone	20	2.20	9.1	10	10	25	625	1	3	1-50	1.2	0.12
	2-12	Fill Willis-Semet Shoreline	Zone	3	0.30	10	5	10	25	625	3	3	1-50	13	0.13
	2-13	Fill -- Railroad Area	Zone	0.7	0.00	600	0.7	500	25	625	3	2	1-50	0.6	0.13
3	3-1	Marl	Pilot points	0.7	0.07	9.7	1.3	13	0.8	35	1	2	0.01 - 10	0.01	0.001
	3-2A	Marl with underlying sand unit -- WB1-8	Zone	1.3	0.10	13	1.3	13	5	400	1	3	1 - 50	5	0.01
	3-2B	Marl with underlying sand unit -- Willis-Semet	Zone	41	0.20	210	30	150	5	400	2	3	1 - 50	5	0.01
	3-2C	Marl with underlying sand unit -- Wastebed B	Zone	11	0.19	57	30	150	5	400	1	3	1 - 50	5	0.01
	3-3	Marl in area without peat	Zone	5	0.01	400	5	400	0.8	35	3	3	0.01 - 10	0.01	0.001
4	4-1	Silt and clay under lake	Pilot points	0.01	0.0003	36	0.01	36	0.06	40	3	2	0.01 - 1	0.06	0.0006
	4-2	Mixed Ninemile Creek deposits	Pilot points	1	0.01	100	1.7	100	2.5	12	1	3	1 - 100	5	0.5
	4-3	Silt and clay -- Ninemile Creek region	Pilot points	10	0.91	11	10	10	2.5	12	3	3	0.1 - 10	5	0.5
	4-4	Silt and clay -- Settling Basin 12-15	Zone	0.12	0.0003	346	0.14	500	2.5	12	1	1	0.1 - 10	not in modeled area	
	4-5A	Silt and clay -- Fairgrounds	Zone	3	0.06	50	3	50	2.5	12	3	3	0.1 - 10	27	0.27
	4-5B	Silt and clay -- Fairgrounds	Zone	1	0.05	19	1	50	2.5	12	3	3	0.1 - 10	27	0.27
	4-6	Silt and clay -- LCP - Matthews Avenue area	Pilot points	10	0.0004	25000	10	10000	2.5	12	1	2	0.1 - 10	5	0,5
5	5-1	Fine sand and silt	Pilot points	7.4	1.72	4.3	10	10	28	110	2	3	1 - 50	28	0.2
	5-2	Mixed Ninemile Creek deposits	Pilot points	1.7	0.09	20	1.7	20	2.5	12	3	3	1 - 100	5	0.5
	5.3	Fine sand and silt -- Ninemile Creek region	Zone	10	0.91	11	10	10	2.5	12	3	3	1 - 100	not in modeled area	
	5.4	Fine sand and silt -- Settling Basin 12-15	Zone	10	0.10	100	10	100	2.5	12	1	2	1 - 100	not in modeled area	
	5-5	Fine sand and silt -- Fairgrounds	Zone	10	0.56	18	10	20	2.5	12	3	3	1 - 100	1.6	
	5-6	Fine sand and silt --LCP - Matthews Avenue	Zone	1.8	0.0037	490	1	500	2.5	12	1	2	1 - 100	1.6	
6	6-1	Sand and gravel unit -- lake area	Pilot points	150	15	10	150	10	50	10	2	3	10 - 1000	10 - 100	10
	6-2	Sand and gravel - Upper Ninemile Creek	Pilot points	150	15	10	150	10	50	10	2	3	10 - 1000	not in modeled area	
	6-3	Sand and gravel -- LCP - Mathews Avenue Area	Pilot points	150	15	10	150	10	50	10	2	3	10 - 1000	10	1
7	7-1	Till	Zone	0.15	0.09	1.6	0.09	1	0.04	16	2	2	0.01 -10	0.05	0.006
8	8-1	Shallow bedrock	Zone	0.88	0.09	10	1	10	1.7	8	1	3	0.1-10	1	0.1
9	9-1	Bedrock	Zone	0.88	0.09	10	1	10	1.7	8	1	3	0.1-10	1	0.1

Note: 1 -- Parameter sensitivity is classed "1" for high sensitivity, "2" for medium sensitivity, and "3" for low sensitivity.

Table 7

Summary of Hydraulic Conductivity Estimates

Layer	Parameter Zone	Slug Test Results (ft/day)					Aquifer Tests Kh (ft/day)			Aquifer Tests Kv (ft/day)		
		Count	Average	Std Dev	Min	Max	Count	Min	Max	Count	Min	Max
2	2-3	5	9.95	11.25	0.09	27.8						
	2-4	5	0.33	0.52	0.02	0.9						
	2-5	42	0.66	1.32	0.01	6.5	6	0.44	9.0	12	0.0093	0.056
	2-6	29	4.95	15.53	0.01	77.4	5	1.76	159.7	3	0.0140	0.079
	2-8	73	10.92	31.89	0.01	229.6	6	0.09	7.9			
3	3-1/3-2	23	8.04	23.58	0.003	81.9	1	33.32	33.3	16	0.0002	1.293
	3-3	2	5.72	6.16	1.36	10.1	4	0.20	22.5			
4	4-1	4	0.18	0.26	0.02	0.6				13	0.0001	0.170
	4-2/5-2	3	8.07	13.51	0.14	23.7						
5	5-1	37	2.88	3.46	0.01	13.6	4	1.60	11.2	2	0.0001	0.010
6	6-1	32	11.49	16.20	0.02	68.0	7	2.40	1073.0	1	0.0012	0.001
7	7-1	6	7.68	9.69	0.06	21.0	4	1.40	249.5			
8	8-1/9-1	12	2.03	2.23	0.00	5.4						

Table 8

Estimated Hydraulic Conductivity Values

Well Name	Depth (ft/bgs)	Geologic Unit	Slug Test Kh (ft/day)	Parameter Zone	Pump Test Kh (ft/day)	Pump Test Kv (ft/day)	Source	Considered in Model Version 1.0
BFMW-01D	48-58'	Marl/Silt/Sand	0.6	3-1			Ballfield RI OBG	
BFMW-02I	45-55'	Marl/Sand/silt	1.3	3-1			Ballfield RI OBG	
BFMW-02S	20-30'	Solvay Waste	7.1	2-6			Ballfield RI OBG	
BFMW-03I	48-58'	Marl/till last 1'	0.1	3-1			Ballfield RI OBG	
BFMW-03S	18-28'	Solvay Waste	NA	2-6			Ballfield RI OBG	
BFMW-04D	54-64'	Silt/clay little sand	3.3	5-1			Ballfield RI OBG	
BFMW-07S	4-14'	Solvay Waste	0.1	2-6			Ballfield RI OBG	
BFMW-08S	15-25'	Solvay Waste	17.1	2-6			Ballfield RI OBG	
HB-01D	86.5-91.5'	f-c Sand/silt/grav/till	20.9	6-1			Wastebed B/Harbor Brook SRI	Y
HB-01S	5-10'	Fill (f/c sand-silt)	0.8				Wastebed B/Harbor Brook SRI	Y
HB-02I	22-32'	Marl/Silt/f/c sand/clay	0.2	3-1			Wastebed B/Harbor Brook SRI	Y
HB-02S	4-14'	Fill/Marl	6.1		51.9		Wastebed B/HB IRM	Y
HB-03S	5-15'	f/m sand/solvay waste	0.9		4.0		Wastebed B/HB IRM	Y
HB-04D	88-98'	Silt/f sand/gravel/till	1.1	6-1			Wastebed B/Harbor Brook SRI	
HB-04S	8-18'	f/m sand/solvay waste/silt	2.0	2-6			Wastebed B/HB IRM	Y
HB-05D	98-108	f-c Sand/till/silt&clay	2.6	6-1	2.4		Wastebed B/HB IRM	Y
HB-05I	44-54'	Solvay Waste/Marl/Clay	0.0				Wastebed B/Harbor Brook SRI	Y
HB-05S	7-17'	Solvay Waste	0.1	2-6			Wastebed B/HB IRM	Y
HB-06S	3-13'	Solvay Waste/f/c sand	1.5	2-6			Wastebed B/HB IRM	Y
HB-07S	3-8'	Fill (Silt)/Till	1.5	2-8			Wastebed B/HB IRM	Y
HB-08D	57.5-67.5	Silt&Clay/Till	3.9				Wastebed B/Harbor Brook SRI	Y
HB-08I	12-22'	Marl/Clay	1.3	3-1			Wastebed B/Harbor Brook SRI	Y
HB-08S	5-10'	Solvay Waste	0.3	2-6			Wastebed B/HB IRM	Y
HB-09S	5-15'	Solvay Waste/silt/gravl/sand	0.5	2-6			Wastebed B/Harbor Brook SRI	Y
HB-11I	35-45'	Marl/Clay/Silt	0.4	3-1			Harbor Brook RI/FS (OBG 2004a)	Y
HB-12D	78-88'	Clay/Silt/Till	0.2				Harbor Brook RI/FS (OBG 2004a)	Y
HB-12I	35-50'	Marl/Clay/Silt	1.2	3-1			Harbor Brook RI/FS (OBG 2004a)	Y
HB-12S	6-16'	Solvay Waste	1.9	2-6			Harbor Brook RI/FS (OBG 2004a)	Y
HB-14D	28-38'	Marl/f sand	5.9	3-1			Wastebed B/HB SRI	
HB-14S	7-12'	Fill (Silt/Clay), Solvay Waste	0.9	3-1			Harbor Brook RI/FS (OBG 2004a)	
HB-16D	97-107'	f sand&silt/till/shale	0.1	6-1	52.4		Harbor Brook RI/FS (OBG 2004a)	Y
HB-17D	67-77'	Clay&Silt/sand/Gravel	1.5	6-1			Harbor Brook RI/FS (OBG 2004a)	Y
HB-18S	4-14'	Solvay Waste/Fill (f/m sand)	0.5	2-6			Wastebed B/HB SRI	Y
HB-19S	4-14'	Fill (f/m Sand), Solvay Waste	6.3	2-6			Wastebed B/HB SRI	Y
HB-20D	125-135'	f sand&silt/till	2.3	6-1			Wastebed B/HB SRI	Y
HB-20I	28-38'	Marl/silt/clay	0.1	2-6			Wastebed B/HB SRI	Y
HB-20S	4-14'	Fill (Silt/Sand)	0.5	2-8			Wastebed B/HB SRI	Y
HB-21I	20-30'	Peat/Marl	0.2	2-6			Wastebed B/HB SRI	Y

Table 8

Estimated Hydraulic Conductivity Values

Well Name	Depth (ft/bgs)	Geologic Unit	Slug Test Kh (ft/day)	Parameter Zone	Pump Test Kh (ft/day)	Pump Test Kv (ft/day)	Source	Considered in Model Version 1.0
HB-MW-22	4-14'	Fill/Marl	5.0	2-8			Wastebed B/Harbor Brook SRI	
HB-MW-23	4-14'	Fill/Marl	1.1	2-8			Wastebed B/Harbor Brook SRI	
HB-MW-24	4-14'	Fill/Marl	0.4	2-8			Wastebed B/Harbor Brook SRI	
HB-MW-25	4-14'	Fill	2.8	2-8			Wastebed B/Harbor Brook SRI	
HB-MW-26	5-15'	Fill/Marl	27.1	2-8			Wastebed B/Harbor Brook SRI	
HB-MW-27	4-14'	Marl	1.1	2-6			Wastebed B/Harbor Brook SRI	
HB-OW-01S	4-14'	Fill		2-8	17.2		Wastebed B/HB IRM	
HB-OW-02S	3-13'	Fill/Marl		2-8	24.8		Wastebed B/HB IRM	
HB-OW-03S	4-14'	Fill/Solvay Waste		2-6	159.7		Wastebed B/HB IRM	
HB-OW-04S	4-14'	Fill/Solvay Waste		2-6	9.3		Wastebed B/HB IRM	
HB-OW-05S	3-13'	Fill/Marl			33.3		Wastebed B/HB IRM	
HB-OW-06S	4-14'	Fill (Silt/Sand)		2-8	0.2		Wastebed B/HB SRI	
HB-OW-07S	4-14'	Fill (Silt/Sand)		2-8	0.5		Wastebed B/HB SRI	
HB-SB-01	20-22	Marl		3-1		5.0E-02		
HB-SB-02	10-12'	Solvay Waste		2-6		1.8E-02		
HB-SB-03	34-36	Silt and clay		4-1		1.7E-04		
HB-SB-05	30-32	Silt/Silt and clay		4-1		1.5E-04		
HB-SB-09	38-40	Silt/Silt and clay		4-1		1.3E-03		
HB-SB-11	38-40	Silt and clay		4-1		3.8E-04		
HB-SB-15	24-26	Marl		3-1		7.4E-03		
HB-SB-18	10-12'	Solvay Waste		2-6		1.4E-02		
HB-SB-19	44-46	Silt and clay		4-1		2.3E-04		
HB-SB-20	22-24	Marl		3-1		2.2E-02		
HB-SB-21	50-52	Silt and clay		4-1		1.6E-04		
HB-SB-22	6-8'	Solvay Waste		2-6		7.9E-02		
HB-SB-25	62-64	Silt and clay		4-1		2.9E-04		
HB-SB-27	54-56	Silt and clay		4-1		7.6E-04		
HB-SB-28	60-62	Silt and clay		4-1		1.1E-03		
HB-TW-01	3-13'	Solvay Waste/Fill		2-6	1.8		Wastebed B/HB IRM	
HB-TW-02	3-13'	Solvay Waste/Marl		2-6	29.4		Wastebed B/HB IRM	
HB-TW-03	4-14'	Fill/Solvay Waste		2-6	20.5		Wastebed B/HB IRM	
HB-TW-04	95-105'	Sand & Silt/till		5-1	1.9		Wastebed B/HB IRM	
HB-TW-05	5-15'	Fill/Marl		3-1			Wastebed B/HB IRM	
WA-08D	68-78'	Silt/f.sand/till	8.1	5-1	11.2		Wastebed B/HB IRM	
WA0-8I	30-40'	Marl/silt/f sand	1.0	3-1			Wastebed B/HB SRI	
WA-08S	9-19'	Solvay Waste	2.0	2-6			Wastebed B/HB SRI	
WB-BL	80-85'	Sandy clay/till	3.5	7-1			Wastebed B/HB SRI	Y
WB-BU	19-24'	Solvay Waste	0.7	2-6			Wastebed B/HB SRI	Y

Table 8

Estimated Hydraulic Conductivity Values

Well Name	Depth (ft/bgs)	Geologic Unit	Slug Test Kh (ft/day)	Parameter Zone	Pump Test Kh (ft/day)	Pump Test Kv (ft/day)	Source	Considered in Model Version 1.0
MW-10S	3-8'	Silt/Silt and clay	0.2	2-8			LCP, VOL 2, Table 3.6-2	
MW-10SR	3-8'	Silt and Clay	5.1	2-8			LCP, VOL 2, Table 3.6-2	
MW-10D	30-35'	fSand&Silt	1.4	5-1			LCP, VOL 2, Table 3.6-2	
MW-11D	30-35'	fSand&Silt	5.1	5-1			LCP, VOL 2, Table 3.6-2	
MW-11S	4-9'	Fill	0.1	2-8			LCP, VOL 2, Table 3.6-2	Y
MW-12D	35-40'	fSand&Silt	0.3	5-1			LCP, VOL 2, Table 3.6-2	
MW-12S	3-8'	Sandy/Clayey/Silt	0.2	2-8			LCP, VOL 2, Table 3.6-2	
MW-13D	35-40'	fSand&Silt	0.4	5-1			LCP, VOL 2, Table 3.6-2	
MW-13S	3-8'	Fill	0.2	2-8			LCP, VOL 2, Table 3.6-2	Y
MW-14D	36-41'	fSand&Silt	9.1	5-1			LCP, VOL 2, Table 3.6-2	
MW-14S	3-8'	Fill	0.2	2-8			LCP, VOL 2, Table 3.6-2	Y
MW-15D	34-39'	f/mSand	9.1	5-1			LCP, VOL 2, Table 3.6-2	
MW-15S	3-8'	Fill	0.4	2-8			LCP, VOL 2, Table 3.6-2	Y
MW-16D	38-43'	f/mSand&Silt	1.1	5-1			LCP, VOL 2, Table 3.6-2	
MW-16S	3-8'	Fill	5.4	2-8			LCP, VOL 2, Table 3.6-2	Y
MW-17D	32-37'	fSand&Silt	0.6	5-2			LCP, VOL 2, Table 3.6-2	
MW-17S	3-8'	Fill	1.0	2-8			LCP, VOL 2, Table 3.6-2	Y
MW-18S	3.1-8.1'	Fill/Clay	9.6	2-8			LCP, VOL 2, Table 3.6-2	Y
MW-19S	3.2-8.2'	Fill/Clay	1.3	2-8			LCP, VOL 2, Table 3.6-2	Y
MW-20S	2.9-7.9'	Fill/Clay&Silt	229.6	2-8			LCP, VOL 2, Table 3.6-2	Y
MW-21I	9-14'	Sand and Clay	0.0	2-8			LCP, VOL 2, Table 3.6-2	Y
MW-21S	3-8"	Fill/Silt&Clay/sand	6.8	2-8			LCP, West Flume, 1994	
P-10N	0.9-4.4	Silt/Clay	0.1	2-8			LCP, Vol. 2	Y
P-10S	4.1-7.6	Silt/Clay	0.0	2-8			LCP, Vol. 2	Y
P-12N	3.25-6.75	Silt/Clay	0.0	2-8			LCP, Vol. 2	Y
P-12S	2.7-6.2	Silt/Clay	0.0	2-8			LCP, Vol. 2	Y
P-13N	4.1-7.6	Silt/Clay	0.0	2-8			LCP, Vol. 2	Y
P-13S	4.1-7.6	Silt/Clay	0.0	2-8			LCP, Vol. 2	Y
MW-08D	34-39	Silty fine sand	0.1	5-1				
MW-09D	33-38	Silty fine sand	2.5	5-1				
MW-21I	8-14'	Fill (sand&silt)	0.0	2-8			LCP, West Flume, 1994	
MW-01D	30-35'	Sand/Silt	13.6	5-1			Mathews Ave PSA	
MW-01S	6.5-16.5'	Fill/Sand&Silt	9.5	2-8			Mathews Ave PSA	
MW-02D	28.5-38.5'	Silt&Clay/Silt&Sand	4.6	5-1			Mathews Ave PSA	
MW-02S	6-16'	Fill/Clay&Silt	7.6	2-8			Mathews Ave PSA	
MW-03	3-13'	Fill	1.1	2-8			Mathews Ave PSA	
MW-04	5-15'	Fill	5.6	2-8			Mathews Ave PSA	
MW-05D	30-35'	Silt&Sand/Till	5.4	5-1			Mathews Ave PSA	

Table 8

Estimated Hydraulic Conductivity Values

Well Name	Depth (ft/bgs)	Geologic Unit	Slug Test Kh (ft/day)	Parameter Zone	Pump Test Kh (ft/day)	Pump Test Kv (ft/day)	Source	Considered in Model Version 1.0
MW-05S	3-13'	Fill/Sand&Silt	0.6	2-8			Mathews Ave PSA	
MW-06D	56-66'	Sand/Silt	11.3	5-1			Mathews Ave PSA	
MW-06S	13-23'	Sand&Silt/Silt&Clay	3.8	5-1			Mathews Ave PSA	
MW-06S2	5-15'	Fill	NA	2-8			Mathews Ave PSA	
MW-07D	48-58'	Silt/Clay	0.1	4-1			Mathews Ave PSA	
MW-07S	4-14'	Fill	1.6	2-8			Mathews Ave PSA	
MW-08D	43-53'	Sand&Silt/Gravel&Sand	1.7	5-1			Mathews Ave PSA	
MW-08S	6-16'	Fill	3.3	2-8			Mathews Ave PSA	
MW-09D	37-47'	Silt&Clay/Silt&Sand/till	0.2	5-1			Mathews Ave PSA	
MW-09S	3-13'	Silt&Clay/ Fill (Silt&Sand)	8.9	2-8			Mathews Ave PSA	
MW-10D	22-32'	Sand&Silt/Silt&Clay	4.1	5-1			Mathews Ave PSA	
MW-10S	3.5-13.5'	Fill (Sand&Silt)/Silt&Clay	112.0	2-8			Mathews Ave PSA	
MW-11D	44-54'	Silt and Sand	0.3	5-1			Mathews Ave PSA	
MW-11S	3.5-13.5'	Fill (Sand&Silt)/Silt&Clay	14.7	2-8			Mathews Ave PSA	
MW-12D	14-24'	Silt/Sand.till	3.2	5-1			Mathews Ave PSA	
MW-12S	3-13'	Marl/Silt/Sand	1.2	2-8			Mathews Ave PSA	
MW-13S	4-14'	Silt/Sand/Till	1.4	2-8			Mathews Ave PSA	
MW-15S	4-14'	Silt/Sand	2.1	5-1			Mathews Ave PSA	
MW-16S	4-14'	Fill/Clay/Silt/Sand	8.7	2-8			Mathews Ave PSA	
MW-17S	10-20'	Fill/Till	3.8	2-8			Mathews Ave PSA	
C-3	4-9'	fSand&Silt/Till	0.6	2-8			Allied, R-5P/MW-111 RI, 1989	
MPS-C-04	3-13.5'	Fill	9.1	2-8			Allied, R-5P/MW-111 RI, 1989	
C-5	5-10.2'	Fill/Till	0.2	2-8			Allied, R-5P/MW-111 RI, 1989	
C-11	4.5-14.5'	Fill	>130	2-8			Allied, R-5P/MW-111 RI, 1989	
C-12	5.5-16'	fSand&Silt/Till	0.2	5-1			Allied, R-5P/MW-111 RI, 1989	
C-13	4-14.2'	Fill/fSand&Silt/Till	4.0	2-8			Allied, R-5P/MW-111 RI, 1989	
C-14	3-24'	Fill/fSand&Silt/Till/Bedrock	0.4	2-8			Allied, R-5P/MW-111 RI, 1989	
C-15	7-17.5'	Fill/Sand&Silt/Till	1.1	2-8			Allied, R-5P/MW-111 RI, 1989	
MPS-C-16	6-22'	Fill/Till/Shale	4.0	2-8			Allied, R-5P/MW-111 RI, 1989	
MPS-C-17	4-25.5'	Fill/Sand&Silt/Shale	>96	2-8			Allied, R-5P/MW-111 RI, 1989	
C-2	2.5-18'	Fill/Silt&Clay/Till/Bedrock	9.9	2-8			Allied, R-5P/MW-111 RI, 1989	
NMDSA-MW-01	6-16'	Fill (Sand&Silt)/Marl	48.8	2-8				
NMDSA-MW-02	6-16'	Fill (Sand&Silt)/Marl	6.0	2-8				
NMDSA-MW-03	6-16'	Marl	81.9	3-1				
NMDSA-MW-04	6-16'	Peat/Marl	79.7	3-1				
NMDSA-MW-05	6-16'	Fill (f-m Sand)/Marl	58.1	2-8				
NMDSA-MW-06	6-16'	Fill (Silt&f Sand)/Marl	18.7	2-8				
NMDSA-MW-07	6-16'	Fill (Silt&f Sand)/Peat/Marl	0.4	2-8				

Table 8

Estimated Hydraulic Conductivity Values

Well Name	Depth (ft/bgs)	Geologic Unit	Slug Test Kh (ft/day)	Parameter Zone	Pump Test Kh (ft/day)	Pump Test Kv (ft/day)	Source	Considered in Model Version 1.0
NMDSA-MW-08	8-18'	Fill (Silt&f Sand)/Peat/Marl	2.6	2-8				
NMDSA-MW-09	6-16'	Fill/Peat/Marl	0.8	2-8				
SB915-MW-34S	8-18'	Solvay Waste	0.5	2-3				
SB915-MW-35S	8-18'	Solvay Waste	10.7	2-3			WB18 RI OBG	
SB-915-MW-35S	8-18'	Solvay Waste	10.7	2-3				
SB915-MW-36I	52-62'	Solvay Waste	0.1	2-3			WB18 RI OBG	
SB915-MW-36S	8-18'	Solvay Waste	27.8	2-3			WB18 RI OBG	
SB915-MW-42D	122-132'	Sand and Gravel	8.7	6-1				
SB915-MW-42I	59-69'	Solvay Waste	0.0	2-4				
SB915-MW-42S	30-40'	Solvay Waste	NA	2-4				
SB915-MW-43S	35-45'	Solvay Waste	0.9	2-4				
SB915-MW-53D	110-120'	f/m Gravel/Sand	23.7	4-2				
SB915-MW-53I	61.5-71.5'	Solvay Waste	0.0	2-4				
SB915-MW-53S	25-35'	Solvay Waste	NA	2-4				
SB915-WB-05L	110-120'	Sand & Gravel	68.0	6-1			Allied 12-15-Chlorobenzene,1995	
SB915-WB-05R	146.5-156.1'	Shale	0.2	8-1			Allied 12-15-Chlorobenzene, Page 5	
GM-14	74-75.4'	Sand	0.1	6-1			Semet GAS, G&M, 1980	
GM-26	89-91'	Silt&Clay/fSand&Silt	0.5	5-1			Semet GAS, G&M, 1980	
SP-02A	6-16'	Fill (fSand)	4.3	2-8			Semet RI, OBG, 1991/Semet Vol 2	
SP-03A	14-24'	Solvay Waste	0.4	2-6			2005 Model K Values Summary	Y
SP-03B	34-44'	Silt/Clay	0.0	4-1			Semet RI, OBG, 1991/Semet Vol 2	
SP-03C	18-20'	Solvay Waste	0.7	2-6			Semet RI, OBG, 1991/Semet Vol 1	Y
SP-04A	28-38'	Solvay Waste	0.4	2-6			2005 Model K Values Summary	Y
SP-04B	52-62'	Silt/Clay & fSand	0.5	5-1			Semet RI, OBG, 1991/Semet Vol 2	
SP-04C	30-32'	Solvay Waste	0.2	2-6			Semet RI, OBG, 1991/Semet Vol 1	Y
SP-05A	8-18'	Fill/Marl	9.1	2-8			Semet RI, OBG, 1991/Semet Vol 2	
SP-05B	34-44'	fSand	1.2	5-1			Semet RI, OBG, 1991/Semet Vol 2	
SP-05C	54-64'	fSand	2.7	5-1			Semet RI, OBG, 1991/Semet Vol 2	
SP-06A	20-30'	Solvay Waste	2.7	2-6			2005 Model K Values Summary	Y
SP-06B	48-58'	fSand	0.2	5-1			Semet RI, OBG, 1991/Semet Vol 1	Y
SP-06C		Silt/Clay	0.6	4-1			Semet RI, OBG, 1991/Semet Vol 1	Y
SP-07A	16-26'	Solvay Waste	0.4	2-6			2005 Model K Values Summary	Y
SP-07B	44-54'	fSand	0.0	5-1			Semet RI, OBG, 1991/Semet Vol 2	
SP-07C	88-98'	Sand and Gravel	0.1	6-1			Semet Vol 1	Y
SP-08A	18-28'	Solvay Waste	0.0	2-6			2005 Model K Values Summary	Y
SP-08B	48-58'	Silt/Clay	0.0	4-1			Semet RI, OBG, 1991/Semet Vol 2	
SP-08C	78-88'	f/mSand	0.4	6-1			Semet RI, OBG, 1991	Y
SP-09A	6-16'	Fill (gravel, sand, silt)	1.1	2-8			Semet RI, OBG, 1991/Semet Vol 2	

Table 8

Estimated Hydraulic Conductivity Values

Well Name	Depth (ft/bgs)	Geologic Unit	Slug Test Kh (ft/day)	Parameter Zone	Pump Test Kh (ft/day)	Pump Test Kv (ft/day)	Source	Considered in Model Version 1.0
SP-09B	24-34'	fSand	1.4	5-1			Semet RI, OBG, 1991/Semet Vol 2	
SP-09C	42-52'	mSand	9.6	6-1			Semet RI, OBG, 1991/Semet Vol 2	Y
SP-13U		Solvay Waste	0.0	2-6			Semet, Vol 1	Y
OW-01D	88-98'	Sand and Gravel		6-1	181.2		SP/WA Pump Test Report	Y
OW-02D	54-64'	fine sand/silt		5-1	1.6		SP/WA Pump Test Report	Y
OW-03I	14-24'	Marl		3-1	0.3		SP/WA Pump Test Report	Y
OW-04D	72-82'	Sand and Gravel		6-1	1073.0		SP/WA Pump Test Report	Y
OW-06D	92-102'	Sand and Gravel		6-1	180.4		SP/WA Pump Test Report	Y
OW-07D	66-74'	fine sand/silt		5-1	5.4		SP/WA Pump Test Report	Y
OW-08S	6-16'	Fill		2-8	104.1			Y
OW-09I	19-29'	Marl		3-1	0.1		SP/WA Pump Test Report	Y
OW-10I	14-24'	Marl		3-1	0.6		SP/WA Pump Test Report	
OW-11D	101-111'	Sand and Gravel		6-1	537.6		SP/WA Pump Test Report	Y
PS-01	4-14'	Fill/Till	10.8	2-8			Willis, Table 7	
PS-02	3.5-13.5'	Till	0.1	7-1			Willis, Table 7	
PS-03D	31-41'	Till	0.1	7-1			Willis II	
PS-03S	4-14'	Fill/Till	9.4	2-8			Willis, Table 7	
TW-02S	4-14'	Fill		7-1	68.9		SP/WA Pump Test Report	Y
TW-03I	14-24'	Marl		3-1	0.1		SP/WA Pump Test Report	Y
WA-1D		Sand and Gravel	17.1	6-1	570.3	1.2E-03	Willis II	Y
WA-01S	6-16'	Fill	70.6	2-8			Willis II	Y
WA-02D	73-83'	fSand&Silt/Shale		5-1		1.0E-04		Y
WA-02S	8-18'	Fill	5.6	2-8	23.9		Willis II	Y
WA-03D	53-63'	Silt/fine sand	3.9	5-1			Willis II	Y
WA-03I	20-30'	Marl	1.1	3-1	0.2		SP/WA Pump Test Report	Y
WA-03S	3-13'	Fill/Solvay Waste	3.1	2-8	6.0		Willis II	Y
WA-04D	60-70'	fSand&Silt/Till	0.0	5-1			Willis II	Y
WA-04I	40-50'	Marl	0.1	3-1			Willis II	Y
WA-04S	23-33'	Solvay Waste	77.4	2-6			Willis II	Y
WA-05D	40-50'	Sand & Silt	0.1	5-1			Willis II	
WA-05I	26-36'	Fill/Marl	0.9	2-8			Willis II	
WA-05S	12-22'	Fill/Solvay Waste	2.9	2-8			Willis II	Y
WA-06D	36-46'	fSand&Silt/Till	1.4	5-1			Willis II	Y
WA-06S	16.5-26.5'	Fill/Solvay Waste	0.2	2-8			Willis II	
WA-07D	70-80'	fSand&Silt/Till		5-1		9.6E-03		Y
WA-07I	30-40'	Marl/Silt/clay	0.3	3-1			Willis II	Y
WA-07S	10-20'	Fill	0.5	2-8			Willis II	Y
Well 49	35-37'	Marl	0.0	3-1		2.1E-03	Geraghty&Miller "Allied Chemical…1982	

Table 8

Estimated Hydraulic Conductivity Values

Well Name	Depth (ft/bgs)	Geologic Unit	Slug Test Kh (ft/day)	Parameter Zone	Pump Test Kh (ft/day)	Pump Test Kv (ft/day)	Source	Considered in Model Version 1.0
Well 55		Fill		2-8	13.8			Y
DW101	122-132	Sand & Gravel	0.9	6-1			Crucible (Thomsen)	
DW102	128-138	Sand & Silt	0.2	5-1			Crucible (Thomsen)	
DW103	157-162	Sand & Gravel	5.7	6-1			Crucible (Thomsen)	
EB-01C	64	Peat/Marl		3-1		2.0E-04	Crucible (Thomsen)	
EB-04	63	Marl		3-1		5.7E-03	Crucible (Thomsen)	
MS104.2	53-63	Solvay Waste	0.1	2-5			Crucible (Thomsen)	Y
MS104.3	43-53	Solvay Waste	0.0	2-5			Crucible (Thomsen)	Y
MS104.4	33-43	Solvay Waste	0.1	2-5			Crucible (Thomsen)	Y
MS104.5	23-33	Solvay Waste	0.2	2-5			Crucible (Thomsen)	Y
MS104.6	81	Silt/Clay		4-1		1.4E-04	Crucible (Thomsen)	
MS105.1	66.5-71.5	Marl/Peat	0.0	3-1			Crucible (Thomsen)	
MS105.2	51	Solvay Waste		2-5		2.0E-02	Crucible (Thomsen)	
MS105.3	42.5-52.5	Solvay Waste	0.1	2-5			Crucible (Thomsen)	Y
MS105.4	33.5-43.5	Solvay Waste	0.2	2-5			Crucible (Thomsen)	Y
MS105.5	23.5-33.5	Solvay Waste	0.2	2-5			Crucible (Thomsen)	Y
MS106.1	63-73	Marl/Peat	0.1	3-1			Crucible (Thomsen)	
MS106.2	31	Solvay Waste		2-5		1.4E-02	Crucible (Thomsen)	
MS106.3	44-54	Solvay Waste	0.2	2-5			Crucible (Thomsen)	Y
MS106.4	34-44	Solvay Waste	0.3	2-5			Crucible (Thomsen)	Y
MS106.5	24-34	Solvay Waste	0.0	2-5			Crucible (Thomsen)	Y
WB18-MW-01D	85-95	Sand & Gravel	7.3	6-1			PSA (OBG)	
WB18-MW-01I	25-35	Marl	0.0	3-1			PSA (OBG)	
WB18-MW-01S	3 - 13'	SolvayWaste	0.6	2-5			PSA (OBG)	
WB18-MW-02D	88-98	m/c Sand	0.3	6-1			PSA (OBG)	
WB18-MW-02I	23-33	Marl	0.3	3-1			PSA (OBG)	
WB18-MW-02S	3 - 13'	Solvay Waste/ Marl	2.5	2-5	6.2		PSA (OBG)	
WB18-MW-03BR	145-155	Shale	1.2	8-1			RI (OBG)	
WB18-MW-03D	128-138	m/c Sand / Sand & Gravel	5.8	6-1			PSA (OBG)	
WB18-MW-03I	40-50	Marl	0.0	3-1			PSA (OBG)	
WB18-MW-03S	4-14'	Solvay Waste/ Marl	1.1	2-5			PSA (OBG)	
WB18-MW-04BR	173-183	Shale	0.0	8-1			RI (OBG)	
WB18-MW-04D	144-154	m/c Sand / Sand & Gravel	2.3	6-1			PSA (OBG)	
WB18-MW-04G	40-50	NMC S&G	1.4	3-3	0.2		PSA (OBG)	
WB18-MW-04I	22-32	Solvay Waste/Marl	0.5	2-5			PSA (OBG)	
WB18-MW-04S	7-17'	Solvay Waste	0.7	2-5	9.0		PSA (OBG)	
WB18-MW-05D	118-128	Sand & Gravel	13.8	6-1			PSA (OBG)	
WB18-MW-05I	22-32	Solvay Waste/Peat/Marl	1.1	2-5			PSA (OBG)	

Table 8

Estimated Hydraulic Conductivity Values

Well Name	Depth (ft/bgs)	Geologic Unit	Slug Test Kh (ft/day)	Parameter Zone	Pump Test Kh (ft/day)	Pump Test Kv (ft/day)	Source	Considered in Model Version 1.0
WB18-MW-05S	15-25	Solvay Waste	0.2	2-5			PSA (OBG)	
WB18-MW-06BR	145-175	Shale	0.0	8-1			RI (OBG)	
WB18-MW-06D	108-118	Sand & Gravel	15.7	6-1			PSA (OBG)	
WB18-MW-06I	64-74	Solvay Waste/Peat/Marl	0.1	2-5			PSA (OBG)	
WB18-MW-06S	33-43'	Solvay Waste	5.2	2-5			PSA (OBG)	
WB18-MW-07D	96-106	f/m/c Sand	61.0	6-1			PSA (OBG)	
WB18-MW-07I	54-64	Solvay Waste/Peat/Marl	0.7	2-5			PSA (OBG)	
WB18-MW-07S	30-40'	Solvay Waste	0.1	2-5			PSA (OBG)	
WB18-MW-08D	74-84	Sand & Gravel	16.1	6-1			PSA (OBG)	
WB18-MW-08I	20-30	Solvay Waste / Silt&Clay	0.1	2-5			PSA (OBG)	
WB18-MW-08S	10-20'	Solvay Waste	0.1	2-5			PSA (OBG)	
WB18-MW-09BR	112-122	Shale	2.3	8-1			WB18 RI OBG	
WB18-MW-09D	51-61	Sand & Silt / Sand & Gravel	11.3	6-1			WB18 RI OBG	
WB18-MW-09I	10-20'	Marl	0.6	3-1			PSA (OBG)	
WB18-MW-09S	3-13'	Solvay Waste	0.4	2-5			WB18 RI OBG	
WB18-MW-10D	94-104	f/m/c Sand & Silt	0.0	6-1			WB18 RI OBG	
WB18-MW-10I	55-65	Solvay Waste/Peat/Marl	0.0	2-5			PSA (OBG)	
WB18-MW-10S	25-35	Solvay Waste	6.5	2-5			WB18 RI OBG	
WB18-MW-12S	3-13'	Solvay Waste/ Marl	0.7	2-5			WB18 RI OBG	
WB18-MW-13BR	76-106'	Shale	5.4	8-1			WB18 RI OBG	
WB18-MW-13BR-2	76-106	Shale	5.4	8-1			WB18 RI OBG	
WB18-MW-13D	43.5-53.5	Sand & Gravel / Till	21.0	6-1			WB18 RI OBG	
WB18-MW-13I	15-25	Sand & Silt	0.9	5-1			WB18 RI OBG	
WB18-MW-13S	3-13'	Fill/clay/silt	2.3	2-8			WB18 RI OBG	
WB18-MW-14BR	100-130	Shale	4.8	8-1			WB18 RI OBG	
WB18-MW-14D	50-60	f/m/c Sand & Silt	0.1	6-1			WB18 RI OBG	
WB18-MW-14I	22-32	Sand & Silt	0.1	4-2			WB18 RI OBG	
WB18-MW-14S	10-20'	clay/silt	0.4	4-2			WB18 RI OBG	
WB18-MW-15S	15-25	Solvay Waste	0.3	2-5			WB18 RI OBG	
WB18-MW-16D	123-133	f/m/c Sand	2.7	6-1			WB18 RI OBG	
WB18-MW-16I	63-73	Solvay Waste/Peat/Marl	0.0	2-5			WB18 RI OBG	
WB18-MW-16S	34-44	Solvay Waste	0.1	2-5			WB18 RI OBG	
WB18-MW-17D	175-185	m/c Sand / Sand & Gravel	29.3	6-1			WB18 RI OBG	
WB18-MW-17I	47-57	Solvay Waste/Peat/Marl	0.3	2-5			WB18 RI OBG	
WB18-MW-17S	35-45	Solvay Waste	2.6	2-5			WB18 RI OBG	
WB18-MW-18D	136-146	f/m/c Sand / Sand & Gravel	3.6	6-1			WB18 RI OBG	
WB18-MW-18G	75-85	NMC S&G/ Silt&Clay	10.1	3-3			WB18 FRI OBG	
WB18-MW-18I	62-72	SW/dense Peat/Marl	0.0	2-5			WB18 RI OBG	

Table 8

Estimated Hydraulic Conductivity Values

Well Name	Depth (ft/bgs)	Geologic Unit	Slug Test Kh (ft/day)	Parameter Zone	Pump Test Kh (ft/day)	Pump Test Kv (ft/day)	Source	Considered in Model Version 1.0
WB18-MW-18S	34-44	Solvay Waste	0.3	2-5			WB18 RI OBG	
WB18-MW-19BR2	109-119'	Shale	3.9	8-1			WB18 RI OBG	
WB18-MW-20BR	138.5-148.5'	Shale	0.0	8-1			FRI (OBG)	
WB18-MW-21D	124-134	Sand	12.5	6-1			WB18 RI OBG	
WB18-MW-21I	62-72	SW/Peat/ Sand	0.3	2-5			WB18 RI OBG	
WB18-MW-21S	30-40	Solvay Waste	1.1	2-5			WB18 RI OBG	
WB18-MW-22D	117-127'	m/f sand/silt		6-1			WB18 RI OBG	
WB18-MW-22D-2	124-134	Sand	25.8	6-1			WB18 RI OBG	
WB18-MW-22I	64-74	SW/Marl	0.0	2-5			WB18 RI OBG	
WB18-MW-22S	34-44	Solvay Waste	0.2	2-5			WB18 RI OBG	
WB18-OW-02S	15-25	Fill/Solvay Waste		2-5	1.7			
WB18-OW-03S	3-13'	Solvay Waste/Marl		2-5	5.6			
WB18-OW-04S	3-13'	Solvay Waste/Marl			13.2			
WB18-OW-05G	41-51	NMC S&G/Marl		3-3	22.5			
WB18-OW-06G	40-50	NMC S&G/Marl		3-3	21.1			
WB18-OW-101	55-60	Solvay Waste	0.0	2-5			Crucible, Phase II (Thomsen)	Y
WB18-OW102	39.5-44.5	Solvay Waste	0.2	2-5			Crucible, Phase II (Thomsen)	Y
WB18-OW-1S	15-25	Fill/Solway Waste		2-5	1.3			
OW-41 (EB-04)	83-84	Silty Sand (some gravel)	2.6	5-1			Crucible, Phase II (Thomsen)	
WB18-OW-56	55-60	Solvay Waste	0.1	2-5			Crucible, Phase II (Thomsen)	Y
WB18-S-1C	58-63	Solvay Waste	0.1	2-5			Crucible, Phase II (Thomsen)	Y
WB18-SB-03	38-40	Clayey Slit		4-1		4.7E-04	WB18 Book 3, OBG, 2007	
WB18-SB-18	10-12'	Solvay Waste		2-5		3.2E-02		
WB18-SB-19BR	24-26	Solvay Waste		2-5		5.6E-02		
WB18-SB-20	48-50	Clayey Silt		4-1		3.2E-04		
WB18-SB-24BR	48-50	Solvay Waste		2-5		2.5E-02	WB18 Book 3, OBG, 2007	
WB18-SB-31NM	16-18	Solvay Waste		2-5		5.2E-02		
WB18-SB-52	20-22	Marl		3-1		1.3E+00	WB18FFS (OBG)	
WB18-SB-54	22-24	Marl		3-1		1.5E-02	WB18FFS (OBG)	
WB18-SB-55	16-18	Marl		3-1		1.4E-02	WB18FFS (OBG)	
WB18-SB-56	6-8'	Solvay Waste		2-5		1.6E-02	WB18FFS (OBG)	
WB18-SB-57	12-14'	Marl		3-1		6.1E-03	WB18FFS (OBG)	
WB18-SB-58	6-8'	Solvay Waste		2-5		1.2E-02	WB18FFS (OBG)	
WB18-SB-60	20-22'	Marl		3-1		6.6E-04	WB18FFS (OBG)	
WB18-SB-61	12-14'	Marl		3-1		1.8E-02	WB18FFS (OBG)	
WB18-SB-62	6-8'	Solvay Waste		2-5		1.5E-02	WB18FFS (OBG)	
WB18-SB-63	18-20'	Marl		3-1		3.6E-03	WB18FFS (OBG)	
WB18-SB-66	6-8'	Marl		3-1		1.1E-01	WB18FFS (OBG)	

Table 8

Estimated Hydraulic Conductivity Values

Well Name	Depth (ft/bgs)	Geologic Unit	Slug Test Kh (ft/day)	Parameter Zone	Pump Test Kh (ft/day)	Pump Test Kv (ft/day)	Source	Considered in Model Version 1.0
WB18-SB-67	4-6'	Solvay Waste		2-5		2.0E-02	WB18FFS (OBG)	
WB18-SB-68	4-6'	Solvay Waste		2-5		9.3E-03	WB18FFS (OBG)	
WB18-SB-69	14-16	Marl		3-1		2.2E-02	WB18FFS (OBG)	
WB18-SB-98	74-76	Marl		3-1		5.3E-03	WB18FFS (OBG)	
WB18-SB-123	32-34	Solvay Waste		2-5		2.3E-02	WB18FFS (OBG)	
WB18-TW-01S	15-25'	Solvay Waste		2-5	0.4			
WB18-TW-02S	3-13'	Marl		3-1	7.9			
WB18-TW-03G	40-50'	NMC Sand/Gravel		3-3	11.1			
WB18-TW-04	88-98'	f/m/cSand&Gravel		6-1				
M-201	82.7-88.6	Till	19.1	7-1	249.5		Mueser Rutledge, Semet Site Remediation, 2003	
M-201	84.2-90.1	Till	21.0	7-1	26.9		Mueser Rutledge, Semet Site Remediation, 2003	
M-201	79-84.9	Till	2.3	7-1	1.4		Mueser Rutledge, Semet Site Remediation, 2003	
M-202	121-126	Bedrock	0.0	8-1			Mueser Rutledge, Semet Site Remediation, 2003	Y
Winkley (Dunn Geoscience, 1986a)		Silt/Clay		4-1		1.7E-01	Winkley Pg 63	
Winkley (Stearns and Wheler Eng, 1987)		Bedrock	1.1	8-1			Winkley pg 56	Y
HMW-11D2		Sand	4.2				Arcadis Former MGP Hiawatha Blvd	
HMW-12D		Sand	3.8				Arcadis Former MGP Hiawatha Blvd	
HMW-12D2		Sand	3.3				Arcadis Former MGP Hiawatha Blvd	
HMW-13S		Sand	4.6				Arcadis Former MGP Hiawatha Blvd	
HMW-13D		Sand	1.5				Arcadis Former MGP Hiawatha Blvd	
HMW-16D		Sand	10.2				Arcadis Former MGP Hiawatha Blvd	
HMW-21D		Sand	0.4				Arcadis Former MGP Hiawatha Blvd	
HMW-19S		Sand	1.5				Arcadis Former MGP Hiawatha Blvd	
HMW-19D1		Sand	0.2				Arcadis Former MGP Hiawatha Blvd	
HMW-19D2		Sand/Silt Clay	0.0				Arcadis Former MGP Hiawatha Blvd	
HMW-20D		Sand	0.7				Arcadis Former MGP Hiawatha Blvd	
HMW-21D		Sand	0.8				Arcadis Former MGP Hiawatha Blvd	
HMW-22D		Sand	1.9				Arcadis Former MGP Hiawatha Blvd	
HMW-11D		Marl	2.5				Hiaw Blvd Form MGP Site, Arcadis	Y
HMW-11S		Fill	36.7				Hiaw Blvd Form MGP Site, Arcadis	Y
HMW-14D		Marl	2.7				Hiaw Blvd Form MGP Site, Arcadis	Y
HMW-14S		Fill	1.5				Hiaw Blvd Form MGP Site, Arcadis	Y
HMW-15D		Sand	1.3				Hiaw Blvd Form MGP Site, Arcadis	Y
HMW-15S		Sand	43.6				Hiaw Blvd Form MGP Site, Arcadis	Y
HMW-18D		Sand	0.7				Hiaw Blvd Form MGP Site, Arcadis	Y
HMW-18S		Fill	44.8				Hiaw Blvd Form MGP Site, Arcadis	Y
HMW-4D		Marl	0.9				Hiaw Blvd Form MGP Site, Arcadis	Y
HMW-4S		Fill	2.6				Hiaw Blvd Form MGP Site, Arcadis	Y

Table 8

Estimated Hydraulic Conductivity Values

Well Name	Depth (ft/bgs)	Geologic Unit	Slug Test Kh (ft/day)	Parameter Zone	Pump Test Kh (ft/day)	Pump Test Kv (ft/day)	Source	Considered in Model Version 1.0
HMW-6D		Marl	7.5				Hiaw Blvd Form MGP Site, Arcadis	Y
HMW-6S		Fill	1.5				Hiaw Blvd Form MGP Site, Arcadis	Y
HMW-1S		Fill/Solvay Waste	18.7				Arcadis Former MGP Hiawatha Blvd	
HMW-7S		Fill/Solvay Waste	68.3				Arcadis Former MGP Hiawatha Blvd	
HMW-8S		Fill/Solvay Waste	15.8				Arcadis Former MGP Hiawatha Blvd	
HMW-9S		Fill/Solvay Waste	2.7				Arcadis Former MGP Hiawatha Blvd	
HMW-12S		Fill/Solvay Waste	2.1				Arcadis Former MGP Hiawatha Blvd	
HMW-16S		Fill/Solvay Waste	11.0				Arcadis Former MGP Hiawatha Blvd	
HMW-2S		Solvay Waste	11.8				Arcadis Former MGP Hiawatha Blvd	
HMW-3S		Solvay Waste	2.0				Arcadis Former MGP Hiawatha Blvd	
HMW-5S		Solvay Waste	1.5				Arcadis Former MGP Hiawatha Blvd	
HMW10S		Solvay Waste	5.7				Arcadis Former MGP Hiawatha Blvd	
HMW-20S		Solvay Waste	0.4				Arcadis Former MGP Hiawatha Blvd	
HMW-21S		Solvay Waste	18.9				Arcadis Former MGP Hiawatha Blvd	
HMW-22S		Solvay Waste	2.8				Arcadis Former MGP Hiawatha Blvd	
HMW-1D		Sand	1.0				Arcadis Former MGP Hiawatha Blvd	
HMW-2D		Sand	0.6				Arcadis Former MGP Hiawatha Blvd	
HMW-3D		Sand	3.7				Arcadis Former MGP Hiawatha Blvd	
MW-3D2		Sand/Silt Clay	0.0				Arcadis Former MGP Hiawatha Blvd	
HMW-4D		Sand	0.9				Arcadis Former MGP Hiawatha Blvd	
HMW-5D		Sand	1.6				Arcadis Former MGP Hiawatha Blvd	
HMW-6D		Sand	7.8				Arcadis Former MGP Hiawatha Blvd	
HMW-7D		Sand	0.5				Arcadis Former MGP Hiawatha Blvd	
HMW-8D		Sand	4.6				Arcadis Former MGP Hiawatha Blvd	
HMW-9D		Sand	77.7				Arcadis Former MGP Hiawatha Blvd	
HMW-10D		Sand	2.8				Arcadis Former MGP Hiawatha Blvd	

Table 9

Summary of Water Level Data and Calibration Targets

Well ID	GW Zone	Model Layer	State Plane (NAD 83 ft)		Period of Water Level Measurements	All Water Level Data						Median Year						Calibration Target Elevtaion (feet, NAVD 88)
			X-coordinate	Y-coordinate		Number of Measure-ments	Average Elevation (feet, NAVD 88)	Median Elevation (feet, NAVD 88)	Range	Variance	25th Percentile Trimmed Mean Elevation (feet, NAVD 88)	Number of Measure-ments	Average Elevation (feet, NAVD 88)	Median Elevation (feet, NAVD 88)	Range	Variance	25th Percentile Trmmed Mean Elevation (feet, NAVD 88)	
BF-BFMW-01D	D	5	923178	1117228	03/12/03 - 06/25/08	25	374.8	374.8	1.9	0.2	374.8	12	374.8	374.7	1.4	0.2	374.7	374.7
BF-BFMW-01I	I	3	923181	1117239	05/08/01 - 12/17/07	6	377.1	377.4	2.4	0.7	377.3	4	376.9	377.4	1.9	0.8	377.4	377.4
BF-BFMW-01S	S	2	923180	1117234	05/08/01 - 06/25/08	27	382.2	382.5	5.3	1.3	382.3	12	382.3	382.5	2.7	0.9	382.4	382.4
BF-BFMW-02I	I	3	923396	1117085	11/17/05 - 06/25/08	13	377.3	376.7	9.7	6.0	376.7	7	376.7	376.7	2.1	0.4	376.7	376.7
BF-BFMW-02S	S	2	923396	1117095	03/12/03 - 06/25/08	7	385.0	386.0	7.8	7.9	386.0	7	385.0	386.0	7.8	7.9	386.0	386.0
BF-BFMW-02S2	S	2	923396	1117095	11/17/05 - 12/17/07	12	381.6	381.7	2.3	0.5	381.6	7	381.5	381.6	1.4	0.3	381.5	381.5
BF-BFMW-03I	I	3	923666	1116859	05/08/01 - 06/25/08	27	378.3	378.1	12.0	4.3	378.1	12	378.2	378.0	4.8	1.6	378.1	378.1
BF-BFMW-03S	S	2	923662	1116863	05/08/01 - 06/06/07	21	383.0	382.8	8.9	5.1	382.9	12	383.6	384.3	7.2	5.3	383.5	383.5
BF-BFMW-04D	D	8	924156	1116500	03/12/03 - 10/19/03	4	375.1	374.7	3.0	1.8	374.7	4	375.1	374.7	3.0	1.8	374.7	374.7
BF-BFMW-04I	I	3	924160	1116502	05/08/01 - 06/06/07	12	377.0	376.8	5.1	2.7	376.8	8	377.2	376.7	4.8	3.3	376.8	376.8
BF-BFMW-04S	S	2	924155	1116505	05/08/01 - 02/23/06	6	382.0	381.6	7.2	7.5	382.1	5	382.1	381.6	7.2	9.3	382.3	382.3
BF-BFMW-05I	I	3	923752	1116577	05/08/01 - 06/28/06	5	384.5	381.8	21.2	76.6	381.3	4	385.1	380.9	21.2	99.5	380.9	380.9
BF-BFMW-05S	S	2	923754	1116575	05/08/01 - 06/28/06	3	387.9	382.5	18.2	104.6	387.9	3	387.9	382.5	18.2	104.6	387.9	387.9
BF-BFMW-06I	I	3	922948	1116944	05/08/01 - 06/06/07	25	377.6	378.5	22.2	16.7	378.4	12	377.4	378.5	11.0	9.1	378.4	378.4
BF-BFMW-06S	S	2	922955	1116942	05/08/01 - 06/06/07	15	385.4	385.3	1.1	0.1	385.4	10	385.4	385.4	0.9	0.1	385.4	385.4
BF-BFMW-07S	S	2	923161	1116589	03/12/03 - 06/25/08	18	381.8	382.0	4.4	1.5	382.0	9	382.0	382.4	4.3	1.5	382.2	382.2
BF-BFMW-08S	S	2	923559	1116692	12/12/05 - 06/25/08	12	383.1	382.9	9.2	6.1	382.7	6	383.2	382.9	4.1	2.2	382.8	382.8
HB-HB-01D	D	7	924585	1117455	05/08/01 - 06/25/08	36	370.0	370.3	6.6	1.3	370.3	12	370.3	370.4	1.3	0.1	370.3	370.3
HB-HB-01S	S	2	924589	1117454	05/08/01 - 06/25/08	36	363.9	363.8	3.1	0.6	363.9	12	363.9	363.8	2.0	0.4	363.8	363.8
HB-HB-02I	I	3	925743	1116367	08/15/00 - 12/17/07	36	362.6	363.1	11.8	3.5	363.0	12	362.8	363.0	3.2	0.6	363.0	363.0
HB-HB-02S	S	2	925739	1116363	08/15/00 - 12/17/07	37	363.7	363.8	3.5	0.4	363.8	12	363.6	363.7	2.4	0.5	363.7	363.7
HB-HB-03S	S	2	923857	1117620	08/15/00 - 06/25/08	25	367.9	367.9	2.0	0.2	368.0	12	367.9	368.0	0.8	0.1	368.0	368.0
HB-HB-04D	D	5	925879	1115915	05/07/03 - 06/06/07	16	373.4	373.4	3.7	0.6	373.3	10	373.4	373.3	2.4	0.4	373.3	373.3
HB-HB-04S	S	2	925887	1115920	08/15/00 - 06/25/08	28	363.3	363.2	3.2	0.4	363.3	12	363.3	363.3	2.0	0.3	363.3	363.3
HB-HB-05D	D	6	925256	1116715	03/12/03 - 06/25/08	25	368.6	368.6	3.0	0.6	368.6	12	368.7	368.6	1.7	0.4	368.7	368.7
HB-HB-05I	I	2	925256	1116728	05/08/01 - 06/25/08	36	365.5	365.4	5.4	1.8	365.4	12	365.3	365.0	4.5	1.8	365.1	365.1
HB-HB-05S	S	2	925255	1116724	05/08/01 - 06/25/08	34	367.3	367.2	10.3	7.3	367.0	11	367.1	366.7	9.4	8.5	366.6	366.6
HB-HB-06S	S	2	926185	1116226	08/15/00 - 06/25/08	37	362.0	362.8	28.2	20.3	362.8	12	362.6	362.7	2.3	0.5	362.7	362.7
HB-HB-07S	S	6	925295	1114938	05/08/01 - 06/25/08	24	370.6	370.9	4.0	0.9	370.9	12	370.7	370.9	2.1	0.4	370.9	370.9
HB-HB-08D	D	4	925459	1115476	03/12/03 - 06/25/08	23	374.1	374.2	3.0	0.5	374.2	12	374.2	374.3	2.2	0.4	374.3	374.3
HB-HB-08I	I	3	925465	1115475	05/08/01 - 06/25/08	25	369.9	370.0	2.0	0.4	370.0	12	370.0	370.2	1.6	0.4	370.1	370.1
HB-HB-08S	S	2	925460	1115484	05/08/01 - 06/25/08	25	370.0	370.0	3.8	1.1	370.1	12	370.2	370.6	3.0	1.0	370.4	370.4
HB-HB-09S	S	2	924390	1115732	05/08/01 - 06/25/08	24	376.5	376.3	2.5	0.5	376.3	12	376.5	376.4	2.0	0.4	376.4	376.4
HB-HB-11I	I	3	924507	1116272	05/08/01 - 12/17/07	23	374.9	375.5	10.4	7.3	375.6	12	375.0	375.3	5.5	3.5	375.3	375.3
HB-HB-11S	S	2	924507	1116272	05/08/01 - 06/25/08	16	382.9	381.8	7.8	4.9	382.2	10	382.7	382.6	3.6	2.0	382.6	382.6
HB-HB-12D	D	4	925071	1115893	05/08/01 - 06/25/08	24	375.2	375.5	2.5	0.6	375.4	12	375.3	375.4	2.2	0.5	375.4	375.4
HB-HB-12I	I	3	925071	1115893	05/08/01 - 06/25/08	24	373.9	374.1	3.7	1.3	374.0	12	374.0	374.1	3.2	1.5	374.1	374.1
HB-HB-12S	S	2	925071	1115893	05/08/01 - 06/25/08	19	380.6	380.9	7.2	3.4	380.7	11	380.5	381.3	6.6	3.6	380.8	380.8
HB-HB-13D	D	8	925156	1115723	05/08/01 - 06/25/08	22	374.6	374.8	2.8	0.5	374.8	12	374.8	374.8	1.7	0.3	374.8	374.8
HB-HB-14D	D	3	924712	1115839	05/08/01 - 02/23/06	5	379.0	376.6	14.6	37.7	376.6	4	379.8	376.6	14.0	46.2	376.6	376.6
HB-HB-14S	S	2	924713	1115840	05/08/01 - 02/23/06	5	382.8	381.4	10.5	18.7	381.4	4	383.1	381.4	10.4	22.0	381.4	381.4
HB-HB-16D	D	5	925490	1116123	03/12/03 - 06/06/07	22	368.9	369.1	4.7	1.1	369.0	12	368.9	369.1	3.5	0.9	369.1	369.1
HB-HB-17D	D	4	924853	1116031	03/12/03 - 06/06/07	15	376.3	376.4	3.1	1.0	376.2	10	376.3	376.3	3.1	0.9	376.2	376.2
HB-HB-18S	S	2	926312	1115851	03/12/03 - 06/25/08	21	361.5	362.7	7.2	6.8	362.3	12	361.5	362.3	6.0	4.5	361.9	361.9
HB-HB-19S	S	2	926203	1115998	03/12/03 - 06/06/07	19	361.7	362.6	6.3	4.2	362.2	12	361.7	362.3	4.4	3.0	361.9	361.9
HB-HB-20D	D	6	926478	1116106	03/12/03 - 06/06/07	19	363.5	363.8	1.7	0.3	363.6	12	363.6	363.7	1.4	0.2	363.7	363.7
HB-HB-20I	I	3	926483	1116105	03/12/03 - 06/06/07	19	363.2	363.5	5.1	1.3	363.4	12	363.4	363.6	1.9	0.3	363.5	363.5
HB-HB-20S	S	2	926488	1116104	03/12/03 - 06/06/07	19	363.2	363.3	2.9	0.4	363.2	12	363.3	363.4	2.3	0.4	363.3	363.3
HB-HB-21I	I	3	925712	1115396	03/12/03 - 12/17/07	22	365.7	366.8	12.7	10.5	366.7	12	366.1	366.8	6.9	3.7	366.7	366.7

Table 9

Summary of Water Level Data and Calibration Targets

Well ID	GW Zone	Model Layer	State Plane (NAD 83 ft)		Period of Water Level Measurements	All Water Level Data						Median Year						Calibration Target Elevtaion (feet, NAVD 88)
			X-coordinate	Y-coordinate		Number of Measure-ments	Average Elevation (feet, NAVD 88)	Median Elevation (feet, NAVD 88)	Range	Variance	25th Percentile Trimmed Mean Elevation (feet, NAVD 88)	Number of Measure-ments	Average Elevation (feet, NAVD 88)	Median Elevation (feet, NAVD 88)	Range	Variance	25th Percentile Trmmed Mean Elevation (feet, NAVD 88)	
HB-MW-22	S	3	928838	1119063	02/28/07 - 06/25/08	4	363.4	363.2	1.4	0.4	363.2	3	363.5	363.3	1.3	0.4	363.5	363.5
HB-MW-23	S	3	928851	1119652	02/28/07 - 06/25/08	4	363.2	363.0	1.4	0.4	363.0	3	363.3	363.2	1.3	0.4	363.3	363.3
HB-MW-24	S	3	929051	1120411	02/28/07 - 06/25/08	4	363.2	362.9	1.6	0.6	362.9	3	363.4	363.2	1.6	0.6	363.4	363.4
HB-MW-25	S	2	929498	1119997	02/28/07 - 06/25/08	4	364.7	364.7	1.2	0.2	364.7	3	364.8	364.7	0.9	0.2	364.8	364.8
HB-MW-26	S	2	929142	1119261	02/28/07 - 06/25/08	4	364.2	364.3	0.9	0.2	364.3	3	364.3	364.4	0.6	0.1	364.3	364.3
HB-MW-27	S	2	929465	1120610	02/28/07 - 06/25/08	4	363.4	363.2	1.4	0.4	363.2	3	363.5	363.3	1.3	0.5	363.5	363.5
HB-OW-01S	S	2	923859	1117590	12/06/04 - 06/25/08	18	368.0	368.2	1.4	0.1	368.1	12	368.1	368.2	1.1	0.1	368.2	368.2
HB-OW-02S	S	2	925766	1116387	12/13/04 - 12/17/07	19	363.6	363.8	1.8	0.3	363.7	12	363.5	363.7	1.7	0.3	363.7	363.7
HB-OW-03S	S	2	925850	1115918	12/13/04 - 12/17/07	20	363.5	363.5	1.4	0.2	363.6	12	363.5	363.5	1.1	0.2	363.6	363.6
HB-OW-04S	S	2	923818	1117612	12/06/04 - 06/25/08	19	368.2	368.2	1.9	0.3	368.2	12	368.1	368.2	1.6	0.3	368.2	368.2
HB-OW-05S	S	2	925785	1116373	12/13/04 - 06/06/07	18	363.5	363.6	2.3	0.4	363.6	12	363.5	363.6	2.0	0.4	363.6	363.6
HB-OW-06S	S	2	926483	1116074	03/30/05 - 06/06/07	15	363.3	363.5	2.2	0.6	363.3	12	363.4	363.6	2.2	0.6	363.5	363.5
HB-OW-07S	S	2	926468	1116084	03/30/05 - 06/06/07	15	363.0	363.3	2.7	0.6	363.1	12	363.1	363.4	2.7	0.6	363.3	363.3
HB-OW-08D	D	7	925101	1116709	01/31/05 - 12/17/07	19	369.9	370.0	2.3	0.5	370.0	12	369.8	370.1	2.1	0.5	369.9	369.9
HB-TW-01	S	2	923848	1117618	12/06/04 - 06/25/08	19	368.0	368.1	1.2	0.1	368.0	12	368.0	368.1	0.9	0.1	368.0	368.0
HB-TW-02	S	2	925762	1116380	12/13/04 - 12/17/07	18	363.5	363.9	2.5	0.5	363.7	12	363.5	363.7	1.9	0.5	363.7	363.7
HB-TW-03	S	2	925859	1115923	01/10/05 - 12/17/07	19	363.3	363.2	1.4	0.2	363.3	12	363.3	363.2	1.1	0.1	363.3	363.3
HB-TW-04	D	6	925208	1116713	01/31/05 - 06/25/08	20	368.8	369.0	2.1	0.4	369.0	12	368.9	369.1	1.7	0.3	369.1	369.1
HB-TW-05	S	2	926487	1116083	03/30/05 - 06/06/07	15	363.2	363.5	3.3	0.9	363.3	12	363.4	363.6	2.2	0.6	363.5	363.5
HB-WA-08D	D	5	924706	1116703	01/04/95 - 06/25/08	35	372.5	372.6	2.0	0.2	372.6	12	372.6	372.6	1.6	0.2	372.6	372.6
HB-WA-08I	I	3	924717	1116705	01/04/95 - 06/25/08	35	371.4	371.4	3.5	0.5	371.4	12	371.2	371.3	2.6	0.5	371.3	371.3
HB-WA-08S	S	2	924708	1116717	01/04/95 - 06/25/08	39	371.5	371.8	6.7	1.9	371.8	12	371.0	371.3	4.8	2.5	371.1	371.1
HB-WB-BL	D	6	924874	1116411	05/08/01 - 06/25/08	21	375.8	376.1	6.4	1.8	376.1	12	376.1	376.1	2.2	0.3	376.1	376.1
HB-WB-BU	S	2	924878	1116408	05/08/01 - 06/25/08	23	372.8	372.8	6.4	1.8	372.8	12	372.6	372.7	3.0	1.0	372.7	372.7
LCP-AW-2	S	2	916623	1117641	12/06/02 - 03/08/05	8	389.2	389.5	2.6	1.0	389.0	5	388.7	388.1	1.7	0.8	388.6	388.6
LCP-AW-3	S	2	916649	1117547	03/25/03 - 06/29/04	6	389.3	389.2	1.7	0.7	389.3	5	389.1	388.6	1.7	0.8	389.0	389.0
LCP-AW-4	S	2	916671	1117594	12/06/02 - 03/08/05	8	389.0	389.3	2.4	0.9	389.1	5	388.6	388.0	1.7	0.8	388.5	388.5
LCP-AW-5	S	4	916411	1117395	12/06/02 - 05/27/05	9	389.2	389.5	2.3	0.9	389.2	6	388.8	388.4	2.2	0.9	388.6	388.6
LCP-CWB-01D	D	7	916941	1118011	03/25/03 - 09/26/05	9	373.7	374.4	7.9	5.9	374.4	7	373.4	374.3	7.6	7.1	374.2	374.2
LCP-CWB-01S	S	5	916920	1118006	03/25/03 - 09/26/05	9	374.5	374.5	1.7	0.2	374.5	7	374.4	374.5	1.1	0.2	374.5	374.5
LCP-CWB-05D	D	8	917179	1117726	12/06/02 - 05/27/05	9	374.4	374.4	1.7	0.3	374.4	6	374.3	374.3	1.5	0.2	374.3	374.3
LCP-CWB-05S	S	7	917173	1117730	12/06/02 - 05/27/05	9	374.7	374.7	1.7	0.3	374.7	6	374.6	374.6	1.5	0.2	374.6	374.6
LCP-CWB-09D	D	7	917424	1117472	12/06/02 - 03/08/05	8	375.4	375.3	2.2	0.5	375.3	5	375.1	375.1	1.8	0.4	375.1	375.1
LCP-CWB-09S	S	5	917418	1117477	12/06/02 - 03/08/05	8	375.0	375.0	1.8	0.3	374.9	5	374.8	374.9	1.5	0.3	374.8	374.8
LCP-CWB-13	S	8	917646	1117149	03/25/03 - 03/08/05	7	372.9	375.1	17.0	36.9	374.9	5	374.9	375.1	3.4	1.7	375.1	375.1
LCP-CWB-17	S	8	917385	1116964	03/25/03 - 03/08/05	7	372.8	376.1	23.6	71.4	375.2	5	375.2	376.1	8.3	10.8	375.9	375.9
LCP-CWB-21	S	9	917060	1116978	12/06/02 - 03/08/05	8	390.1	390.2	3.2	1.2	390.1	5	389.7	389.7	2.3	0.8	389.6	389.6
LCP-CWB-26	D	9	916617	1117165	12/06/02 - 03/08/05	8	381.4	381.6	2.3	0.6	381.5	5	381.2	381.3	1.9	0.5	381.2	381.2
LCP-CWB-32	D	9	916477	1117652	12/06/02 - 05/27/05	9	378.2	378.3	2.1	0.5	378.4	6	378.1	378.1	1.9	0.6	378.3	378.3
LCP-CWB-35D	D	9	916721	1117832	12/06/02 - 05/27/05	9	370.0	376.3	33.2	168.6	376.2	6	373.7	376.2	17.2	44.4	376.2	376.2
LCP-CWB-35S	D	7	916720	1117825	12/06/02 - 05/27/05	9	374.8	374.8	1.7	0.3	374.8	6	374.6	374.7	1.5	0.3	374.5	374.5
LCP-MMW-1	S	5	917515	1118324	06/29/04 - 06/29/04	1	380.4	380.4	0.0		380.4	1	380.4	380.4			380.4	380.4
LCP-MW-10D	D	5	916731	1117525	03/25/03 - 09/26/05	8	376.9	376.7	2.7	0.7	376.8	6	376.9	376.7	2.7	1.0	376.8	376.8
LCP-MW-10S	S	4	916731	1117525	03/25/03 - 09/26/05	8	378.8	379.3	4.0	1.8	379.2	6	378.5	378.8	3.8	2.0	378.8	378.8
LCP-MW-11D	D	5	917353	1117984	12/06/02 - 05/27/05	9	377.0	376.8	1.8	0.3	377.0	6	376.7	376.7	1.5	0.3	376.7	376.7
LCP-MW-11S	S	2	917354	1117987	12/06/02 - 05/27/05	8	382.2	382.4	1.9	0.4	382.4	5	382.0	382.2	1.8	0.5	382.1	382.1
LCP-MW-12D	D	5	917093	1117766	12/06/02 - 05/27/05	9	374.7	374.7	1.7	0.3	374.7	6	374.5	374.5	1.5	0.3	374.5	374.5
LCP-MW-12S	S	2	917094	1117771	12/06/02 - 05/27/05	9	383.6	384.0	2.4	0.6	383.8	6	383.3	383.3	1.9	0.5	383.4	383.4
LCP-MW-13D	D	5	917467	1117545	12/06/02 - 09/26/05	10	375.0	375.0	1.9	0.4	375.0	7	374.8	374.9	1.6	0.3	374.8	374.8

Table 9

Summary of Water Level Data and Calibration Targets

Well ID	GW Zone	Model Layer	State Plane (NAD 83 ft)		Period of Water Level Measurements	All Water Level Data						Median Year						Calibration Target Elevtaion (feet, NAVD 88)
			X-coordinate	Y-coordinate		Number of Measure-ments	Average Elevation (feet, NAVD 88)	Median Elevation (feet, NAVD 88)	Range	Variance	25th Percentile Trimmed Mean Elevation (feet, NAVD 88)	Number of Measure-ments	Average Elevation (feet, NAVD 88)	Median Elevation (feet, NAVD 88)	Range	Variance	25th Percentile Trmmed Mean Elevation (feet, NAVD 88)	
LCP-MW-13S	S	2	917464	1117550	12/06/02 - 09/26/05	10	387.3	388.1	4.5	3.2	387.8	7	386.9	387.9	4.4	3.8	387.0	387.0
LCP-MW-14D	D	6	917383	1117028	12/06/02 - 03/08/05	8	376.4	376.4	1.8	0.3	376.4	5	376.2	376.2	1.4	0.3	376.2	376.2
LCP-MW-14S	S	4	917388	1117030	12/06/02 - 03/08/05	8	389.1	388.8	2.7	0.8	388.8	5	388.9	388.6	1.6	0.4	388.7	388.7
LCP-MW-15D	D	7	917044	1116983	03/25/03 - 03/08/05	7	376.9	377.0	1.9	0.4	376.9	5	376.7	376.7	1.5	0.3	376.7	376.7
LCP-MW-15S	S	4	917041	1116981	03/25/03 - 03/08/05	7	390.4	390.6	2.1	0.7	390.4	5	390.1	389.8	1.6	0.6	390.1	390.1
LCP-MW-16D	D	5	917260	1117383	12/06/02 - 03/08/05	8	375.9	376.0	1.8	0.3	375.9	5	375.7	375.8	1.5	0.3	375.7	375.7
LCP-MW-16S	S	2	917260	1117383	12/06/02 - 03/08/05	8	389.6	389.7	1.7	0.3	389.7	5	389.4	389.3	1.2	0.3	389.3	389.3
LCP-MW-17D	D	5	916964	1117481	10/01/03 - 05/27/05	5	379.7	378.0	11.2	22.4	377.8	5	379.7	378.0	11.2	22.4	377.8	377.8
LCP-MW-18D	D	5	917241	1117557	03/25/03 - 05/27/05	8	374.7	374.7	1.7	0.3	374.7	6	374.5	374.6	1.5	0.3	374.6	374.6
LCP-MW-18S	S	2	917236	1117552	12/06/02 - 05/27/05	9	387.2	387.4	1.9	0.4	387.2	6	387.0	386.8	1.4	0.4	386.9	386.9
LCP-MW-19D	D	5	916929	1117706	12/06/02 - 05/27/05	9	374.6	374.6	1.8	0.3	374.6	6	374.5	374.6	1.5	0.2	374.5	374.5
LCP-MW-19S	S	2	916930	1117698	12/06/02 - 05/27/05	9	387.2	387.1	0.8	0.1	387.1	6	387.1	387.1	0.3	0.0	387.1	387.1
LCP-MW-1A	S	5	916510	1117545	12/06/02 - 03/08/05	8	386.7	387.0	1.7	0.6	386.7	5	386.3	385.8	1.5	0.6	386.2	386.2
LCP-MW-20S	S	2	916825	1117887	12/06/02 - 05/27/05	9	385.8	385.8	0.8	0.1	385.8	6	385.8	385.7	0.3	0.0	385.7	385.7
LCP-MW-21I	I	5	917407	1117370	12/06/02 - 03/08/05	8	385.3	385.2	1.5	0.3	385.3	5	385.2	384.9	1.1	0.3	385.1	385.1
LCP-MW-21S	S	2	917407	1117370	12/06/02 - 03/08/05	8	387.8	387.7	2.1	0.5	387.7	5	387.5	387.3	1.6	0.4	387.4	387.4
LCP-MW-23S	S	2	917082	1117148	03/25/03 - 06/29/04	3	389.1	389.0	1.3	0.5	389.1	3	389.1	389.0	1.3	0.5	389.1	389.1
LCP-MW-24D	D	5	916650	1117869	03/25/03 - 05/27/05	8	374.9	375.0	1.7	0.3	375.0	6	374.7	374.8	1.4	0.3	374.8	374.8
LCP-MW-24S	S	4	916654	1117874	03/25/03 - 05/27/05	8	383.8	384.2	2.8	1.1	383.8	6	383.5	383.4	2.6	1.0	383.6	383.6
LCP-MW-25S	S	4	916832	1117675	12/06/02 - 03/08/05	8	388.6	388.8	2.0	0.6	388.7	5	388.3	387.9	1.6	0.6	388.2	388.2
LCP-MW-27S	S	2	917163	1117715	12/06/02 - 05/27/05	9	382.1	382.1	0.4	0.0	382.1	6	382.0	382.0	0.2	0.0	382.0	382.0
LCP-MW-28D	D	5	916954	1118125	12/06/02 - 09/26/05	10	374.2	374.2	1.6	0.3	374.2	7	374.1	374.1	1.5	0.3	374.0	374.0
LCP-MW-28S	S	4	916951	1118131	12/06/02 - 09/26/05	10	379.2	379.4	1.9	0.4	379.2	7	379.0	379.0	1.3	0.3	379.0	379.0
LCP-MW-29D	D	5	917055	1117967	12/06/02 - 09/26/05	10	374.1	374.1	1.7	0.3	374.1	7	373.9	374.0	1.5	0.3	373.8	373.8
LCP-MW-29S	S	4	917049	1117976	12/06/02 - 09/26/05	10	380.2	380.2	0.9	0.1	380.2	7	380.1	380.2	0.6	0.0	380.1	380.1
LCP-MW-30D	D	5	917126	1117843	12/06/02 - 09/26/05	10	373.8	373.8	1.8	0.3	373.8	7	373.6	373.7	1.5	0.3	373.6	373.6
LCP-MW-30S	S	4	917122	1117850	12/06/02 - 09/26/05	10	381.2	381.2	1.0	0.1	381.2	7	381.1	381.1	0.8	0.1	381.1	381.1
LCP-MW-32S	S	5	917433	1117923	12/06/02 - 05/27/05	9	381.5	382.8	10.5	11.5	382.7	6	381.3	382.1	5.2	4.6	381.5	381.5
LCP-MW-33D	D	6	917077	1117563	10/01/03 - 06/29/04	2	374.2	374.2	0.1	0.0	374.2	2	374.2	374.2	0.1	0.0	374.2	374.2
LCP-MW-3AR	S	5	916637	1117413	12/06/02 - 05/27/05	9	389.5	389.9	2.3	0.8	389.5	6	389.1	388.8	1.7	0.6	389.0	389.0
LCP-MW-4A	S	5	916561	1117496	12/06/02 - 05/27/05	9	387.3	387.7	1.7	0.5	387.3	6	387.0	386.7	1.5	0.5	386.9	386.9
LCP-MW-8D	D	5	916388	1117333	12/06/02 - 05/27/05	9	378.8	378.8	1.8	0.3	378.9	6	378.6	378.7	1.4	0.2	378.7	378.7
LCP-MW-9D	D	5	916704	1117549	03/25/03 - 03/08/05	7	378.4	378.7	1.7	0.3	378.5	5	378.2	378.2	1.3	0.3	378.3	378.3
LCP-NMW-1	S	2	917740	1117464	03/25/03 - 03/08/05	7	384.7	384.5	2.8	1.0	384.7	5	384.5	384.3	2.2	0.9	384.5	384.5
LCP-NMW-2D	D	5	917610	1117573	03/25/03 - 03/08/05	7	374.9	375.1	1.8	0.4	375.0	5	374.7	374.7	1.5	0.3	374.7	374.7
LCP-NMW-2S	S	2	917610	1117573	03/25/03 - 03/08/05	7	384.4	385.0	3.6	1.7	384.7	5	384.0	384.3	3.3	1.8	384.2	384.2
LCP-NMW-3	S	2	917566	1117351	03/25/03 - 03/08/05	7	387.1	387.2	0.8	0.1	387.1	5	387.0	387.0	0.5	0.0	387.1	387.1
LCP-OW-01	D	6	917122	1117739	12/06/02 - 05/27/05	9	377.3	377.2	1.6	0.3	377.3	6	377.1	377.1	1.4	0.3	377.1	377.1
LCP-OW-02	D	5	917118	1117753	12/06/02 - 05/27/05	9	375.6	375.6	1.7	0.3	375.6	6	375.4	375.5	1.5	0.3	375.4	375.4
LCP-OW-03	D	5	917108	1117760	12/06/02 - 05/27/05	9	377.6	377.5	1.5	0.2	377.6	6	377.4	377.4	1.3	0.2	377.4	377.4
LCP-PMW-1D	D	5	917545	1117705	03/25/03 - 09/26/05	9	374.7	374.8	1.8	0.4	374.8	7	374.6	374.7	1.5	0.3	374.5	374.5
LCP-PMW-1S	S	5	917540	1117711	03/25/03 - 09/26/05	9	382.7	382.5	4.7	2.6	382.8	7	382.3	382.0	4.0	2.1	382.3	382.3
LCP-PMW-2	S	2	917437	1117637	03/25/03 - 06/29/04	6	385.1	384.8	4.7	2.6	384.7	5	384.8	384.7	3.0	1.2	384.6	384.6
LCP-PMW-3D	D	5	917375	1117605	03/25/03 - 09/26/05	9	374.8	374.8	1.9	0.4	374.8	7	374.6	374.6	1.6	0.3	374.6	374.6
LCP-PMW-3S	S	4	917380	1117600	03/25/03 - 09/26/05	9	382.6	382.7	2.4	0.5	382.5	7	382.3	382.3	1.4	0.3	382.4	382.4
LCP-PMW-4	S	2	917353	1117767	03/25/03 - 05/27/05	8	383.7	383.8	5.4	5.0	383.8	6	383.0	382.1	5.1	4.6	382.8	382.8
LCP-PMW-5	S	5	917638	1117664	10/01/03 - 03/08/05	5	381.1	382.3	5.4	5.5	381.3	4	380.6	380.7	4.9	5.7	380.7	380.7
LCP-PMW-6	S	5	917254	1117765	10/01/03 - 03/08/05	5	381.4	382.3	4.2	2.9	381.6	4	381.1	381.3	3.7	2.9	381.3	381.3
LCP-PMW-7	S	5	917541	1117815	10/01/03 - 03/08/05	5	381.6	382.0	3.2	1.5	381.7	4	381.3	381.5	2.7	1.5	381.5	381.5

Table 9

Summary of Water Level Data and Calibration Targets

			State Plane (NAD 83 ft)			All Water Level Data						Median Year						
Well ID	**GW Zone**	**Model Layer**	**X-coordinate**	**Y-coordinate**	**Period of Water Level Measurements**	**Number of Measure-ments**	**Average Elevation (feet, NAVD 88)**	**Median Elevation (feet, NAVD 88)**	**Range**	**Variance**	**25th Percentile Trimmed Mean Elevation (feet, NAVD 88)**	**Number of Measure-ments**	**Average Elevation (feet, NAVD 88)**	**Median Elevation (feet, NAVD 88)**	**Range**	**Variance**	**25th Percentile Trmmed Mean Elevation (feet, NAVD 88)**	**Calibration Target Elevtaion (feet, NAVD 88)**
LCP-PMW-8	S	5	917686	1117737	03/18/04 - 06/29/04	2	380.8	380.8	0.9	0.4	380.8	2	380.8	380.8	0.9	0.4	380.8	380.8
LCP-PMW-9	S	5	917537	1117954	03/18/04 - 06/29/04	2	380.6	380.6	0.8	0.3	380.6	2	380.6	380.6	0.8	0.3	380.6	380.6
LCP-PW-01	D	5	917127	1117748	12/06/02 - 05/27/05	9	374.5	374.5	2.4	0.6	374.5	6	374.3	374.2	1.8	0.5	374.3	374.3
LCP-W-5	S	2	916439	1117654	12/06/02 - 03/08/05	8	389.1	389.7	4.8	3.2	389.2	5	388.3	387.2	3.8	3.1	388.1	388.1
LCP-W-7	S	4	916514	1117675	12/06/02 - 03/08/05	8	389.6	390.2	2.7	1.3	389.8	5	389.1	388.4	2.3	1.4	389.0	389.0
MA-MAMW-01D	D	9	914828	1116197	05/25/03 - 03/15/07	9	398.6	398.9	3.6	1.3	398.8	6	398.9	399.2	3.3	1.3	399.0	399.0
MA-MAMW-01S	S	9	914836	1116194	05/25/03 - 03/15/07	9	402.7	402.9	3.3	1.0	402.9	6	402.9	403.0	2.8	0.9	403.0	403.0
MA-MAMW-02D	D	9	915486	1116255	05/25/03 - 03/15/07	9	399.9	400.1	3.4	0.9	400.0	6	400.1	400.1	2.6	0.9	400.0	400.0
MA-MAMW-02S	S	9	915482	1116251	05/25/03 - 03/15/07	9	401.1	401.3	4.0	1.2	401.2	6	401.3	401.3	3.6	1.3	401.3	401.3
MA-MAMW-03	S	9	916249	1116457	05/25/03 - 12/17/07	11	399.5	399.4	3.4	0.9	399.5	6	399.6	399.4	2.3	0.7	399.4	399.4
MA-MAMW-04	S	9	916829	1116523	05/25/03 - 12/17/07	11	399.5	399.5	3.7	1.1	399.4	6	399.6	399.6	3.4	1.3	399.5	399.5
MA-MAMW-05D	D	9	917094	1116701	05/25/03 - 12/17/07	11	397.7	397.4	4.5	1.7	397.4	6	397.8	397.4	4.2	2.1	397.4	397.4
MA-MAMW-05S	S	9	917100	1116696	05/25/03 - 12/17/07	11	398.3	398.2	3.6	0.8	398.3	6	398.4	398.4	3.1	1.0	398.4	398.4
MA-MAMW-06D	D	7	916410	1117137	05/25/03 - 12/17/07	8	376.1	376.2	3.0	0.7	376.2	6	376.1	376.2	3.0	1.0	376.1	376.1
MA-MAMW-06S	S	4	916406	1117139	05/25/03 - 12/17/07	8	390.4	390.2	1.3	0.2	390.3	6	390.4	390.3	1.3	0.2	390.3	390.3
MA-MAMW-06S2	S	2	916370	1117151	02/06/07 - 12/17/07	4	390.5	390.3	1.2	0.3	390.3	4	390.5	390.3	1.2	0.3	390.3	390.3
MA-MAMW-07D	D	7	915152	1117669	05/25/03 - 12/17/07	7	376.9	376.6	4.4	1.9	376.8	6	376.7	376.7	3.0	1.2	376.9	376.9
MA-MAMW-07S	S	2	915142	1117671	05/25/03 - 12/17/07	7	390.5	392.8	18.5	40.1	392.4	6	391.5	392.9	10.8	14.6	392.5	392.5
MA-MAMW-08D	D	7	916255	1116847	05/25/03 - 12/17/07	6	380.0	380.0	1.5	0.3	380.0	5	379.9	379.7	1.5	0.4	379.9	379.9
MA-MAMW-08S	S	9	916252	1116849	05/25/03 - 12/17/07	6	399.5	399.4	1.9	0.5	399.4	5	399.5	399.4	1.9	0.6	399.3	399.3
MA-MAMW-09D	D	7	914921	1117557	05/25/03 - 06/06/07	5	381.9	381.8	2.4	0.7	381.8	5	381.9	381.8	2.4	0.7	381.8	381.8
MA-MAMW-09S	S	4	914922	1117566	05/25/03 - 06/06/07	5	391.7	391.5	1.9	0.6	391.7	5	391.7	391.5	1.9	0.6	391.7	391.7
MA-MAMW-10D	D	7	914457	1117456	05/25/03 - 12/17/07	5	386.2	385.8	4.2	2.7	386.1	5	386.2	385.8	4.2	2.7	386.1	386.1
MA-MAMW-10S	S	4	914450	1117444	05/25/03 - 12/17/07	5	391.4	391.3	0.4	0.0	391.4	5	391.4	391.3	0.4	0.0	391.4	391.4
MA-MAMW-11D	D	9	914876	1116941	05/25/03 - 12/17/07	5	381.8	381.7	1.4	0.2	381.8	5	381.8	381.7	1.4	0.2	381.8	381.8
MA-MAMW-11S	S	5	914869	1116942	05/25/03 - 12/17/07	6	398.4	398.4	1.3	0.2	398.4	5	398.5	398.4	0.9	0.1	398.4	398.4
MA-MAMW-12D	D	9	914373	1116068	02/06/07 - 12/17/07	4	400.7	400.5	1.5	0.5	400.5	4	400.7	400.5	1.5	0.5	400.5	400.5
MA-MAMW-12S	S	9	914367	1116074	02/06/07 - 12/17/07	4	403.5	403.5	1.3	0.3	403.5	4	403.5	403.5	1.3	0.3	403.5	403.5
MA-MAMW-13S	S	5	914240	1117058	02/06/07 - 12/17/07	4	394.8	394.7	1.2	0.3	394.7	4	394.8	394.7	1.2	0.3	394.7	394.7
MA-MAMW-15D	D	9	915560	1117292	02/06/07 - 12/17/07	4	378.9	378.6	1.0	0.2	378.6	4	378.9	378.6	1.0	0.2	378.6	378.6
MA-MAMW-15S	S	5	915558	1117284	02/06/07 - 12/17/07	4	392.8	392.8	0.9	0.2	392.8	4	392.8	392.8	0.9	0.2	392.8	392.8
MA-MAMW-16S	S	4	915182	1117245	02/06/07 - 12/17/07	4	396.4	396.3	0.8	0.1	396.3	4	396.4	396.3	0.8	0.1	396.3	396.3
MA-MAMW-17S	S	4	916985	1116893	02/06/07 - 12/17/07	4	391.6	391.4	1.2	0.3	391.4	4	391.6	391.4	1.2	0.3	391.4	391.4
MPS-C-2	S	9	920719	1116596	06/25/08 - 06/25/08	1	396.5	396.5	0.0		396.5	1	396.5	396.5			396.5	396.5
MPS-MW-01BR	BR	9	919189	1116242	06/25/08 - 06/25/08	1	402.2	402.2	0.0		402.2	1	402.2	402.2			402.2	402.2
MPS-MW-03BR	BR	9	921192	1115812	06/25/08 - 06/25/08	1	393.2	393.2	0.0		393.2	1	393.2	393.2			393.2	393.2
NMDSA-MW-01	S	3	914020	1126621	11/15/04 - 06/25/08	13	364.1	364.8	9.4	6.3	364.4	7	364.3	363.4	4.6	3.2	364.2	364.2
NMDSA-MW-02	S	4	913693	1126681	11/15/04 - 06/25/08	13	366.6	366.3	9.1	5.1	366.2	7	366.1	366.3	3.0	1.0	366.0	366.0
NMDSA-MW-03	S	3	913767	1127091	11/15/04 - 06/25/08	13	366.1	366.2	11.7	11.8	365.7	7	365.1	364.9	7.3	6.7	365.0	365.0
NMDSA-MW-04	S	3	912164	1129039	11/15/04 - 06/25/08	13	364.6	364.5	2.9	0.6	364.5	7	364.3	364.4	1.9	0.4	364.4	364.4
NMDSA-MW-05	S	2	911733	1129457	11/15/04 - 06/25/08	13	365.3	364.7	9.1	5.4	364.8	7	364.6	364.7	1.3	0.2	364.6	364.6
NMDSA-MW-06	S	3	911524	1130186	11/15/04 - 06/25/08	13	364.3	364.0	10.2	6.4	363.8	7	363.6	363.4	2.8	0.8	363.7	363.7
NMDSA-MW-07	S	3	910262	1132883	11/15/04 - 06/25/08	13	363.7	363.3	8.4	4.2	363.4	7	363.1	363.3	2.4	0.8	363.2	363.2
NMDSA-MW-08	S	3	909681	1134270	11/15/04 - 12/17/07	11	366.0	365.6	3.1	1.2	365.8	7	366.0	365.6	2.4	0.8	365.9	365.9
NMDSA-MW-09	S	3	910023	1134115	11/15/04 - 06/25/08	13	363.8	363.6	10.4	5.8	363.6	7	363.2	363.7	4.2	2.2	363.5	363.5
PSA-MW-03SR	S	5	921520	1117046	06/25/08 - 06/25/08	1	384.1	384.1	0.0		384.1	1	384.1	384.1			384.1	384.1
PSA-MW-04BR	BR	9	921099	1117123	06/25/08 - 06/25/08	1	367.7	367.7	0.0		367.7	1	367.7	367.7			367.7	367.7
SB915-BA-01S	S	2	907971	1120451	01/13/05 - 06/25/08	19	410.7	411.4	12.3	11.2	410.5	9	411.1	411.6	12.1	11.6	411.2	411.2
SB915-BA-02S	S	2	907508	1119900	01/13/05 - 06/25/08	23	413.8	413.9	8.9	6.2	413.6	11	413.7	413.7	6.6	4.0	413.7	413.7

Table 9

Summary of Water Level Data and Calibration Targets

Well ID	GW Zone	Model Layer	State Plane (NAD 83 ft)		Period of Water Level Measurements	All Water Level Data						Median Year						Calibration Target Elevtaion (feet, NAVD 88)
			X-coordinate	Y-coordinate		Number of Measure-ments	Average Elevation (feet, NAVD 88)	Median Elevation (feet, NAVD 88)	Range	Variance	25th Percentile Trimmed Mean Elevation (feet, NAVD 88)	Number of Measure-ments	Average Elevation (feet, NAVD 88)	Median Elevation (feet, NAVD 88)	Range	Variance	25th Percentile Trmmed Mean Elevation (feet, NAVD 88)	
SB915-BA-03S	S	2	905910	1119740	01/13/05 - 12/17/07	14	409.2	408.9	11.1	7.6	408.8	7	408.5	408.8	5.9	3.0	408.6	408.6
SB915-IMW-01S	S	2	912219	1121197	09/26/05 - 06/25/08	18	365.7	365.7	2.6	0.3	365.8	10	365.6	365.7	2.2	0.4	365.7	365.7
SB915-IMW-02S	S	4	911976	1121978	09/26/05 - 06/25/08	18	368.5	368.4	2.8	0.6	368.4	10	368.3	368.4	1.5	0.3	368.3	368.3
SB915-IMW-03S	S	4	911612	1122559	09/26/05 - 06/25/08	18	367.5	367.4	4.9	1.6	367.4	10	367.7	367.5	4.4	1.5	367.5	367.5
SB915-IMW-04S	S	5	911192	1122857	09/26/05 - 06/25/08	18	366.8	366.6	3.8	1.2	366.6	10	366.9	366.9	3.1	1.1	367.0	367.0
SB915-IMW-05S	S	4	911621	1122186	09/26/05 - 06/25/08	18	368.7	368.6	4.2	1.0	368.7	10	368.5	368.6	3.1	0.8	368.6	368.6
SB915-IMW-06S	S	4	911871	1121779	09/26/05 - 06/25/08	18	369.5	369.7	2.4	0.5	369.6	10	369.4	369.7	1.8	0.5	369.5	369.5
SB915-MW-01	S	9	911683	1118588	09/26/05 - 12/17/07	16	387.8	388.5	11.0	7.0	388.3	10	387.9	388.6	7.6	5.1	388.5	388.5
SB915-MW-04	S	5	912377	1120044	07/27/05 - 12/17/07	18	367.7	367.7	6.7	3.6	367.7	11	367.6	367.8	3.5	1.2	367.8	367.8
SB915-MW-34S	S	2	906286	1118640	08/03/06 - 12/17/07	6	441.3	440.9	5.9	5.3	441.1	5	440.7	440.4	5.2	4.2	440.4	440.4
SB915-MW-35S	S	9	906267	1117371	08/03/06 - 12/17/07	8	440.9	440.3	7.3	5.7	440.9	6	440.6	440.3	6.8	6.2	440.8	440.8
SB915-MW-36D	D	7	907405	1118698	08/03/06 - 06/25/08	9	370.3	370.5	2.8	1.0	370.3	6	370.1	370.1	2.7	0.9	370.1	370.1
SB915-MW-36I	I	2	907405	1118698	08/03/06 - 06/25/08	9	417.5	416.7	8.7	7.8	417.5	6	417.3	417.7	8.7	8.9	417.6	417.6
SB915-MW-36S	S	2	907405	1118698	08/03/06 - 06/25/08	9	439.8	439.1	11.4	14.2	440.1	6	439.6	439.6	10.8	16.8	440.1	440.1
SB915-MW-40S	S	2	914447	1122219	08/03/06 - 12/17/07	8	390.4	389.4	7.9	8.9	390.1	6	390.5	390.3	6.7	5.8	390.5	390.5
SB915-MW-42D	D	6	913102	1121518	08/03/06 - 06/25/08	9	364.9	364.8	1.1	0.1	364.9	6	365.0	364.9	0.9	0.1	365.0	365.0
SB915-MW-42I	I	2	913108	1121520	08/03/06 - 06/25/08	9	386.0	385.7	5.8	3.4	386.2	6	386.0	385.4	2.8	1.5	385.8	385.8
SB915-MW-42S	S	2	913115	1121523	08/03/06 - 12/17/07	7	393.7	392.8	4.5	2.7	393.5	5	393.8	394.1	2.2	1.2	393.9	393.9
SB915-MW-43S	S	2	912822	1122527	08/03/06 - 12/17/07	6	390.2	390.4	11.2	17.9	390.8	4	390.9	390.5	5.5	6.9	390.5	390.5
SB915-MW-50S	S	2	910256	1122741	08/03/06 - 06/25/08	7	399.8	399.6	4.7	2.6	399.7	6	399.8	399.6	4.7	3.1	399.7	399.7
SB915-MW-51S	S	2	910495	1122148	08/03/06 - 06/25/08	7	401.0	400.7	2.7	0.9	400.7	5	401.2	400.7	2.7	1.3	400.8	400.8
SB915-MW-53D	D	7	909265	1123028	08/03/06 - 06/25/08	9	366.1	366.1	1.1	0.2	366.0	6	366.1	366.0	1.0	0.2	366.1	366.1
SB915-MW-53I	I	2	909254	1123031	08/03/06 - 06/25/08	9	386.7	385.8	7.1	6.2	386.8	6	386.6	386.1	4.8	3.5	386.6	386.6
SB915-MW-53S	S	2	909245	1123034	11/15/06 - 06/25/08	4	399.9	399.1	12.1	25.6	399.1	4	399.9	399.1	12.1	25.6	399.1	399.1
SB915-MW-59S	S	4	909681	1122234	11/15/06 - 06/25/08	6	364.2	364.1	1.4	0.2	364.1	4	364.3	364.2	1.3	0.3	364.2	364.2
SB915-MW-60S	S	4	909452	1122406	11/15/06 - 06/25/08	6	365.0	364.9	1.4	0.2	364.9	4	365.1	365.0	1.2	0.3	365.0	365.0
SB915-MW-70S	S	5	910108	1121887	11/15/06 - 06/25/08	6	363.3	363.4	1.2	0.2	363.4	4	363.3	363.4	1.2	0.3	363.4	363.4
SB915-P1-01S	S	2	908202	1120136	01/13/05 - 12/17/07	16	411.7	410.8	8.9	6.8	410.8	7	411.3	411.1	4.2	1.9	410.9	410.9
SB915-P1-02S	S	2	908350	1120332	01/13/05 - 12/17/07	6	411.7	410.5	7.5	8.3	410.6	5	411.9	410.5	7.5	9.9	410.7	410.7
SB915-P2-01S	S	2	907284	1119403	01/13/05 - 12/17/07	19	416.2	416.5	11.6	10.0	415.9	10	415.2	415.6	7.7	6.2	415.3	415.3
SB915-P2-02S	S	2	907555	1119471	01/13/05 - 12/17/07	18	414.8	414.8	9.6	6.1	414.5	10	414.1	414.3	4.6	2.5	414.2	414.2
SB915-P3-01S	S	2	906133	1119259	11/15/04 - 06/06/07	22	413.6	413.2	8.5	5.6	413.5	11	413.5	413.9	5.4	3.5	413.6	413.6
SB915-PZ-01D	S	5	907969	1120504	11/15/04 - 06/25/08	26	379.2	379.6	6.2	3.7	379.3	12	379.5	380.2	5.4	3.5	379.9	379.9
SB915-PZ-01I	S	4	907969	1120462	11/15/04 - 06/25/08	28	397.2	397.1	12.6	8.4	397.0	12	397.3	398.1	8.9	7.1	397.6	397.6
SB915-PZ-02D	S	2	906338	1120814	11/15/04 - 06/25/08	24	387.3	387.0	39.5	50.1	386.9	12	386.4	386.8	19.3	21.8	386.8	386.8
SB915-PZ-02I	S	2	906335	1120809	11/15/04 - 06/25/08	25	402.4	402.8	38.2	40.2	402.6	12	403.0	402.5	10.7	10.9	402.6	402.6
SB915-PZ-02N	D	6	906342	1120817	11/15/04 - 06/25/08	24	376.6	374.8	20.9	22.5	375.0	12	376.3	374.9	12.4	13.7	375.2	375.2
SB915-PZ-02S	S	2	906330	1120805	03/30/05 - 06/25/08	13	414.9	414.7	10.8	8.0	414.6	7	414.6	415.5	4.9	3.6	414.9	414.9
SB915-PZ-03	S	2	910630	1120206	11/15/04 - 06/25/08	22	436.2	436.4	11.1	3.9	436.3	12	436.1	436.4	4.7	1.7	436.3	436.3
SB915-PZ-04	S	9	910090	1118820	11/15/04 - 12/17/07	20	438.1	438.3	9.3	8.3	438.4	12	438.1	438.1	6.9	6.8	438.3	438.3
SB915-PZ-05	S	4	908974	1120047	11/15/04 - 06/25/08	24	439.7	440.6	14.3	9.3	440.3	12	439.7	441.1	9.2	8.1	440.5	440.5
SB915-PZ-07D	S	2	910101	1120024	11/15/04 - 06/25/08	22	414.9	415.1	6.1	2.6	414.9	12	414.8	415.3	5.9	3.1	415.1	415.1
SB915-PZ-07I	S	2	910099	1120020	11/15/04 - 06/25/08	22	423.4	423.6	7.2	3.0	423.7	12	423.4	423.7	5.5	2.9	423.8	423.8
SB915-PZ-07N	D	4	910107	1120060	11/15/04 - 06/25/08	22	415.1	415.5	6.4	2.7	415.4	12	415.3	415.6	6.4	3.0	415.6	415.6
SB915-PZ-07S	S	2	910098	1120015	11/15/04 - 06/25/08	22	439.9	440.8	11.1	8.4	440.7	12	440.0	441.0	8.4	6.9	440.8	440.8
SB915-TA-01S	S	2	905602	1119983	03/30/05 - 12/17/07	10	412.8	411.8	9.1	7.2	412.0	6	412.4	411.8	5.1	3.3	412.3	412.3
SB915-TA-02S	S	2	905498	1119824	02/03/05 - 12/17/07	10	409.6	408.4	9.7	8.6	408.8	6	409.3	408.3	4.8	3.9	408.9	408.9
SB915-WB-01L	D	5	910152	1134684	11/15/04 - 12/14/06	17	377.6	380.7	23.1	59.7	381.1	12	376.7	380.6	23.1	70.2	380.0	380.0
SB915-WB-01U	S	5	902381	1116875	07/27/05 - 12/14/06	15	382.3	381.7	19.5	22.0	381.4	11	381.9	381.7	10.2	7.9	381.4	381.4

Table 9

Summary of Water Level Data and Calibration Targets

Well ID	GW Zone	Model Layer	State Plane (NAD 83 ft)		Period of Water Level Measurements	All Water Level Data						Median Year						Calibration Target Elevtaion (feet, NAVD 88)
			X-coordinate	Y-coordinate		Number of Measure-ments	Average Elevation (feet, NAVD 88)	Median Elevation (feet, NAVD 88)	Range	Variance	25th Percentile Trimmed Mean Elevation (feet, NAVD 88)	Number of Measure-ments	Average Elevation (feet, NAVD 88)	Median Elevation (feet, NAVD 88)	Range	Variance	25th Percentile Trmmed Mean Elevation (feet, NAVD 88)	
SB915-WB-02L	D	8	904803	1119281	11/15/04 - 06/25/08	21	373.5	373.4	3.2	1.0	373.5	12	373.6	373.7	2.6	0.9	373.6	373.6
SB915-WB-02U	S	6	904801	1119375	11/15/04 - 06/25/08	22	376.5	376.8	3.3	1.0	376.6	12	376.6	376.9	3.0	0.9	376.7	376.7
SB915-WB-03L	D	6	904594	1121509	02/23/06 - 02/23/06	1	403.1	403.1	0.0		403.1	1	403.1	403.1			403.1	375.2
SB915-WB-03U	S	5	904594	1121509	02/23/06 - 02/23/06	1	404.3	404.3	0.0		404.3	1	404.3	404.3			404.3	375.6
SB915-WB-04L	D	6	907823	1121395	11/15/04 - 06/25/08	21	373.6	374.0	6.1	1.8	373.9	12	373.8	374.0	3.2	0.9	373.9	373.9
SB915-WB-04U	S	6	907823	1121395	11/15/04 - 06/25/08	22	374.1	374.2	2.8	0.6	374.2	12	374.1	374.1	2.8	0.7	374.0	374.0
SB915-WB-05L	D	6	910619	1121729	11/15/04 - 06/25/08	22	362.1	361.7	7.3	3.3	361.6	12	362.5	361.8	5.7	3.5	361.7	361.7
SB915-WB-05M	I	6	910606	1121734	11/15/04 - 06/25/08	21	364.8	364.4	17.0	8.9	364.4	12	365.6	364.4	11.3	10.7	364.5	364.5
SB915-WB-05R	BR	8	910722	1121709	11/15/04 - 06/25/08	22	357.3	356.3	16.4	12.6	356.2	12	356.6	356.3	6.1	2.3	356.3	356.3
SB915-WB-05U	S	4	910614	1121731	11/15/04 - 06/25/08	22	371.6	371.9	19.5	12.8	372.1	12	372.5	372.5	6.8	3.0	372.3	372.3
SB915-WB-07L	D	6	912306	1121356	11/15/04 - 06/25/08	22	365.5	364.9	6.0	3.2	365.0	12	365.7	365.1	5.9	2.7	365.3	365.3
SB915-WB-07U	S	5	912146	1121344	11/15/04 - 06/25/08	21	366.1	365.7	6.5	2.6	365.8	12	366.3	366.0	6.5	2.8	365.9	365.9
SB915-WB-09U	S	2	914998	1121687	11/15/04 - 06/25/08	21	363.0	363.1	6.1	3.4	362.7	12	363.2	363.1	5.2	2.2	363.0	363.0
SB915-WB-10U	S	4	913726	1121315	11/15/04 - 06/25/08	20	366.6	365.9	7.5	3.4	366.2	12	367.0	367.0	5.3	2.2	366.9	366.9
SB915-WB-11U	S	2	912244	1121315	11/15/04 - 06/25/08	22	367.1	366.8	5.8	2.2	366.8	12	367.3	367.0	5.7	2.3	366.9	366.9
SB915-WB-12U	S	4	911544	1120904	01/19/06 - 02/23/06	2	378.7	378.7	0.0	0.0	378.7	2	378.7	378.7	0.0	0.0	378.7	378.7
SB915-WB-15A/15CF	D	9	905566	1116672	05/27/05 - 12/17/07	19	405.8	406.1	3.5	0.9	405.9	12	405.9	406.1	2.7	0.7	406.1	406.1
SB915-WB-15B/15S	S	9	905550	1116676	05/27/05 - 12/17/07	13	430.9	432.0	14.4	17.3	431.5	11	430.0	431.2	8.5	12.4	430.4	430.4
SP-SP-02A	S	2	920686	1117973	02/20/91 - 07/27/05	9	374.0	372.8	10.4	11.4	372.9	6	372.9	372.8	0.8	0.1	372.9	372.9
SP-SP-03A	S	2	921949	1117886	02/20/91 - 12/17/07	26	381.2	382.2	7.4	5.4	381.8	8	380.6	380.8	5.3	4.9	380.8	380.8
SP-SP-03B	I	4	921954	1117869	02/20/91 - 12/17/07	25	377.5	378.0	4.9	1.5	377.8	9	377.7	378.0	2.4	0.8	377.8	377.8
SP-SP-03C	D	6	921961	1117885	02/20/91 - 12/17/07	25	372.9	373.3	3.3	0.5	373.1	9	373.0	373.1	0.9	0.1	373.1	373.1
SP-SP-04A	S	2	921275	1118406	02/20/91 - 06/25/08	27	394.7	395.1	5.2	2.3	394.8	9	394.7	395.1	3.5	1.8	394.8	394.8
SP-SP-04B	I	5	921304	1118411	02/20/91 - 06/25/08	28	374.1	374.3	4.4	1.1	374.2	10	374.4	374.4	1.4	0.2	374.4	374.4
SP-SP-04C	D	5	921304	1118382	02/20/91 - 06/25/08	28	371.7	372.3	5.9	2.4	372.0	10	371.9	371.8	2.7	0.9	372.0	372.0
SP-SP-05A	S	3	920827	1119136	02/20/91 - 09/22/92	8	366.8	367.0	1.9	0.4	367.0	6	366.7	367.0	1.9	0.6	367.0	367.0
SP-SP-05B	I	5	920827	1119126	02/20/91 - 09/22/92	8	370.1	370.5	2.9	1.0	370.4	6	370.1	370.4	2.9	1.1	370.4	370.4
SP-SP-05C	D	6	920820	1119132	02/20/91 - 09/22/92	8	373.0	373.2	3.1	1.1	373.3	6	373.0	373.3	3.1	1.3	373.3	373.3
SP-SP-06A	S	2	922112	1118419	02/20/91 - 06/25/08	34	377.0	376.7	4.5	2.0	376.9	11	376.7	376.6	4.1	1.7	376.6	376.6
SP-SP-06B	I	3	922117	1118435	02/20/91 - 06/25/08	34	371.8	371.8	3.4	1.1	371.9	11	371.7	371.9	2.9	0.9	371.7	371.7
SP-SP-06C	D	5	922136	1118424	02/20/91 - 06/25/08	34	371.1	371.2	8.4	2.1	371.2	11	371.3	371.1	2.0	0.3	371.2	371.2
SP-SP-07A	S	2	921833	1118762	02/20/91 - 06/25/08	34	377.3	377.1	5.1	2.6	377.2	11	377.1	377.0	4.5	2.2	377.0	377.0
SP-SP-07B	I	3	921815	1118770	02/20/91 - 06/25/08	34	372.0	371.9	5.2	1.4	372.0	12	371.9	372.0	4.3	1.5	371.9	371.9
SP-SP-07C	D	6	921814	1118748	02/20/91 - 06/25/08	34	374.6	374.6	9.1	6.0	374.8	12	374.7	374.5	6.1	2.5	374.5	374.5
SP-SP-08A	S	2	921403	1119074	02/20/91 - 06/25/08	34	379.8	380.1	4.7	1.1	380.1	11	379.8	379.6	2.0	0.4	379.8	379.8
SP-SP-08B	I	5	921362	1119080	02/20/91 - 06/25/08	34	371.3	371.1	6.2	1.1	371.2	12	371.2	371.2	1.9	0.3	371.2	371.2
SP-SP-08C	D	6	921382	1119077	02/20/91 - 06/25/08	34	373.4	373.4	4.8	0.8	373.4	12	373.4	373.3	1.3	0.2	373.4	373.4
SP-SP-09A	S	2	920244	1118530	02/20/91 - 09/22/92	8	369.7	369.9	2.4	0.6	370.0	6	369.7	370.0	2.4	0.8	370.0	370.0
SP-SP-09B	I	3	920221	1118536	02/20/91 - 09/22/92	8	371.5	372.0	3.8	1.6	371.9	6	371.4	372.0	3.8	2.1	371.9	371.9
SP-SP-09C	D	6	920226	1118519	02/20/91 - 09/22/92	8	373.4	373.6	2.7	0.8	373.6	6	373.3	373.5	2.6	0.9	373.6	373.6
SP-SP-10BR	BR	9	920507	1118401	06/25/08 - 06/25/08	1	372.8	372.8	0.0		372.8	1	372.8	372.8			372.8	372.8
SP-SP-10D	D	5	920511	1118408	06/25/08 - 06/25/08	1	372.7	372.7	0.0		372.7	1	372.7	372.7			372.7	372.7
SP-SP-11BR	BR	9	921548	1117545	06/25/08 - 06/25/08	1	373.1	373.1	0.0		373.1	1	373.1	373.1			373.1	373.1
SP-SP-11D	D	5	921554	1117552	06/25/08 - 06/25/08	1	380.4	380.4	0.0		380.4	1	380.4	380.4			380.4	380.4
SP-SP-12BR	BR	9	922637	1116944	06/25/08 - 06/25/08	1	374.4	374.4	0.0		374.4	1	374.4	374.4			374.4	374.4
SP-SP-12D	D	5	922631	1116945	06/25/08 - 06/25/08	1	376.2	376.2	0.0		376.2	1	376.2	376.2			376.2	376.2
WA-MW-100BR	BR	8	921145	1119601	05/10/05 - 06/25/08	15	370.7	370.8	1.8	0.3	370.8	8	370.8	370.8	1.8	0.3	370.9	370.9
WA-MW-100D	D	6	921139	1119609	05/10/05 - 06/25/08	15	371.3	371.3	1.4	0.2	371.3	8	371.3	371.2	1.3	0.2	371.3	371.3
WA-OW-01D	D	6	921870	1119049	12/05/01 - 12/17/07	15	371.7	371.7	1.4	0.1	371.8	9	371.7	371.7	1.3	0.1	371.7	371.7

Table 9

Summary of Water Level Data and Calibration Targets

Well ID	GW Zone	Model Layer	State Plane (NAD 83 ft)		Period of Water Level Measurements	All Water Level Data						Median Year						Calibration Target Elevtaion (feet, NAVD 88)
			X-coordinate	Y-coordinate		Number of Measure-ments	Average Elevation (feet, NAVD 88)	Median Elevation (feet, NAVD 88)	Range	Variance	25th Percentile Trimmed Mean Elevation (feet, NAVD 88)	Number of Measure-ments	Average Elevation (feet, NAVD 88)	Median Elevation (feet, NAVD 88)	Range	Variance	25th Percentile Trmmed Mean Elevation (feet, NAVD 88)	
WA-OW-02D	D	5	921920	1119064	12/05/01 - 06/28/06	12	370.3	371.5	4.8	3.8	371.1	8	370.4	370.9	4.2	2.2	370.7	370.7
WA-OW-03I	I	3	921917	1119061	12/05/01 - 06/28/06	12	363.7	363.6	0.9	0.1	363.7	8	363.7	363.6	0.6	0.0	363.7	363.7
WA-OW-04D	D	6	921697	1119232	12/05/01 - 06/28/06	12	370.5	370.6	1.8	0.3	370.6	8	370.4	370.6	1.7	0.3	370.6	370.6
WA-OW-05D	D	6	921482	1119379	12/05/01 - 06/28/06	13	370.9	371.0	2.1	0.3	371.0	9	370.9	370.7	1.3	0.2	370.9	370.9
WA-OW-06D	D	6	921940	1119042	12/05/01 - 06/28/06	13	370.2	370.3	1.6	0.2	370.3	9	370.2	370.2	1.2	0.1	370.2	370.2
WA-OW-07D	D	5	922175	1118833	12/05/01 - 06/28/06	13	370.2	370.2	2.0	0.3	370.3	9	370.2	370.1	1.7	0.3	370.2	370.2
WA-OW-08S	S	2	923077	1117795	12/05/01 - 09/26/06	10	365.0	364.3	3.7	1.9	364.6	7	364.9	364.4	2.4	1.0	364.8	364.8
WA-OW-09I	I	3	923082	1117851	12/05/01 - 07/15/02	2	364.0	364.0	0.2	0.0	364.0	2	364.0	364.0	0.2	0.0	364.0	364.0
WA-OW-10I	I	3	921929	1119051	12/05/01 - 06/28/06	12	363.6	363.6	0.9	0.1	363.6	8	363.7	363.6	0.5	0.0	363.7	363.7
WA-OW-11D	D	6	922187	1118820	12/05/01 - 06/28/06	14	369.5	370.1	11.1	7.5	370.1	10	369.2	370.1	11.1	10.3	370.0	370.0
WA-TW-01D	D	6	921895	1119083	12/05/01 - 12/17/07	13	370.2	370.3	2.0	0.3	370.3	8	370.3	370.3	1.1	0.1	370.3	370.3
WA-TW-02S	S	2	923059	1117817	12/05/01 - 12/17/07	16	364.1	364.0	1.9	0.3	364.0	9	364.1	363.9	1.8	0.3	364.0	364.0
WA-TW-03I	I	3	921908	1119071	12/05/01 - 06/28/06	12	363.4	363.3	1.2	0.1	363.4	8	363.3	363.3	1.1	0.1	363.3	363.3
WA-WA-01D	D	6	922746	1118138	03/18/92 - 06/06/07	38	370.2	370.3	2.3	0.2	370.3	12	370.2	370.4	1.5	0.2	370.3	370.3
WA-WA-01I	I	3	922758	1118136	03/18/92 - 07/15/02	11	364.3	364.6	3.2	0.9	364.5	8	364.4	364.6	1.4	0.3	364.5	364.5
WA-WA-01S	S	2	922762	1118123	03/18/92 - 12/17/07	39	364.0	364.0	2.6	0.2	364.0	11	363.9	364.0	0.7	0.1	363.9	363.9
WA-WA-02D	D	5	923054	1117869	03/18/92 - 12/17/07	27	373.4	373.5	2.9	0.4	373.3	12	373.5	373.4	1.3	0.3	373.5	373.5
WA-WA-02S	S	2	923049	1117874	03/18/92 - 06/06/07	38	362.8	362.7	2.4	0.3	362.7	11	362.7	362.7	1.6	0.2	362.6	362.6
WA-WA-03D	D	5	923317	1117730	03/18/92 - 06/25/08	38	373.2	373.3	1.8	0.2	373.3	11	373.2	373.4	1.5	0.2	373.2	373.2
WA-WA-03I	I	3	923351	1117734	03/18/92 - 06/25/08	30	367.1	367.2	1.6	0.2	367.2	11	367.1	367.2	1.1	0.1	367.2	367.2
WA-WA-03S	S	2	923284	1117734	03/18/92 - 06/25/08	41	367.2	367.2	1.8	0.2	367.2	11	367.1	367.1	1.0	0.1	367.1	367.1
WA-WA-04D	D	5	922858	1117269	03/18/92 - 06/25/08	29	375.5	375.5	6.0	1.2	375.5	10	375.5	375.7	3.5	1.0	375.5	375.5
WA-WA-04I	I	3	922839	1117263	03/18/92 - 06/25/08	29	376.1	376.0	2.6	0.5	376.0	10	375.9	375.9	1.5	0.2	375.9	375.9
WA-WA-04S	S	2	922878	1117280	03/18/92 - 06/25/08	31	377.9	378.0	4.6	1.1	378.0	10	377.9	377.8	1.0	0.1	377.9	377.9
WA-WA-05D	D	5	922449	1117081	03/18/92 - 06/25/08	21	375.7	376.9	33.7	45.2	376.9	8	377.0	376.6	2.7	0.8	376.7	376.7
WA-WA-05I	I	3	922441	1117088	03/18/92 - 06/25/08	20	378.1	377.8	4.8	1.5	377.8	8	378.1	377.9	2.8	0.8	377.9	377.9
WA-WA-05S	S	2	922452	1117091	03/18/92 - 11/15/04	12	378.1	378.0	1.6	0.2	378.0	7	378.0	378.0	1.1	0.1	378.0	378.0
WA-WA-06D	D	5	921706	1117407	03/18/92 - 12/17/07	22	376.5	376.3	6.5	1.5	376.3	10	376.5	376.3	3.6	1.1	376.2	376.2
WA-WA-06S	S	2	921696	1117419	03/18/92 - 12/17/07	23	377.2	378.1	19.8	16.4	378.2	9	377.7	378.1	5.1	2.2	378.1	378.1
WA-WA-07D	D	5	922534	1117641	03/18/92 - 12/17/07	29	374.4	374.6	3.0	0.5	374.5	12	374.4	374.7	2.0	0.4	374.6	374.6
WA-WA-07I	I	3	922551	1117649	03/18/92 - 12/17/07	23	371.5	371.3	8.7	3.1	371.2	10	371.3	371.3	2.1	0.5	371.3	371.3
WA-WA-07S	S	2	922542	1117660	03/18/92 - 12/17/07	30	376.4	376.3	5.1	1.3	376.5	11	376.4	376.7	2.8	0.8	376.5	376.5
WB18-DW103	D	6	915654	1124348	11/15/04 - 11/15/04	1	369.3	369.3	0.0		369.3	1	369.3	369.3			369.3	369.3
WB18-MW-01D	D	8	920303	1121727	11/15/04 - 06/25/08	18	368.6	368.8	4.2	1.2	368.7	9	368.6	368.8	4.2	1.5	368.7	368.7
WB18-MW-01I	I	3	920300	1121731	11/15/04 - 06/25/08	20	363.4	363.4	3.3	0.5	363.4	10	363.4	363.5	2.1	0.3	363.4	363.4
WB18-MW-01S	S	2	920295	1121733	11/15/04 - 06/25/08	20	363.5	363.5	2.0	0.2	363.5	10	363.5	363.6	1.1	0.1	363.6	363.6
WB18-MW-02D	D	6	919010	1123582	11/15/04 - 06/25/08	18	369.2	369.3	2.7	0.5	369.2	9	369.2	369.1	2.1	0.5	369.1	369.1
WB18-MW-02I	I	3	919007	1123587	11/15/04 - 06/25/08	20	364.0	364.1	1.9	0.2	364.0	10	364.0	364.0	1.1	0.1	364.0	364.0
WB18-MW-02S	S	2	919004	1123591	11/15/04 - 06/25/08	20	364.5	364.5	1.9	0.2	364.5	10	364.4	364.4	1.0	0.1	364.5	364.5
WB18-MW-03BR	BR	8	917761	1124797	06/06/07 - 06/25/08	4	364.7	364.2	2.8	1.8	364.2	3	364.5	364.0	1.7	0.9	364.5	364.5
WB18-MW-03D	D	6	917752	1124814	11/15/04 - 06/25/08	18	368.0	368.4	5.2	1.3	368.2	10	368.2	368.4	2.0	0.3	368.3	368.3
WB18-MW-03I	I	3	917757	1124810	11/15/04 - 06/25/08	19	365.2	365.5	2.9	0.7	365.4	10	365.3	365.5	1.8	0.4	365.3	365.3
WB18-MW-03S	S	2	917759	1124805	11/15/04 - 06/25/08	19	364.1	364.2	1.8	0.2	364.2	10	364.0	364.1	1.2	0.1	364.1	364.1
WB18-MW-04BR	BR	9	916261	1125516	04/27/07 - 06/25/08	5	361.7	360.5	6.2	6.5	360.8	4	361.3	360.9	3.4	2.4	360.9	360.9
WB18-MW-04D	D	6	916254	1125514	11/15/04 - 06/25/08	20	371.6	371.6	6.9	3.4	371.5	10	371.9	372.1	4.4	2.4	371.9	371.9
WB18-MW-04G	G	3	916250	1125511	11/15/04 - 06/25/08	20	370.5	370.9	7.5	3.8	370.7	10	370.4	370.9	5.8	4.0	370.4	370.4
WB18-MW-04I	I	3	916245	1125509	11/15/04 - 06/25/08	20	372.0	372.0	9.8	6.6	372.1	10	371.8	372.3	7.8	7.1	372.0	372.0
WB18-MW-04S	S	2	916241	1125505	11/15/04 - 06/25/08	16	374.2	373.8	8.9	5.6	373.9	8	374.1	374.4	6.8	5.4	374.2	374.2
WB18-MW-05D	D	6	915308	1125359	11/15/04 - 06/25/08	20	372.2	372.1	4.1	1.0	372.2	10	372.4	372.5	2.1	0.6	372.4	372.4

Table 9

Summary of Water Level Data and Calibration Targets

Well ID	GW Zone	Model Layer	State Plane (NAD 83 ft)		Period of Water Level Measurements	All Water Level Data						Median Year						Calibration Target Elevtaion (feet, NAVD 88)
			X-coordinate	Y-coordinate		Number of Measure-ments	Average Elevation (feet, NAVD 88)	Median Elevation (feet, NAVD 88)	Range	Variance	25th Percentile Trimmed Mean Elevation (feet, NAVD 88)	Number of Measure-ments	Average Elevation (feet, NAVD 88)	Median Elevation (feet, NAVD 88)	Range	Variance	25th Percentile Trmmed Mean Elevation (feet, NAVD 88)	
WB18-MW-05I	I	3	915311	1125364	11/15/04 - 06/25/08	20	371.3	371.7	7.5	4.8	371.6	10	371.1	371.5	6.5	5.6	371.4	371.4
WB18-MW-05S	S	2	915314	1125369	11/15/04 - 06/25/08	19	372.5	372.6	11.0	9.9	372.7	10	372.3	372.3	9.1	11.0	372.4	372.4
WB18-MW-06BR	BR	9	918221	1122679	04/27/07 - 06/25/08	5	365.8	369.6	18.4	62.8	369.0	4	365.0	369.2	18.4	79.1	369.2	369.2
WB18-MW-06D	D	6	918208	1122692	11/15/04 - 06/25/08	20	371.0	371.3	3.3	0.9	371.2	10	371.2	371.4	2.3	0.6	371.3	371.3
WB18-MW-06I	I	2	918211	1122688	11/15/04 - 06/25/08	20	383.2	383.6	5.4	2.7	383.4	10	383.3	384.1	4.6	3.0	383.6	383.6
WB18-MW-06S	S	2	918215	1122684	11/15/04 - 06/25/08	20	396.4	396.9	9.4	6.2	396.6	10	396.3	397.0	7.0	6.4	396.4	396.4
WB18-MW-07D	D	6	919398	1121385	11/15/04 - 06/25/08	20	372.5	372.1	11.9	6.1	372.1	10	372.6	372.3	6.6	3.4	372.2	372.2
WB18-MW-07I	I	3	919394	1121389	11/15/04 - 06/25/08	20	384.4	384.4	8.7	4.5	384.3	10	384.3	384.4	6.2	4.7	384.2	384.2
WB18-MW-07S	S	2	919391	1121392	11/15/04 - 06/25/08	20	392.7	392.7	12.0	9.1	392.6	10	392.4	392.5	8.7	9.6	392.1	392.1
WB18-MW-08D	D	6	917577	1121558	11/15/04 - 06/25/08	20	372.4	372.5	2.8	0.5	372.5	10	372.4	372.6	2.1	0.5	372.5	372.5
WB18-MW-08I	S/I	2	917573	1121562	11/15/04 - 06/25/08	20	384.3	385.2	8.5	6.0	384.5	10	384.1	384.1	7.0	6.6	384.3	384.3
WB18-MW-08S	S	2	917570	1121565	11/15/04 - 06/25/08	15	387.5	387.4	6.6	3.2	387.6	7	387.2	387.1	5.3	3.9	387.3	387.3
WB18-MW-09BR	BR	9	920869	1120367	04/27/07 - 06/25/08	4	367.2	366.7	4.2	3.5	366.7	4	367.2	366.7	4.2	3.5	366.7	366.7
WB18-MW-09D	D	5	920887	1120367	06/01/06 - 06/25/08	7	370.7	370.6	2.3	0.6	370.6	5	370.8	370.6	1.8	0.5	370.5	370.5
WB18-MW-09I	I	3	920887	1120367	11/15/04 - 06/25/08	18	364.6	364.6	2.1	0.3	364.6	10	364.6	364.6	1.4	0.2	364.6	364.6
WB18-MW-09S	S	2	920887	1120367	06/01/06 - 06/25/08	8	364.8	364.7	1.9	0.4	364.7	6	364.8	364.7	1.9	0.5	364.7	364.7
WB18-MW-10D	D	6	920095	1120369	06/01/06 - 06/25/08	10	371.8	371.8	2.8	0.8	371.8	6	371.9	371.6	2.7	0.9	371.8	371.8
WB18-MW-10I	I	3	920095	1120369	11/15/04 - 06/25/08	20	383.9	384.0	9.6	5.9	383.7	10	383.6	383.6	6.6	5.5	383.5	383.5
WB18-MW-10S	S	2	920095	1120369	06/01/06 - 06/25/08	10	388.3	387.8	7.6	5.8	388.0	6	388.4	387.7	7.6	8.6	388.0	388.0
WB18-MW-11I	I	3	915484	1124364	11/15/04 - 06/25/08	20	372.6	371.4	23.7	29.2	371.1	10	371.6	371.4	9.9	7.5	371.4	371.4
WB18-MW-12S	S	3	920869	1120062	04/20/06 - 06/25/08	10	363.9	363.8	2.6	0.5	363.8	5	363.8	363.7	1.8	0.5	363.8	363.8
WB18-MW-13BR2	BR	9	919005	1120176	06/06/07 - 12/17/07	3	373.1	373.0	0.8	0.2	373.1	3	373.1	373.0	0.8	0.2	373.1	373.1
WB18-MW-13D	D	6	919042	1120302	04/20/06 - 06/25/08	11	372.8	373.1	3.9	1.7	372.9	6	372.8	373.2	3.3	1.8	372.9	372.9
WB18-MW-13I	I	5	919042	1120302	04/20/06 - 06/25/08	11	371.0	371.3	4.1	2.0	371.2	6	370.9	371.0	3.6	1.8	371.2	371.2
WB18-MW-13S	S	4	919042	1120302	04/20/06 - 06/25/08	11	369.6	370.5	10.8	9.5	370.5	6	370.5	370.5	1.6	0.4	370.4	370.4
WB18-MW-14BR	BR	9	916007	1122830	06/06/07 - 06/25/08	4	366.8	366.7	0.7	0.1	366.7	3	366.7	366.8	0.4	0.0	366.7	366.7
WB18-MW-14D	D	5	916093	1122919	04/20/06 - 06/25/08	11	370.9	370.7	2.6	0.9	370.8	6	370.8	370.9	2.1	0.5	370.9	370.9
WB18-MW-14I	I	5	916093	1122919	04/20/06 - 06/25/08	11	369.4	369.4	2.6	0.6	369.4	6	369.4	369.5	1.8	0.4	369.5	369.5
WB18-MW-14S	S	4	916093	1122919	04/20/06 - 06/25/08	11	369.6	369.1	3.4	1.2	369.5	6	369.5	369.6	2.5	1.2	369.6	369.6
WB18-MW-15S	S	2	915138	1124771	04/20/06 - 06/25/08	11	372.5	373.6	15.9	17.4	373.3	6	371.7	373.1	14.7	28.3	373.3	373.3
WB18-MW-16D	D	6	916800	1123913	04/20/06 - 06/25/08	11	370.3	370.3	2.8	0.7	370.3	6	370.3	370.2	1.9	0.4	370.3	370.3
WB18-MW-16I	I	3	916800	1123913	04/20/06 - 06/25/08	11	393.7	394.0	22.0	29.4	394.3	6	393.4	393.5	5.2	3.5	393.6	393.6
WB18-MW-16S	S	2	916800	1123913	04/20/06 - 06/25/08	11	399.5	399.2	9.0	6.3	399.3	6	399.1	399.3	6.2	4.4	399.2	399.2
WB18-MW-17D	D	6	917081	1125248	04/20/06 - 06/25/08	10	373.9	373.9	2.8	0.7	373.9	6	374.0	374.1	1.8	0.5	374.0	374.0
WB18-MW-17I	I	3	917081	1125248	04/20/06 - 06/25/08	10	372.9	372.9	8.4	5.4	372.8	6	372.6	372.7	6.4	6.0	372.9	372.9
WB18-MW-17S	S	2	917081	1125248	04/20/06 - 06/25/08	10	379.0	378.6	9.6	9.3	378.5	6	379.1	378.5	7.4	9.3	379.1	379.1
WB18-MW-18D	D	6	915937	1123977	04/20/06 - 06/25/08	11	370.9	371.1	3.8	1.0	371.0	6	370.9	370.9	1.8	0.5	370.9	370.9
WB18-MW-18G	G	4	915937	1123977	04/20/06 - 06/25/08	11	368.7	368.5	4.5	1.6	368.5	6	368.6	368.6	3.2	1.3	368.5	368.5
WB18-MW-18I	I	2	915937	1123977	04/20/06 - 06/25/08	11	370.1	370.1	5.2	3.0	369.8	6	369.6	369.7	3.8	1.8	369.5	369.5
WB18-MW-18S	S	2	915937	1123977	04/20/06 - 06/25/08	11	391.1	391.1	16.1	19.0	391.1	6	390.6	389.9	9.8	13.7	389.9	389.9
WB18-MW-19BR2	BR	8	920502	1121031	04/20/06 - 06/25/08	11	369.8	369.8	1.9	0.3	369.8	6	369.9	369.8	1.2	0.2	369.9	369.9
WB18-MW-20BR	BR	9	919707	1122866	06/01/06 - 06/25/08	10	368.3	368.8	3.7	1.6	368.5	6	368.6	368.6	2.6	0.9	368.6	368.6
WB18-MW-21D	D	6	918555	1123091	04/27/07 - 06/25/08	5	369.7	369.6	1.9	0.5	369.5	4	369.8	369.5	1.7	0.6	369.5	369.5
WB18-MW-21I	I	2	918554	1123096	04/27/07 - 06/25/08	5	382.7	382.6	5.9	5.6	382.3	4	382.6	382.0	5.9	7.2	382.0	382.0
WB18-MW-21S	S	2	918550	1123102	04/27/07 - 06/25/08	5	394.3	394.4	11.0	19.2	393.5	4	394.1	392.8	11.0	25.3	392.8	392.8
WB18-MW-22D2	D	5	919774	1121597	06/06/07 - 06/25/08	4	371.8	371.7	1.0	0.2	371.7	3	371.8	371.8	0.3	0.0	371.8	371.8
WB18-MW-22I	I	2	919760	1121616	04/27/07 - 12/17/07	4	379.4	379.0	5.6	6.3	379.0	4	379.4	379.0	5.6	6.3	379.0	379.0
WB18-MW-22S	S	2	919755	1121619	04/27/07 - 06/25/08	5	395.5	396.5	9.4	14.8	396.3	4	395.0	395.7	9.4	17.5	395.7	395.7
WB18-MW-23I	I	4	917106	1123298	07/19/07 - 07/19/07	1	381.0	381.0	0.0		381.0	1	381.0	381.0			381.0	381.0

Table 9

Summary of Water Level Data and Calibration Targets

Well ID	GW Zone	Model Layer	State Plane (NAD 83 ft) X-coordinate	Y-coordinate	Period of Water Level Measurements	All Water Level Data Number of Measure-ments	Average Elevation (feet, NAVD 88)	Median Elevation (feet, NAVD 88)	Range	Variance	25th Percentile Trimmed Mean Elevation (feet, NAVD 88)	Median Year Number of Measure-ments	Average Elevation (feet, NAVD 88)	Median Elevation (feet, NAVD 88)	Range	Variance	25th Percentile Trmmed Mean Elevation (feet, NAVD 88)	Calibration Target Elevtaion (feet, NAVD 88)
WB18-OW-01S	S	2	916224	1125493	06/01/06 - 12/17/07	7	373.6	372.1	7.5	7.5	373.1	4	374.1	373.4	7.5	11.3	373.4	373.4
WB18-OW-02S	S	2	916223	1125509	06/01/06 - 06/25/08	9	373.1	372.3	8.0	6.7	372.4	5	373.5	372.1	8.0	10.4	372.9	372.9
WB18-OW-03S	S	3	918986	1123581	06/01/06 - 06/25/08	8	365.0	364.9	1.3	0.2	364.9	4	365.1	365.2	1.0	0.2	365.2	365.2
WB18-OW-04S	S	2	918979	1123606	06/01/06 - 06/25/08	8	364.6	364.5	1.2	0.1	364.5	4	364.7	364.6	1.0	0.2	364.6	364.6
WB18-OW-05G	G	3	916246	1125423	06/01/06 - 07/19/07	8	371.9	371.9	7.3	4.5	371.7	6	372.0	371.9	7.3	6.3	372.0	372.0
WB18-OW-06G	G	3	916273	1125485	06/01/06 - 12/17/07	8	372.0	371.2	10.2	10.3	371.1	5	372.5	371.3	9.3	15.1	371.0	371.0
WB18-OW-07D	D	6	920333	1121585	06/01/06 - 12/14/06	4	370.3	370.3	0.3	0.0	370.3	3	370.3	370.3	0.2	0.0	370.3	370.3
WB18-TW-01S	S	2	916232	1125500	06/01/06 - 06/25/08	9	373.3	372.4	7.9	7.4	372.5	5	373.8	372.3	7.9	11.3	372.9	372.9
WB18-TW-02S	S	2	918998	1123588	06/01/06 - 06/25/08	8	364.8	364.7	1.0	0.1	364.7	4	364.9	364.7	0.8	0.1	364.7	364.7
WB18-TW-03G	G	3	916248	1125486	06/01/06 - 07/19/07	7	370.2	370.4	10.0	10.0	370.4	5	371.3	370.4	5.8	6.2	370.9	370.9
WB18-TW-04D	D	6	920314	1121681	06/01/06 - 09/26/06	3	369.9	369.8	0.1	0.0	369.9	2	369.9	369.9	0.1	0.0	369.9	369.9

Table 10

Summary of Calibration Statistics (Hydraulic Heads Only)

Layers	Count	Mean Error[1]	Mean Absolute Error[2]	Sum of Squared Residuals[3]	Standard Deviation of Residuals[4]	Root-Mean Squared Error[5]	Normalized Root Mean Squared Error[6]
1 and 2	43	0.1	2.1	286	2.6	2.6	0.007
Wastebeds	91	0.9	4.5	3911	6.5	6.6	0.017
3	51	0.4	2.3	469	3.0	3.0	0.008
4	33	1.3	3.6	580	4.1	4.2	0.011
5	69	-1.6	2.8	909	3.3	3.6	0.010
6	46	-0.3	1.8	261	2.4	2.4	0.006
7	14	-4.6	4.7	431	3.4	5.5	0.015
8 and 9	43	-1.0	3.8	1094	5.0	5.0	0.013
All	390	-0.2	3.2	7941	4.5	4.5	0.012

---

[1] The mean residual is defined as the arithmetic average of the residuals:

$$MRE = \frac{1}{N}\sum_{i=1}^{N}\left(cal_i - obs_i\right)$$

where N is the number of observations; cal_i is the calculated value; and obs_i is the observed value.

[2] The mean absolute residual is defined as the arithmetic average of the absolute value of the residuals:

$$MAE = \frac{1}{N}\sum_{i=1}^{N}\left|cal_i - obs_i\right|$$

[3] Sum of squared residuals (SSE) defined as: $SSE = \sum_{i=1}^{N}\left(cal_i - obs_i\right)^2$

[4] Standard deviation of residuals (SDEV) is defined as:

$$SDEV = \left[\frac{1}{N-1}\sum_{i=1}^{N}\left(cal_i - obs_i\right)^2 - \frac{N}{N-1}MRE^2\right]^{1/2}$$

[5] Root-Mean-Squared Error (RMSE) is defined as: $RMSE = \left[\frac{1}{N}\sum_{i=1}^{N}R_i^2\right]^{1/2}$

[6] The normalized root mean squared error (RMSE) is defined as:

$$NRMSE = \frac{1}{\bar{O}}\left[\frac{1}{N}\sum_{i=1}^{N}R_i^2\right]^{1/2}$$

The term $\bar{O}$ represents the average of the observed values $\bar{O} = \frac{1}{N}\sum_{i=1}^{N}O_i$

Table 11

Calculated Water Levels and Residuals

Well ID	GW Zone	State Plane (NAD 83 ft)		Model Location			Water Levels		Residual v1.0	Residual v3.0	Residual v3.01
		X-coordinate	Y-coordinate	Layer	Row	Column	Target Groundwater Elevation (ft, NAVD88)	Calculated Groundwater Elevation (ft, NAVD88)			
BF-BFMW-01D	D	923177.807	1117228.240	5	65	175	374.7	375.5	-3	-1	-1
BF-BFMW-01I	I	923181.391	1117238.585	3	64	175	377.4	375.5	0	2	2
BF-BFMW-01S	S	923179.661	1117233.886	2	65	175	382.4	383.4	4	-1	-2
BF-BFMW-02I	I	923396.485	1117084.634	3	64	181	376.7	375.8	NA	1	1
BF-BFMW-02S	S	923396.404	1117095.309	2	63	181	386.0	389.2	6	-3	4
BF-BFMW-02S2	S	923396.404	1117095.309	2	63	181	381.5	382.8	NA	-1	-1
BF-BFMW-03I	I	923665.967	1116859.297	3	63	190	378.1	376.0	-3	2	1
BF-BFMW-03S	S	923661.900	1116863.200	2	63	190	383.5	387.5	-1	-4	-4
BF-BFMW-04D	D	924155.940	1116500.393	8	61	205	374.7	372.3	-4	2	1
BF-BFMW-04I	I	924159.785	1116501.915	3	61	205	376.8	372.3	-3	4	2
BF-BFMW-04S	S	924155.488	1116505.495	2	61	205	382.3	384.5	-2	-2	-3
BF-BFMW-05I	I	923752.332	1116576.810	3	67	196	380.9	376.9	0	4	3
BF-BFMW-05S	S	923754.135	1116574.557	2	67	197	387.9	382.5	-1	5	6
BF-BFMW-06I	I	922948.079	1116943.789	3	74	175	378.4	379.2	-1	-1	0
BF-BFMW-06S	S	922955.312	1116942.499	2	74	176	385.4	387.4	6	-2	0
BF-BFMW-07S	S	923160.866	1116588.657	2	77	185	382.2	381.6	-1	1	1
BF-BFMW-08S	S	923558.632	1116692.235	2	68	191	382.8	382.5	NA	0	0
HB-HB-01D	D	924585.110	1117454.882	7	37	197	370.3	369.0	-2	1	1
HB-HB-01S	S	924589.129	1117453.958	2	37	197	363.8	363.6	-1	0	0
HB-HB-02I	I	925743.105	1116367.279	3	37	237	363.0	364.9	-2	-2	-2
HB-HB-02S	S	925739.180	1116363.204	2	37	237	363.7	364.9	-1	-1	-1
HB-HB-03S	S	923856.691	1117620.208	2	46	181	368.0	369.6	0	-2	-2
HB-HB-04D	D	925878.700	1115914.650	5	43	247	373.3	371.8	-1	2	1
HB-HB-04S	S	925886.606	1115919.801	2	43	247	363.3	364.8	-1	-1	-1
HB-HB-05D	D	925256.340	1116715.240	6	39	222	368.7	370.4	0	-2	-2
HB-HB-05I	I	925256.095	1116728.241	2	39	222	365.1	366.1	-4	-1	-2
HB-HB-05S	S	925255.170	1116724.222	2	39	222	366.6	367.1	1	0	-2
HB-HB-06S	S	926184.961	1116225.556	2	32	247	362.7	363.8	0	-1	-1
HB-HB-07S	S	925294.877	1114938.234	6	71	253	370.9	367.9	3	3	3
HB-HB-08D	D	925458.809	1115475.548	4	58	247	374.3	370.2	-2	4	3
HB-HB-08I	I	925464.829	1115474.661	3	58	247	370.1	365.5	1	5	5
HB-HB-08S	S	925459.658	1115483.567	2	58	246	370.4	365.6	1	5	5
HB-HB-09S	S	924389.522	1115732.483	2	72	223	376.4	374.2	-5	2	1
HB-HB-11I	I	924507.394	1116271.929	3	60	216	375.3	370.2	-3	5	3
HB-HB-11S	S	924507.394	1116271.929	2	60	216	382.6	383.2	5	-1	-3
HB-HB-12D	D	925070.767	1115893.401	4	57	232	375.4	371.6	-3	4	3
HB-HB-12I	I	925070.767	1115893.401	3	57	232	374.1	368.1	0	6	5
HB-HB-12S	S	925070.767	1115893.401	2	57	232	380.8	378.9	7	2	3
HB-HB-13D	D	925156.018	1115722.938	8	59	237	374.8	370.5	-3	4	3
HB-HB-14D	D	924711.653	1115838.604	3	64	227	376.6	371.2	-3	5	4
HB-HB-14S	S	924712.634	1115839.623	2	64	227	381.4	378.0	3	3	2
HB-HB-16D	D	925489.601	1116123.396	5	46	236	369.1	370.9	-1	-2	-2
HB-HB-17D	D	924853.075	1116031.351	4	58	226	376.2	371.4	-1	5	3
HB-HB-18S	S	926312.083	1115850.799	2	37	256	361.9	364.3	NA	-2	-2
HB-HB-19S	S	926203.265	1115997.807	2	36	251	361.9	364.0	NA	-2	-2
HB-HB-20D	D	926478.337	1116106.041	6	29	255	363.7	364.6	0	-1	-1
HB-HB-20I	I	926483.356	1116105.135	3	29	255	363.5	363.0	0	1	0
HB-HB-20S	S	926488.375	1116104.230	2	29	255	363.3	363.7	0	0	0
HB-HB-21I	I	925712.409	1115396.299	3	55	253	366.7	364.8	NA	2	2
HB-MW-22	S	928838.047	1119063.290	3	5	248	363.5	363.8	NA	0	0

Table 11

Calculated Water Levels and Residuals

Well ID	GW Zone	State Plane (NAD 83 ft)		Model Location			Water Levels		Residual v1.0	Residual v3.0	Residual v3.01
		X-coordinate	Y-coordinate	Layer	Row	Column	Target Groundwater Elevation (ft, NAVD88)	Calculated Groundwater Elevation (ft, NAVD88)			
HB-MW-23	S	928851.439	1119651.761	3	3	238	363.3	363.5	NA	0	0
HB-MW-24	S	929050.763	1120410.992	3	2	229	363.4	363.9	NA	-1	-1
HB-MW-25	S	929498.373	1119997.137	2	2	244	364.8	366.1	NA	-1	-2
HB-MW-26	S	929142.458	1119260.981	2	4	250	364.3	365.1	NA	-1	-1
HB-MW-27	S	929465.491	1120609.945	2	-	-	363.5	-	NA	-	-
HB-OW-01S	S	923859.257	1117590.244	2	46	181	368.2	370.7	NA	-3	-4
HB-OW-02S	S	925765.841	1116387.435	2	36	237	363.7	364.8	NA	-1	-1
HB-OW-03S	S	925849.623	1115918.103	2	43	246	363.6	364.9	NA	-1	-1
HB-OW-04S	S	923817.821	1117612.472	2	47	180	368.2	370.0	NA	-2	-3
HB-OW-05S	S	925785.013	1116373.072	2	36	237	363.6	364.7	NA	-1	-1
HB-OW-06S	S	926482.941	1116074.115	2	30	255	363.5	363.7	NA	0	0
HB-OW-07S	S	926467.752	1116083.832	2	30	255	363.3	363.7	NA	0	-1
HB-OW-08D	D	925101.388	1116709.315	7	42	219	369.9	372.1	NA	-2	-3
HB-TW-01	S	923847.728	1117618.038	2	46	181	368.0	369.7	NA	-2	-3
HB-TW-02	S	925761.880	1116379.639	2	36	237	363.7	364.8	NA	-1	-1
HB-TW-03	S	925858.529	1115923.273	2	43	246	363.3	364.8	NA	-2	-2
HB-TW-04	D	925208.356	1116713.334	6	40	221	369.1	370.7	NA	-2	-2
HB-TW-05	S	926486.772	1116083.191	2	30	255	363.5	363.7	NA	0	0
HB-WA-08D	D	924706.347	1116702.860	5	48	212	372.6	372.0	-3	1	0
HB-WA-08I	I	924717.300	1116705.100	3	48	212	371.3	368.4	-1	3	1
HB-WA-08S	S	924708.100	1116716.900	2	48	212	371.1	368.6	0	3	1
HB-WB-BL	D	924873.924	1116410.901	6	51	220	376.1	372.2	NA	4	3
HB-WB-BU	S	924878.000	1116408.000	2	51	220	372.7	368.5	NA	4	2
LCP-AW-2	S	916623.400	1117640.800	2	116	62	388.6	388.3	NA	0	0
LCP-AW-3	S	916649.100	1117547.200	2	116	62	389.0	388.1	NA	1	1
LCP-AW-4	S	916671.300	1117593.600	2	116	62	388.5	388.1	NA	0	0
LCP-AW-5	S	916410.900	1117394.600	4	117	62	388.6	384.2	NA	4	6
LCP-CWB-01D	D	916941.500	1118010.900	7	115	62	374.2	378.3	NA	-4	-4
LCP-CWB-01S	S	916919.600	1118006.500	5	115	62	374.5	379.2	NA	-5	-4
LCP-CWB-05D	D	917179.000	1117726.300	8	115	64	374.3	379.2	NA	-5	-5
LCP-CWB-05S	S	917172.900	1117730.200	7	115	64	374.6	379.9	NA	-5	-5
LCP-CWB-09D	D	917423.900	1117471.800	7	115	68	375.1	380.3	NA	-5	-5
LCP-CWB-09S	S	917417.800	1117476.700	5	115	68	374.8	380.8	NA	-6	-6
LCP-CWB-13	S	917646.000	1117148.800	8	115	75	375.1	382.6	NA	-7	-7
LCP-CWB-17	S	917384.829	1116963.543	8	116	73	375.9	383.2	NA	-7	-7
LCP-CWB-21	S	917060.000	1116977.700	9	117	69	389.6	383.6	NA	6	6
LCP-CWB-26	D	916617.300	1117165.400	9	117	64	381.2	383.1	NA	-2	-2
LCP-CWB-32	D	916477.100	1117652.000	9	116	61	378.3	380.2	NA	-2	-2
LCP-CWB-35D	D	916720.800	1117831.700	9	116	61	376.2	379.2	NA	-3	-3
LCP-CWB-35S	D	916719.900	1117824.700	7	116	61	374.5	379.0	NA	-4	-4
LCP-MMW-1	S	917514.800	1118323.800	5	113	63	380.4	383.1	NA	-3	-1
LCP-MW-10D	D	916730.586	1117524.730	5	116	63	376.8	380.8	NA	-4	-4
LCP-MW-10S	S	916730.586	1117524.730	4	116	63	378.8	383.5	NA	-5	-3
LCP-MW-11D	D	917353.180	1117983.661	5	114	64	376.7	381.3	NA	-5	-3
LCP-MW-11S	S	917354.100	1117986.700	2	114	64	382.1	384.9	NA	-3	-2
LCP-MW-12D	D	917093.187	1117765.668	5	115	63	374.5	381.5	NA	-7	-6
LCP-MW-12S	S	917094.100	1117770.700	2	115	63	383.4	381.9	NA	2	1
LCP-MW-13D	D	917466.500	1117544.600	5	115	68	374.8	382.6	-6	-8	-7
LCP-MW-13S	S	917464.400	1117549.600	2	115	67	387.0	386.5	NA	0	2
LCP-MW-14D	D	917383.200	1117027.800	6	116	72	376.2	383.1	NA	-7	-6

Table 11

Calculated Water Levels and Residuals

Well ID	GW Zone	State Plane (NAD 83 ft)		Model Location			Water Levels		Residual v1.0	Residual v3.0	Residual v3.01
		X-coordinate	Y-coordinate	Layer	Row	Column	Target Groundwater Elevation (ft, NAVD88)	Calculated Groundwater Elevation (ft, NAVD88)			
LCP-MW-14S	S	917388.200	1117029.900	4	116	72	388.7	383.7	NA	5	6
LCP-MW-15D	D	917043.900	1116983.400	7	117	68	376.7	383.5	-14	-7	-6
LCP-MW-15S	S	917041.000	1116981.400	4	117	68	390.1	385.0	NA	5	6
LCP-MW-16D	D	917260.500	1117382.700	5	115	67	375.7	382.7	NA	-7	-6
LCP-MW-16S	S	917260.500	1117382.700	2	115	67	389.3	386.2	NA	3	4
LCP-MW-17D	D	916963.500	1117481.100	5	116	64	377.8	382.2	NA	-4	-3
LCP-MW-18D	D	917241.200	1117557.400	5	115	66	374.6	382.3	NA	-8	-7
LCP-MW-18S	S	917236.300	1117552.300	2	115	66	386.9	385.0	NA	2	2
LCP-MW-19D	D	916929.300	1117705.600	5	115	63	374.5	381.6	NA	-7	-6
LCP-MW-19S	S	916930.400	1117697.600	2	115	63	387.1	384.0	NA	3	3
LCP-MW-1A	S	916510.100	1117544.600	5	116	62	386.2	383.7	NA	3	4
LCP-MW-20S	S	916824.800	1117886.700	2	115	62	385.7	382.2	NA	4	3
LCP-MW-21I	I	917406.800	1117370.400	5	115	68	385.1	382.9	NA	2	3
LCP-MW-21S	S	917406.800	1117370.400	2	115	68	387.4	384.9	NA	3	2
LCP-MW-23S	S	917081.800	1117148.200	2	116	67	389.1	386.0	NA	3	4
LCP-MW-24D	D	916650.100	1117869.400	5	116	61	374.8	381.0	NA	-6	-5
LCP-MW-24S	S	916654.000	1117874.400	4	116	61	383.6	383.0	NA	1	2
LCP-MW-25S	S	916831.800	1117674.700	4	116	62	388.2	385.4	NA	3	3
LCP-MW-27S	S	917163.172	1117714.968	2	115	64	382.0	382.6	NA	-1	-1
LCP-MW-28D	D	916954.348	1118125.194	5	115	61	374.0	378.9	-1	-5	-5
LCP-MW-28S	S	916951.200	1118131.100	4	115	61	379.0	382.6	NA	-4	-3
LCP-MW-29D	D	917055.373	1117967.036	5	115	62	373.8	381.0	NA	-7	-6
LCP-MW-29S	S	917049.200	1117975.900	4	115	62	380.1	382.4	NA	-2	-2
LCP-MW-30D	D	917125.736	1117843.313	5	115	63	373.6	379.6	NA	-6	-6
LCP-MW-30S	S	917121.600	1117850.200	4	115	63	381.1	382.0	NA	-1	0
LCP-MW-32S	S	917433.354	1117923.149	5	114	65	381.5	381.5	NA	0	1
LCP-MW-33D	D	917076.999	1117563.281	6	115	64	374.2	380.7	NA	-7	-6
LCP-MW-3AR	S	916636.658	1117412.912	5	116	63	389.0	382.5	NA	7	7
LCP-MW-4A	S	916561.100	1117496.500	5	116	62	386.9	383.7	NA	3	4
LCP-MW-8D	D	916388.100	1117333.200	5	117	62	378.7	382.0	NA	-3	-3
LCP-MW-9D	D	916704.100	1117549.200	5	116	62	378.3	382.0	NA	-4	-3
LCP-NMW-1	S	917740.100	1117463.800	2	115	71	384.5	388.2	NA	-4	-2
LCP-NMW-2D	D	917610.000	1117573.300	5	115	69	374.7	380.3	NA	-6	-5
LCP-NMW-2S	S	917610.000	1117573.300	2	115	69	384.2	387.6	NA	-3	-1
LCP-NMW-3	S	917566.200	1117351.400	2	115	70	387.1	387.4	NA	0	1
LCP-OW-01	D	917121.700	1117739.200	6	115	64	377.1	379.9	NA	-3	-2
LCP-OW-02	D	917118.400	1117753.100	5	115	64	375.4	379.9	NA	-4	-4
LCP-OW-03	D	917108.300	1117760.000	5	115	64	377.4	379.8	NA	-2	-2
LCP-PMW-1D	D	917544.500	1117705.200	5	114	67	374.5	382.2	NA	-8	-7
LCP-PMW-1S	S	917540.400	1117711.100	5	114	67	382.3	383.7	NA	-1	0
LCP-PMW-2	S	917436.800	1117637.100	2	115	67	384.6	386.1	NA	-1	0
LCP-PMW-3D	D	917375.300	1117604.900	5	115	66	374.6	380.3	NA	-6	-5
LCP-PMW-3S	S	917380.400	1117600.000	4	115	66	382.4	383.7	NA	-1	0
LCP-PMW-4	S	917353.300	1117766.600	2	115	65	382.8	385.2	NA	-2	-2
LCP-PMW-5	S	917638.000	1117664.000	5	114	68	380.7	384.2	NA	-4	-2
LCP-PMW-6	S	917254.000	1117765.000	5	115	64	381.3	382.7	NA	-1	0
LCP-PMW-7	S	917541.000	1117815.000	5	114	66	381.5	383.5	NA	-2	-1
LCP-PMW-8	S	917686.000	1117736.800	5	114	68	380.8	384.3	NA	-4	-2
LCP-PMW-9	S	917536.800	1117954.100	5	114	65	380.6	381.5	NA	-1	0
LCP-PW-01	D	917126.500	1117748.300	5	115	64	374.3	379.9	NA	-6	-5

Table 11

Calculated Water Levels and Residuals

Well ID	GW Zone	State Plane (NAD 83 ft)		Model Location			Water Levels		Residual v1.0	Residual v3.0	Residual v3.01
		X-coordinate	Y-coordinate	Layer	Row	Column	Target Groundwater Elevation (ft, NAVD88)	Calculated Groundwater Elevation (ft, NAVD88)			
LCP-W-5	S	916439.000	1117654.300	2	116	61	388.1	384.6	NA	3	4
LCP-W-7	S	916513.700	1117674.700	4	116	61	389.0	384.2	NA	5	6
MA-MAMW-01D	D	914828.000	1116197.000	9	122	60	399.0	402.0	NA	-3	-4
MA-MAMW-01S	S	914836.000	1116194.000	9	122	60	403.0	402.1	NA	1	0
MA-MAMW-02D	D	915486.000	1116255.000	9	121	62	400.0	401.0	NA	-1	-2
MA-MAMW-02S	S	915482.000	1116251.000	9	121	62	401.3	401.0	NA	0	-1
MA-MAMW-03	S	916249.000	1116457.000	9	119	66	399.4	396.1	NA	3	2
MA-MAMW-04	S	916829.000	1116523.000	9	118	71	399.5	392.4	NA	7	6
MA-MAMW-05D	D	917094.000	1116701.000	9	117	72	397.4	387.4	NA	10	9
MA-MAMW-05S	S	917100.000	1116696.000	9	117	72	398.4	387.6	NA	11	9
MA-MAMW-06D	D	916410.000	1117137.000	7	117	63	376.1	383.9	NA	-8	-7
MA-MAMW-06S	S	916406.000	1117139.000	4	117	63	390.3	386.9	NA	3	4
MA-MAMW-06S2	S	916370.000	1117151.000	2	117	63	390.3	387.1	NA	3	4
MA-MAMW-07D	D	915152.000	1117669.000	7	119	56	376.9	382.4	NA	-5	-5
MA-MAMW-07S	S	915142.000	1117671.000	2	119	56	392.5	390.4	NA	2	1
MA-MAMW-08D	D	916255.000	1116847.000	7	118	63	379.9	386.8	NA	-7	-6
MA-MAMW-08S	S	916252.000	1116849.000	9	118	63	399.3	388.7	NA	11	10
MA-MAMW-09D	D	914921.000	1117557.000	7	119	56	381.8	384.9	NA	-3	-3
MA-MAMW-09S	S	914922.000	1117566.000	4	119	56	391.7	390.3	NA	1	5
MA-MAMW-10D	D	914457.000	1117456.000	7	120	54	386.1	387.2	NA	-1	-1
MA-MAMW-10S	S	914450.000	1117444.000	4	120	54	391.4	388.3	NA	3	3
MA-MAMW-11D	D	914876.000	1116941.000	9	120	58	381.8	392.6	NA	-11	-11
MA-MAMW-11S	S	914869.000	1116942.000	5	120	58	398.4	393.2	NA	5	5
MA-MAMW-12D	D	914373.000	1116068.000	9	123	59	400.5	402.4	NA	-2	-3
MA-MAMW-12S	S	914367.000	1116074.000	9	123	59	403.5	402.3	NA	1	1
MA-MAMW-13S	S	914240.000	1117058.000	5	121	55	394.7	394.1	NA	1	1
MA-MAMW-15D	D	915560.000	1117292.000	9	119	59	378.6	385.4	NA	-7	-7
MA-MAMW-15S	S	915558.000	1117284.000	5	119	59	392.8	390.6	NA	2	2
MA-MAMW-16S	S	915182.000	1117245.000	4	119	58	396.3	391.7	NA	5	4
MA-MAMW-17S	S	916985.000	1116893.000	4	117	69	391.4	384.7	NA	7	8
MPS-C-2	S	920719.020	1116596.431	9	108	140	396.5	390.8	NA	6	4
MPS-MW-01BR	BR	919188.872	1116242.001	9	114	118	402.2	398.9	NA	3	2
MPS-MW-03BR	BR	921192.394	1115812.269	9	110	162	393.2	398.9	NA	-6	-8
NMDSA-MW-01	S	914019.839	1126621.245	3	47	24	364.2	364.7	NA	-1	-1
NMDSA-MW-02	S	913692.578	1126681.092	4	52	23	366.0	371.6	NA	-6	-6
NMDSA-MW-03	S	913766.877	1127090.659	3	43	23	365.0	365.3	NA	0	0
NMDSA-MW-04	S	912164.454	1129039.193	3	34	17	364.4	365.8	NA	-1	-2
NMDSA-MW-05	S	911733.390	1129457.222	2	34	15	364.6	366.0	NA	-1	-1
NMDSA-MW-06	S	911523.557	1130185.552	3	25	13	363.7	365.0	NA	-1	-1
NMDSA-MW-07	S	910262.130	1132882.814	3	14	7	363.2	366.3	NA	-3	-3
NMDSA-MW-08	S	909680.699	1134270.388	3	10	3	365.9	366.3	NA	0	-1
NMDSA-MW-09	S	910022.773	1134114.785	3	10	4	363.5	365.6	NA	-2	-2
PSA-MW-03SR	S	921520.229	1117045.790	5	96	148	384.1	380.6	NA	3	5
PSA-MW-04BR	BR	921099.375	1117122.642	9	101	138	367.7	381.3	NA	-14	-14
SB915-BA-01S	S	907971.135	1120451.058	2	126	23	411.2	422.1	NA	-11	-7
SB915-BA-02S	S	907507.860	1119899.805	2	127	24	413.7	420.1	NA	-6	-2
SB915-BA-03S	S	905910.247	1119740.375	2	130	21	408.6	415.8	NA	-7	-5
SB915-IMW-01S	S	912219.204	1121196.509	2	117	33	365.7	366.2	NA	-1	-1
SB915-IMW-02S	S	911975.813	1121977.878	4	116	30	368.3	368.7	NA	0	-1
SB915-IMW-03S	S	911611.517	1122559.164	4	116	27	367.5	368.2	NA	-1	-1

Table 11

Calculated Water Levels and Residuals

Well ID	GW Zone	State Plane (NAD 83 ft)		Model Location			Water Levels		Residual v1.0	Residual v3.0	Residual v3.01
		X-coordinate	Y-coordinate	Layer	Row	Column	Target Groundwater Elevation (ft, NAVD88)	Calculated Groundwater Elevation (ft, NAVD88)			
SB915-IMW-04S	S	911192.222	1122857.392	5	116	25	367.0	368.1	NA	-1	-1
SB915-IMW-05S	S	911620.990	1122185.661	4	116	28	368.6	367.2	NA	1	2
SB915-IMW-06S	S	911871.126	1121779.051	4	117	30	369.5	370.3	NA	-1	-2
SB915-MW-01	S	911682.986	1118587.771	9	123	40	388.5	390.7	NA	-2	-4
SB915-MW-04	S	912377.357	1120043.630	5	119	38	367.8	371.1	NA	-3	-3
SB915-MW-34S	S	906285.968	1118640.406	2	132	23	440.4	424.9	NA	15	16
SB915-MW-36D	D	907404.904	1118697.543	7	130	25	370.1	382.7	NA	-13	-13
SB915-MW-36I	I	907404.904	1118697.543	2	130	25	417.6	413.9	NA	4	5
SB915-MW-36S	S	907404.904	1118697.543	2	130	25	440.1	431.9	NA	8	10
SB915-MW-40S	S	914447.199	1122218.763	2	109	38	390.5	379.8	NA	11	8
SB915-MW-42D	D	913102.148	1121517.772	6	115	36	365.0	368.1	NA	-3	-3
SB915-MW-42I	I	913108.151	1121520.227	2	115	36	385.8	379.9	NA	6	3
SB915-MW-42S	S	913115.126	1121523.182	2	115	36	393.9	395.8	NA	-2	-1
SB915-MW-43S	S	912821.566	1122526.752	2	114	31	390.5	382.1	NA	8	6
SB915-MW-50S	S	910255.655	1122740.509	2	118	24	399.7	409.4	NA	-10	-6
SB915-MW-51S	S	910495.130	1122148.433	2	118	25	400.8	401.4	NA	-1	1
SB915-MW-53D	D	909264.734	1123027.940	7	119	21	366.1	369.0	NA	-3	-3
SB915-MW-53I	I	909253.947	1123031.113	2	119	21	386.6	374.1	NA	12	-5
SB915-MW-53S	S	909244.550	1123033.533	2	119	21	399.1	420.7	NA	-22	8
SB915-MW-59S	S	909681.498	1122233.726	4	119	24	364.2	367.7	NA	-4	-3
SB915-MW-60S	S	909451.843	1122405.820	4	119	23	365.0	367.8	NA	-3	-3
SB915-MW-70S	S	910108.034	1121886.659	5	119	25	363.4	367.2	NA	-4	-4
SB915-P1-01S	S	908202.158	1120136.176	2	126	24	410.9	420.8	NA	-10	-6
SB915-P1-02S	S	908349.752	1120332.216	2	125	24	410.7	420.3	NA	-10	-6
SB915-P2-01S	S	907283.744	1119402.905	2	129	24	415.3	429.8	NA	-14	-11
SB915-P2-02S	S	907555.173	1119471.103	2	128	24	414.2	420.6	NA	-6	-3
SB915-P3-01S	S	906132.699	1119259.323	2	131	22	413.6	417.2	NA	-4	-2
SB915-PZ-01D	S	907968.876	1120503.610	5	125	23	379.9	371.3	NA	9	8
SB915-PZ-01I	S	907969.068	1120461.887	4	126	23	397.6	390.1	NA	8	9
SB915-PZ-02D	S	906338.431	1120813.955	2	128	20	386.8	399.8	NA	-13	-12
SB915-PZ-02I	S	906334.556	1120809.429	2	128	20	402.6	399.8	NA	3	4
SB915-PZ-02N	D	906342.319	1120817.042	6	128	20	375.2	373.5	NA	2	1
SB915-PZ-02S	S	906329.523	1120804.506	2	128	20	414.9	419.3	NA	-4	-3
SB915-PZ-03	S	910629.554	1120205.696	2	122	31	436.3	409.5	NA	27	27
SB915-PZ-07D	S	910100.799	1120024.252	2	123	30	415.1	401.0	NA	14	15
SB915-PZ-07I	S	910098.875	1120019.549	2	123	30	423.8	408.9	NA	15	16
SB915-PZ-07S	S	910098.096	1120015.467	2	123	30	440.8	416.9	NA	24	25
SB915-TA-01S	S	905602.083	1119982.614	2	130	20	412.3	416.3	NA	-4	-3
SB915-TA-02S	S	905498.081	1119824.250	2	131	20	408.9	415.1	NA	-6	-5
SB915-WB-01U	S	902381.100	1116874.800	5	142	19	381.4	390.3	NA	-9	-9
SB915-WB-02L	D	904802.689	1119281.387	8	133	20	373.6	373.9	NA	0	-1
SB915-WB-02U	S	904800.900	1119375.400	6	133	19	376.7	377.6	NA	-1	-1
SB915-WB-03L	D	904593.568	1121509.316	6	129	15	375.2	375.4	NA	0	-1
SB915-WB-03U	S	904593.600	1121509.300	5	129	15	375.6	375.4	NA	0	0
SB915-WB-04L	D	907822.994	1121395.211	6	124	22	373.9	370.7	NA	3	3
SB915-WB-04U	S	907823.000	1121395.200	6	124	22	374.0	370.7	NA	3	3
SB915-WB-05L	D	910619.403	1121729.073	6	119	26	361.7	366.6	NA	-5	-5
SB915-WB-05M	I	910605.631	1121733.793	6	119	26	364.5	366.6	NA	-2	-2
SB915-WB-05R	BR	910722.224	1121709.044	8	119	27	356.3	360.1	NA	-4	-4
SB915-WB-05U	S	910613.701	1121731.225	4	119	26	372.3	367.5	NA	5	5

Table 11

Calculated Water Levels and Residuals

Well ID	GW Zone	State Plane (NAD 83 ft)		Model Location			Water Levels		Residual v1.0	Residual v3.0	Residual v3.01
		X-coordinate	Y-coordinate	Layer	Row	Column	Target Groundwater Elevation (ft, NAVD88)	Calculated Groundwater Elevation (ft, NAVD88)			
SB915-WB-07L	D	912305.523	1121355.779	6	117	33	365.3	367.7	NA	-2	-2
SB915-WB-07U	S	912145.942	1121344.177	5	117	33	365.9	367.6	NA	-2	-1
SB915-WB-09U	S	914998.359	1121686.726	2	109	42	363.0	364.8	NA	-2	-3
SB915-WB-10U	S	913725.870	1121314.564	4	114	39	366.9	370.9	NA	-4	-5
SB915-WB-11U	S	912244.275	1121314.607	2	117	33	366.9	370.6	NA	-4	-3
SB915-WB-12U	S	911543.739	1120904.224	4	119	32	378.7	368.0	NA	11	10
SB915-WB-15A/15CF	D	905566.224	1116671.766	9	137	25	406.1	409.0	NA	-3	-6
SP-SP-02A	S	920685.745	1117972.530	2	93	116	372.9	374.5	NA	-2	-1
SP-SP-03A	S	921948.900	1117886.300	2	73	141	380.8	376.4	-1	4	-4
SP-SP-03B	I	921954.200	1117869.400	4	74	142	377.8	374.5	0	3	4
SP-SP-03C	D	921960.900	1117884.600	6	73	141	373.1	374.7	-4	-2	-1
SP-SP-04A	S	921274.800	1118405.800	2	75	120	394.8	379.2	3	16	4
SP-SP-04B	I	921303.700	1118411.400	5	75	120	374.4	372.9	-1	2	2
SP-SP-04C	D	921304.300	1118382.400	5	75	121	372.0	373.7	-1	-2	-1
SP-SP-05A	S	920826.900	1119135.700	3	70	99	367.0	371.4	-1	-4	-4
SP-SP-05B	I	920827.000	1119125.700	5	70	100	370.4	371.6	-2	-1	-1
SP-SP-05C	D	920819.900	1119132.500	6	70	99	373.3	372.9	-1	0	1
SP-SP-06A	S	922111.900	1118418.600	2	61	135	376.6	368.0	2	9	8
SP-SP-06B	I	922116.600	1118434.700	3	61	135	371.7	367.9	-1	4	4
SP-SP-06C	D	922135.800	1118424.100	5	60	135	371.2	373.2	-4	-2	-2
SP-SP-07A	S	921833.300	1118761.500	2	59	124	377.0	372.8	1	4	-4
SP-SP-07B	I	921815.200	1118770.200	3	59	124	371.9	367.4	-2	4	4
SP-SP-07C	D	921813.600	1118748.100	6	60	124	374.5	373.1	0	1	2
SP-SP-08A	S	921403.300	1119073.500	2	61	111	379.8	369.8	5	10	10
SP-SP-08B	I	921362.100	1119079.700	5	61	110	371.2	371.9	-1	-1	0
SP-SP-08C	D	921382.200	1119077.100	6	61	111	373.4	372.6	-1	1	1
SP-SP-09A	S	920244.000	1118530.400	2	91	99	370.0	373.6	-3	-4	-3
SP-SP-09B	I	920220.900	1118536.000	3	91	98	371.9	373.8	-1	-2	-1
SP-SP-09C	D	920226.200	1118519.100	6	91	99	373.6	374.6	0	-1	0
SP-SP-10BR	BR	920507.295	1118401.227	9	88	106	372.8	373.8	NA	-1	0
SP-SP-10D	D	920511.003	1118408.188	5	88	106	372.7	373.8	NA	-1	0
SP-SP-11BR	BR	921547.747	1117545.398	9	87	140	373.1	376.6	NA	-3	-3
SP-SP-11D	D	921554.082	1117551.963	5	86	140	380.4	375.6	NA	5	5
SP-SP-12BR	BR	922636.902	1116944.140	9	79	170	374.4	379.5	NA	-5	-5
SP-SP-12D	D	922631.045	1116945.395	5	79	170	376.2	379.0	NA	-3	-2
WA-MW-100BR	BR	921145.120	1119601.006	8	56	97	370.9	370.5	NA	0	1
WA-MW-100D	D	921138.554	1119609.012	6	56	97	371.3	371.7	NA	0	0
WA-OW-01D	D	921869.914	1119049.311	6	53	120	371.7	372.2	NA	0	0
WA-OW-02D	D	921919.652	1119064.256	5	52	121	370.7	372.2	0	-1	-1
WA-OW-03I	I	921916.700	1119061.200	3	52	121	363.7	365.3	NA	-2	-2
WA-OW-04D	D	921697.394	1119232.131	6	53	114	370.6	372.1	-2	-1	-1
WA-OW-05D	D	921481.532	1119379.118	6	54	107	370.9	371.9	-1	-1	-1
WA-OW-06D	D	921940.087	1119041.632	6	52	121	370.2	372.1	-1	-2	-2
WA-OW-07D	D	922175.120	1118832.981	5	52	129	370.2	372.3	0	-2	-2
WA-OW-08S	S	923077.081	1117794.572	2	56	163	364.8	369.6	NA	-5	-5
WA-OW-09I	I	923082.025	1117850.688	3	55	163	364.0	368.5	NA	-5	-5
WA-OW-10I	I	921928.898	1119051.425	3	52	121	363.7	365.3	0	-2	-2
WA-OW-11D	D	922187.400	1118820.200	6	52	130	370.0	372.1	-1	-2	-2
WA-TW-01D	D	921895.292	1119082.804	6	52	120	370.3	372.0	NA	-2	-2
WA-TW-02S	S	923058.600	1117817.200	2	56	163	364.0	369.3	NA	-5	-5

Table 11

Calculated Water Levels and Residuals

Well ID	GW Zone	State Plane (NAD 83 ft)		Model Location			Water Levels		Residual v1.0	Residual v3.0	Residual v3.01
		X-coordinate	Y-coordinate	Layer	Row	Column	Target Groundwater Elevation (ft, NAVD88)	Calculated Groundwater Elevation (ft, NAVD88)			
WA-TW-03I	I	921907.500	1119071.000	3	52	120	363.3	365.3	NA	-2	-2
WA-WA-01D	D	922746.457	1118138.475	6	55	152	370.3	372.5	-3	-2	-2
WA-WA-01I	I	922757.500	1118135.700	3	55	152	364.5	367.6	NA	-3	-3
WA-WA-01S	S	922761.800	1118122.800	2	55	152	363.9	367.5	-1	-4	-4
WA-WA-02D	D	923053.664	1117869.161	5	55	162	373.5	374.0	-3	0	0
WA-WA-02S	S	923048.600	1117874.100	2	55	162	362.6	368.5	-3	-6	-6
WA-WA-03D	D	923317.397	1117730.079	5	53	169	373.2	373.8	-2	-1	-1
WA-WA-03I	I	923351.300	1117733.700	3	52	170	367.2	368.3	-1	-1	-1
WA-WA-03S	S	923284.300	1117733.500	2	54	168	367.1	368.8	0	-2	-2
WA-WA-04D	D	922857.902	1117269.221	5	69	168	375.5	376.0	-3	-1	0
WA-WA-04I	I	922839.000	1117262.900	3	70	168	375.9	376.7	-2	-1	0
WA-WA-04S	S	922877.700	1117279.600	2	69	169	377.9	376.4	1	1	2
WA-WA-05D	D	922449.300	1117081.400	5	80	164	376.7	378.3	-3	-2	-1
WA-WA-05I	I	922441.100	1117088.300	3	80	164	377.9	378.4	-1	-1	0
WA-WA-05S	S	922452.100	1117090.500	2	80	164	378.0	378.4	-1	0	1
WA-WA-06D	D	921705.800	1117406.500	5	86	145	376.2	376.7	-1	0	0
WA-WA-06S	S	921695.600	1117419.400	2	86	144	378.1	376.7	-1	1	2
WA-WA-07D	D	922533.800	1117641.300	5	68	156	374.6	374.6	-2	0	0
WA-WA-07I	I	922550.600	1117648.600	3	68	156	371.3	374.7	-3	-3	-3
WA-WA-07S	S	922542.400	1117660.400	2	68	156	376.5	373.2	2	3	4
WB18-DW103	D	915654.398	1124348.179	6	61	35	369.3	368.7	6	1	1
WB18-MW-01D	D	920302.752	1121726.835	8	31	61	368.7	370.4	NA	-2	-2
WB18-MW-01I	I	920299.677	1121730.779	3	31	61	363.4	364.6	NA	-1	-1
WB18-MW-01S	S	920294.639	1121732.685	2	31	61	363.6	364.6	NA	-1	-1
WB18-MW-02D	D	919010.214	1123582.200	6	21	50	369.1	369.1	NA	0	0
WB18-MW-02I	I	919007.119	1123587.144	3	21	50	364.0	364.4	NA	0	-1
WB18-MW-02S	S	919004.043	1123591.087	2	21	50	364.5	364.4	NA	0	0
WB18-MW-03BR	BR	917761.354	1124796.505	8	21	42	364.5	363.2	NA	1	1
WB18-MW-03D	D	917752.457	1124813.964	6	21	42	368.3	368.5	NA	0	0
WB18-MW-03I	I	917756.532	1124810.039	3	21	42	365.3	365.7	NA	0	-1
WB18-MW-03S	S	917758.627	1124805.076	2	21	42	364.1	365.8	NA	-2	-2
WB18-MW-04BR	BR	916260.726	1125515.822	9	30	34	360.9	363.1	NA	-2	-2
WB18-MW-04D	D	916253.639	1125513.959	6	30	34	371.9	368.5	NA	3	3
WB18-MW-04G	G	916249.695	1125510.884	3	30	34	370.4	368.4	NA	2	2
WB18-MW-04I	I	916244.733	1125508.789	3	30	34	372.0	368.8	NA	3	3
WB18-MW-04S	S	916240.808	1125504.714	2	30	34	374.2	378.9	NA	-5	-6
WB18-MW-05D	D	915308.181	1125359.053	6	49	31	372.4	368.6	NA	4	4
WB18-MW-05I	I	915311.086	1125364.110	3	49	31	371.4	367.0	NA	4	3
WB18-MW-05S	S	915313.992	1125369.166	2	48	31	372.4	370.6	NA	2	1
WB18-MW-06BR	BR	918221.329	1122678.642	9	49	51	369.2	368.6	NA	1	1
WB18-MW-06D	D	918207.693	1122691.694	6	49	50	371.3	370.9	NA	0	1
WB18-MW-06I	I	918210.768	1122687.750	2	49	50	383.6	377.1	NA	6	4
WB18-MW-06S	S	918214.844	1122683.825	2	49	50	396.4	397.7	NA	-1	-2
WB18-MW-07D	D	919397.841	1121384.621	6	52	59	372.2	372.3	NA	0	0
WB18-MW-07I	I	919393.765	1121388.545	3	52	59	384.2	372.5	NA	12	12
WB18-MW-07S	S	919390.690	1121392.489	2	52	59	392.1	384.8	NA	7	7
WB18-MW-08D	D	917576.824	1121558.329	6	80	52	372.5	373.2	NA	-1	0
WB18-MW-08I	S/I	917572.748	1121562.254	2	80	52	384.3	373.8	NA	10	11
WB18-MW-08S	S	917569.691	1121565.197	2	80	52	387.3	387.1	NA	0	-4
WB18-MW-09BR	BR	920869.022	1120366.837	9	46	79	366.7	368.8	NA	-2	-2

Table 11

Calculated Water Levels and Residuals

Well ID	GW Zone	State Plane (NAD 83 ft)		Model Location			Water Levels		Residual v1.0	Residual v3.0	Residual v3.01
		X-coordinate	Y-coordinate	Layer	Row	Column	Target Groundwater Elevation (ft, NAVD88)	Calculated Groundwater Elevation (ft, NAVD88)			
WB18-MW-09D	D	920886.644	1120367.298	5	46	80	370.5	371.6	NA	-1	-1
WB18-MW-09I	I	920886.644	1120367.298	3	46	80	364.6	366.4	NA	-2	-2
WB18-MW-09S	S	920886.644	1120367.298	2	46	80	364.7	366.5	NA	-2	-2
WB18-MW-10D	D	920095.282	1120369.367	6	59	68	371.8	373.0	NA	-1	-1
WB18-MW-10I	I	920095.282	1120369.367	3	59	68	383.5	377.4	NA	6	5
WB18-MW-10S	S	920095.282	1120369.367	2	59	68	388.0	389.7	NA	-2	-1
WB18-MW-11I	I	915484.032	1124363.970	3	64	35	371.4	372.1	NA	-1	-4
WB18-MW-12S	S	920869.311	1120061.817	3	52	84	363.8	366.0	NA	-2	-2
WB18-MW-13BR2	BR	919004.901	1120176.309	9	81	62	373.1	371.8	NA	1	2
WB18-MW-13D	D	919041.900	1120301.746	6	78	62	372.9	374.2	NA	-1	-1
WB18-MW-13I	I	919041.900	1120301.746	5	78	62	371.2	373.6	NA	-2	-2
WB18-MW-13S	S	919041.900	1120301.746	4	78	62	370.4	373.7	NA	-3	-3
WB18-MW-14BR	BR	916006.653	1122830.488	9	83	42	366.7	367.4	NA	-1	0
WB18-MW-14D	D	916093.050	1122918.653	5	80	42	370.9	370.3	NA	1	1
WB18-MW-14I	I	916093.050	1122918.653	5	80	42	369.5	371.1	NA	-2	-1
WB18-MW-14S	S	916093.050	1122918.653	4	80	42	369.6	374.6	NA	-5	-4
WB18-MW-15S	S	915138.300	1124770.571	2	62	32	373.3	373.0	NA	0	-1
WB18-MW-16D	D	916800.160	1123913.274	6	50	41	370.3	369.5	NA	1	1
WB18-MW-16I	I	916800.160	1123913.274	3	50	41	393.6	386.3	NA	7	5
WB18-MW-16S	S	916800.160	1123913.274	2	50	41	399.2	391.8	NA	7	7
WB18-MW-17D	D	917080.789	1125248.121	6	23	38	374.0	368.4	NA	6	6
WB18-MW-17I	I	917080.789	1125248.121	3	23	38	372.9	372.2	NA	1	-1
WB18-MW-17S	S	917080.789	1125248.121	2	23	38	379.1	380.8	NA	-2	-3
WB18-MW-18D	D	915937.105	1123977.292	6	63	38	370.9	369.0	NA	2	2
WB18-MW-18G	G	915937.105	1123977.292	4	63	38	368.5	370.4	NA	-2	-3
WB18-MW-18I	I	915937.105	1123977.292	2	63	38	369.5	373.5	NA	-4	-5
WB18-MW-18S	S	915937.105	1123977.292	2	63	38	389.9	385.9	NA	4	4
WB18-MW-19BR2	BR	920502.279	1121031.317	8	40	66	369.9	367.4	NA	2	3
WB18-MW-20BR	BR	919706.950	1122865.569	9	22	55	368.6	366.1	NA	3	3
WB18-MW-21D	D	918555.268	1123090.622	6	35	50	369.5	370.1	NA	-1	-1
WB18-MW-21I	I	918553.701	1123096.485	2	35	50	382.0	376.5	NA	6	3
WB18-MW-21S	S	918550.320	1123102.417	2	35	50	392.8	392.9	NA	0	-1
WB18-MW-22D2	D	919773.547	1121596.531	5	42	60	371.8	371.0	NA	1	1
WB18-MW-22I	I	919760.415	1121616.372	2	42	60	379.0	375.8	NA	3	2
WB18-MW-22S	S	919755.348	1121618.925	2	42	60	395.7	390.6	NA	5	5
WB18-MW-23I	I	917105.754	1123297.574	4	56	44	381.0	377.7	NA	3	3
WB18-OW-01S	S	916223.973	1125492.852	2	31	34	373.4	374.2	NA	-1	-2
WB18-OW-02S	S	916223.300	1125509.319	2	30	34	372.9	373.6	NA	-1	-2
WB18-OW-07D	D	920332.908	1121585.369	6	33	62	370.3	370.6	NA	0	0
WB18-TW-01S	S	916232.064	1125499.933	2	30	34	372.9	374.1	NA	-1	-2
WB18-TW-04D	D	920313.689	1121680.807	6	31	62	369.9	370.5	NA	-1	-1

Table 12

Model Water Balance

Model Flow Summary (gpm)		
	Inflows	**Outflows**
Recharge	3249	
Constant Head – Ninemile		
Onondaga Lake		
Direct Discharge to Lake	8	321
Northwest Wetlands		94
Outlet Channel		27
Wetlands Harbor Brook Mouth		7
Wetlands Ninemile Creek Mouth		4
Seeps at Wastebed 1-8		7
Ditches at Wastebed 1-8		52
East Flume		7
Tributary 5A		87
Ninemile Creek		
Mainstem	108	1835
Unnamed Tributaries		118
Geddes Brook		
Mainstem		296
West Flume		30
Unnamed Tributary		3
Harbor Brook		
Mainstem		587
Railroad Ditches		10
Barge Canal		24
I-690 Underdrain		13
Interbed Area and Associated Wetlands		20
Constant Head Inflow Ninemile Valley	192	
Constant Head Inflow Onondaga Trough	8	
TOTALS	**3565**	**3542**

ATTACHMENT A

Johnson, Timothy

From: Donald Hesler [djhesler@gw.dec.state.ny.us]
Sent: Tuesday, December 21, 2010 4:33 PM
To: Johnson, Timothy
Cc: David Scheuing; Michael.Spera@aecom.com; Robert Montione; Jesse Schwalbaum; Kelly Robinson; Ed_Modica@epamail.epa.gov; Nunes.Robert@epamail.epa.gov; Robert Edwards; Tim Larson; Tracy Smith; John.McAuliffe@honeywell.com; McDonald, Michelle; Doug Crawford; Guy Swenson; Babcock, David; Glaza, Edward; O'Loughlin, James; Miller, Megan; Broschart, Michael; Blauvelt, Shane; Charles Andrews
Subject: RE: Draft Version 3 - Honeywell Groundwater Model

Tim,

NYSDEC has reviewed Charles Andrews' October 6, 2010 memo in response to NYSDEC's June 15, 2010 comments on Version 3.01 of the Honeywell Groundwater Flow Model. Although NYSDEC does not agree with some statements in this memo and some comments were not specifically addressed, we will forego further discussions on the topics until there is a specific application of the model. As stated in my June 15, 2010 email and comments, each of the issues identified in those comments should be addressed as part of the documentation for any future application of the model. Honeywell should soon discuss with NYSDEC how the model is being and/or will be used for site-specific applications and the anticipated schedules. Also, if Honeywell intends to finalize the documentation for Version 3.01 of the model, our June 15, 2010 comments should be included in Attachment A with the other comments and responses. If Honeywell has made changes or intends to make any changes to the model or documentation before submission, those changes will need to be discussed with NYSDEC before submission.

Don

>>> "Johnson, Timothy" <Timothy.Johnson@parsons.com> 10/6/2010 10:55 AM >>>
Don,
Attached is a brief write up finalizing the information related to the revised version of the groundwater model. It is great that we have reached a point where we have a conditional agreement on the model and can use it for site specific evaluations in the future. Feel free to give me a call with any questions.

Thanks,
Tim
Tim Johnson
Senior Project Manager
Parsons
301 Plainfield Road
Syracuse, NY 13212
Direct Line: 315-552-9701
Cell: 315-569-8531
Fax: 315-451-9570
timothy.johnson@parsons.com
www.parsons.com
SAFETY - MAKE IT PERSONAL

S.S. PAPADOPULOS & ASSOCIATES, INC.
Environmental & Water-Resource Consultants

Memorandum

Date: October 6, 2010

From: Charles Andrews

To: Groundwater Technical Workgroup

Subject: **NYSDEC Comments on Honeywell Groundwater Flow Model, Version 3 dated February 2010**

The NYSDEC, via email from Donald Hesler to John McAuliffe on June 15, 2010, conditionally accepted Version 3.01 of the Honeywell Groundwater Model[1] conditioned on Honeywell's agreement to address issues related to representation of the drains near the lakeshore and recharge rates in future applications of the model. The issues to be addressed with the drains and recharge rates are uncertainties in the specification of the drain parameters and uncertainties in the recharge rates.

In the model report, dated February 2010, we noted that an uncertainty analysis is an important component of any model application and should be included when the model is used to make a prediction. An example of such an uncertainty analysis, which included an evaluation of uncertainties in the recharge rate, was included in Attachment A to the model report. We are committed to including such an uncertainty analysis, which also includes an evaluation of uncertainties associated with drain parameters if appropriate, with all model applications that are submitted to NYSDEC in the future. These uncertainty analyses will include an evaluation of the predictive uncertainty associated with model calculated results and will describe the sensitivity of model parameters that are major drivers of this uncertainty.

Two issues that are discussed in detail in attachments to the e-mail from Donald Hesler dated June 15, 2010 are discussed below.

ASTM D5718

The NYSDEC comments indicate that the model report does not completely follow the guidelines set forth in Section 5 of the ASTM D5718 Standard Guide for Documenting a Ground-Water Flow Model Application. The model report is fully consistent with the guidance provided in ASTM D5718 and includes all items described in email from Tim Johnson to Don Hesler dated March 30, 2007. The guidance in ASTM D5718 does not describe a rigid outline that must be followed in documenting a groundwater model. Rather as stated in Section 1.6 of ASTM D5781:

[1] As described in "Honeywell Groundwater Flow Model, Version 3" dated February 2010 prepared by S.S. Papadopulos & Associates, Inc. and O'Brien & Gere.

> *"This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care of which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects."*

All of the applicable major topics described in Section 5, Model Documentation, in ASTM D5718 are discussed in the model report. As a result, it is not apparent to us how the model documentation report could be modified to better follow the guidance in ASTM D5718.

RECHARGE RATES

The NYSDEC comments contain a detailed discussion of the recharge rate within the model area, and the comments state *"...the recharge parameter which, in spite of statements to the contrary, is not well quantified"*. The model report does not state that the recharge parameter is known with little uncertainty. In fact, in the uncertainty analysis contained in Attachment A to the model report, it is stated:

"This evaluation indicated that the sensitive model parameters for the prediction, as expected, were the recharge rate on the wastebed and the hydraulic conductivity of model layers 1, 2 and 3 …"

This statement is followed by a discussion of potential recharge rates on Wastebeds 1-8 and describes an evaluation of groundwater discharge to the lake that was conducted with recharge rates varying between 3- and 15-inches per year.

In calibration of any model, it is not possible to independently estimate parameters that exhibit a high degree of correlation. In the Honeywell model, the recharge rate on the wastebeds is highly correlated with the hydraulic conductivity of the shallow model layers. To maintain a tractable calibration problem, the recharge rates on the wastebeds were specified at the same values as used in model Version 1.0. Specifying the recharge rates does not imply that the recharge rate is well known. As a result, we noted (Attachment A, page 6, of model report) that an uncertainty analysis is an important component of any model application should be included when the model is used to make a prediction.

Johnson, Timothy

From: Donald Hesler [djhesler@gw.dec.state.ny.us]
Sent: Tuesday, June 15, 2010 8:57 AM
To: John.McAuliffe@honeywell.com
Cc: David Scheuing; Michael.Spera@aecom.com; Robert Montione; Jesse Schwalbaum; Kelly Robinson; Ed_Modica@epamail.epa.gov; Nunes.Robert@epamail.epa.gov; Robert Edwards; Thomas Biel; Tim Larson; Tara Blum; Tracy Smith; McDonald, Michelle; Doug Crawford; Guy Swenson; Babcock, David; Glaza, Edward; Miller, Megan; Broschart, Michael; Johnson, Timothy; Charles Andrews

Subject: RE: Draft Version 3 - Honeywell Groundwater Model
Attachments: GW Model Report V3.1 NYSDEC Comments 06 11 2010.pdf

John,

NYSDEC has completed its review of the revised model (Version 3.01) and Honeywell's responses to our comments on Version 3 of the Groundwater Model. Our comments on the revised model Version 3.01, Honeywell's 2/18/10 responses to NYSDEC's 1/11/10 comments on Version 3, and the redline/strikeout file of the revised report are provided in the attached file.

As discussed in the attached file, the primary issues that remain to be resolved with Version 3 of the groundwater model are those associated with the drains near the lake shore and the recharge parameter.

NYSDEC hereby conditionally accepts the groundwater model conditioned on Honeywell's agreement to address these outstanding issues as part of any future applications of the model. Those specific applications will also need to include site-specific sensitivity and uncertainty analyses.

Please contact me if you have any questions. Thanks.

Don

Comments on Responses to NYSDEC Comments on "Honeywell Groundwater Flow Model, Version 3" and Revised Model Version 3.01, Prepared by S.S. Papadopulos & Associates for Honeywell, February 16, 2010

NYSDEC has reviewed S.S. Papadopulos and Associates' (SSPA) February 16, 2010 responses to NYDEC's January 11, 2010 comments on the Honeywell Groundwater Flow Model Version 3. In general, SSPA has addressed most of the issues raised by NYSDEC and has incorporated many of those comments into a newly-revised version of the groundwater model designated Version 3.01. However, SSPA has still not addressed some of the key issues related to the ability of the model to reliably predict fluxes and flows near the lake shore. In a complex groundwater model such as this, in which parameters can only be estimated within a fairly wide range of values, it is critical to evaluate parameter sensitivity and model uncertainty and to quantify how these affect the predictive ability of the model.

SSPA has taken some steps with respect to developing a sensitivity analysis but this analysis is incomplete because it does not take into account one of the most critical and difficult to define parameters in the model – recharge. According to the authors of these responses, recharge near the lakeshore is assumed to be known *a priori*, that is, this value is assumed to be known and therefore does not have to be treated like the other model parameters. This is a major point of disagreement and one that needs to be resolved.

This issue notwithstanding, the Honeywell Groundwater Model Version 3.01 has come a long way over the last six years and continues to be improved as an assessment tool. It will always be a work in progress and will undoubtedly be revised for virtually any application. Therefore, it would not be fruitful to continue further iterations of comments and responses on this "theoretical" version of the model. Rather, future assessments of the utility and uncertainty of the model should be conducted for each specific application. Any future prediction of fluxes and flows, particularly near the lake shore, will need to be made in the light of more site-specific parameter sensitivity and uncertainty analyses. This is particularly true with respect to the recharge parameter which, in spite of statements to the contrary, is not well quantified. The impact of this parameter on predicted fluxes has been acknowledged by the authors.

Below are specific comments on the major responses. It should be noted that although we have accepted most of SSPA's responses, the responses clearly indicate that significant changes were made to the model with little or no discussion in the original text. In the future, Honeywell and SSPA should endeavor to properly document all model changes. In addition, the model report does not completely follow the guidelines set forth in Section 5 (Model Documentation) of the ASTM D5718 standard for documenting a groundwater flow model application. Documents for future applications of the model should be fully consistent with this standard.

Model Structure, Boundary Conditions and Parameters

The rationale for changes to the model layering and thicknesses that were made between the issuance of Memorandum #3 and the Version 3 model report has been explained.

The elimination of the upland till layer in the model seems reasonable and probably does not significantly impact the model results. The response includes the statement that "groundwater flow from the till/bedrock uplands to the valley aquifers is appropriately accounted for in the model." However, the comment was not about accounting for groundwater flow but about accounting for surface runoff from the till/bedrock uplands which would result in higher recharge along the stratified drift/till boundary. This is typically done for valley aquifers surrounded by till/bedrock uplands and may improve the overall water balance of the model.

The comment about accounting for groundwater inflow from the Onondaga Trough has been addressed.

The drains and rivers within the model have been improved in the revised version of the model by dramatically reducing the conductance parameter (C), as suggested in the NYSDEC comment letter. However, the C values still seem too high to accurately represent the observed conditions. The response letter provides a formula for calculating C which includes a scalar factor – "k(1)". However, there is no discussion of what this scalar represents physically nor are the k(1) values used to determine C for the drains and rivers discussed. In addition, the hydraulic conductivity value used in the formula is assumed to be the horizontal hydraulic conductivity of the aquifer. However, since flow to rivers, streams and open drains is generally through the bottom of the surface water body, it is the vertical hydraulic conductivity that should be used in this equation. This could significantly change the amount of water flowing out of the model through the drains and rivers. This is an issue that will need to be addressed in any future application of the model.

The issue of the uncertainty in the recharge parameter has already been raised. The responder notes that a high correlation between hydraulic conductivity and recharge is relatively common. Although true, that statement does not address the comment that "Honeywell should present a discussion of this correlation with respect to the model's ability to predict lake fluxes." This issue will need to be thoroughly evaluated for any application of the model near the lake shore.

As stated in the response letter – "In the near shore areas of the lake adjacent to Wastebeds 1-8 and Wastebed B, the magnitude of groundwater discharge to the lake is a strong function of the recharge rates on the wastebeds." This is our point precisely. However, rather than address the uncertainty in this parameter, SSPA simply states that the values were based on "a priori information." However, the recharge parameter, particularly in the wastebeds, is not better quantified than the hydraulic conductivity parameter. There is no justifiable reason to treat recharge differently from any other parameter in the model with respect to sensitivity and uncertainty. There is uncertainty in this parameter and that uncertainty has a significant impact on the results. The response also contains this questionable circular logic – "If recharge rates on the wastebeds were higher than 6-inches per year, groundwater discharge rates to the lake adjacent to the wastebeds would be higher than calculated in the calibrated model." This seems to imply that the lake fluxes, rather than being an outcome of the model, are being used as a calibration target.

The response to the comment about the proliferation of drains near the lake shore in the model is incomplete. The response only talks about one specific area of drains – those used to represent the seeps at the slope of Wastebeds 1-8. However, there are many more drains near the lake shore and the relationship between the model drains and the physical seeps, drains, brooks and wetlands that they are aimed at simulating is not discussed in the report or in the response to comments. In addition, it is stated in the text that the total flux to the seeps at Wastebeds 1-8 is 4 gpm, but Table 12 indicates that the flux is 7 gpm. A cogent rationale needs to be provided for these drains as well as a discussion of the magnitude of the projected fluxes, how this might impact projected groundwater flows to the lake, how the C values were determined and whether these fluxes were verified with any field data.

Model Calibration

The response memo has addressed most of these comments. However, it should be acknowledged that having a calibration target with a zero weight is the same as not having a calibration target at all at that location. The justifications provided in the response are justifications for not using these data points for calibration, not for assigning them zero weights.

The issue of whether recharge is an *a priori* known or a potential calibration parameter is still a major issue of concern. See Attachments 1 and 2 below.

We also disagree on whether questionable surface water flow data should be used in the calibration. There are many instances where questionable groundwater level data were not used, so why utilize questionable flow data?

Sensitivity and Uncertainty Analysis

The response letter includes a presentation and discussion of a sensitivity analysis, which was missing from the original report. Although the analysis is instructive, it is also, at this point in time, of limited usefulness with respect to any model prediction or specific application. The sensitivity analysis utilizes calibration targets model-wide and, as a result, parameters that cover a larger area tend to be the parameters with the greatest sensitivity model-wide. Ideally a sensitivity analysis should address the sensitivity of a parameter with respect to a given prediction. It will ultimately be more useful to conduct a more focused sensitivity analysis for each application of the model.

For example, when evaluating potential groundwater fluxes to the lake, the sensitivity analysis can be focused on the calibration targets and parameters that actually impact those fluxes. The same holds true for the uncertainty analysis, as noted in the response. In both cases, however, it will be necessary to include the recharge parameter as a potentially sensitive and uncertain parameter. See Attachment 1 below.

Conclusions

In summary, the primary issues that remain to be resolved with Version 3 of the groundwater model are those associated with the drains near the lake shore and the recharge parameter. However, rather than continuing the review of Version 3, NYSDEC will conditionally accept the groundwater model and requests that Honeywell address these outstanding issues as part of any future applications of the model. Those specific applications should also include site-specific sensitivity and uncertainty analyses. Also, as previously noted, documents for future applications of the model should be fully consistent with the ASTM standard.

Attachment 1 – Version 3.01 Sensitivity Analysis for Recharge Rates and Drain Conductance Values

The NYSDEC team conducted a sensitivity analysis on Version 3.01 of the Honeywell Groundwater Model to evaluate the relative impacts of the recharge rates on the wastebeds and the drains that surround them.

In the responses, SSPA inexplicably downplayed the potential impact of recharge rates on the potential groundwater fluxes to Onondaga Lake. They cited the original Onondaga Lake Feasibility Study conducted in 2004 as providing definitive data on the recharge rates to the wastebeds and surrounding area. However, the FS provides no actual data or detailed analysis on the recharge parameter. Rather, it was simply assumed that the recharge rate was 6 inches per year. However, higher recharge rates have been estimated in other reports. The original groundwater model of the area developed by O'Brien & Gere (December, 2002) for Honeywell had recharge rates along the lake shore as high as 20 inches per year (near the Semet Ponds/Willis Avenue Site). An earlier study completed by BBL in 1989 for Honeywell calculated infiltration rates for the wastebeds that ranged from 11 to 15 inches per year. Therefore, there seems to be no justification for a fixed assumed recharge rate of 6 inches per year but a significant amount of evidence for higher potential recharge rates.

Another issue of concern was the impact of the numerous drains that are simulated near the lake shore. In Version 3.0 of the model, these were given extremely high conductance values, which allowed a lot of water to flow out of them rather than into the lake. The conductance values were lowered in the recently issued Version 3.01 of the model. However, the conductance values are still higher than can be justified on the basis of the geometry of the drains and the prevailing hydraulic conductivity values.

Two groundwater simulations were conducted by the NYSDEC team in order to evaluate the potential impact of these parameter values on the groundwater fluxes to the lake. Version 3.01 of the groundwater flow model was used as a starting point. In the first simulation (Run 1), the only change was to increase the recharge rates at the wastebeds and surrounding area from 6 inches per year to 12 inches per year. The second simulation (Run 2) included this higher recharge rate but also reduced the conductance values of the drains to values determined by the geometry of the drains and the prevailing hydraulic conductivity of the underlying soils. The length of the drains was assumed to correspond to the length of the model node (from 200 to 40 feet). The width of the drains was assumed to be in the range of 5 to 10 feet. The hydraulic conductivity values used were the horizontal hydraulic conductivity values used in the model for the underlying soils. In many cases, it may be more appropriate to use the vertical hydraulic conductivity value. This would result in a more dramatic reduction in the flows of the drains.

The results of the model runs are summarized below. The original predictions of fluxes to the lake bottom just offshore from Wastebeds 1-8 and the flows to the drains were compared to changes in Runs 1 and 2.

Model Simulation	**Change to Model**	**Change to Lake Flux at WB 1-8**	**Change in Flow to Drains**
Ver. 3.01	No change	0	0
Run 1	Higher Recharge	+ 79%	+ 50%
Run 2	Higher recharge and lower drain C	+ 83%	+18%

Clearly, the recharge rate used in the model has a significant impact on predicted groundwater fluxes to the lake. The drains also impact fluxes to the lake but to a lesser degree. Based on this simplified sensitivity analysis, there is a potential for nearly double the rate of upwelling into the lake depending on recharge and drain assumptions. These are two significant unknowns within the groundwater model that will need to be taken into account in any future application of the model (e.g., when designing and assessing site remediation strategies).

As noted by SSPA, recharge rates and hydraulic conductivity (K) values are correlated in the model. This means that the model can be calibrated to the same observed heads by making proportional changes to recharge and Ks. This can be easily done in the lakeshore area because of the uncertainties associated with both K values and recharge rates. The current hydraulic conductivity values assumed in the model are on the low range of expected values, especially the upper layers representing fill. The current K values are generally less than 1 ft/day. However, the results of pumping tests and specific capacity tests conducted in these units by O’Brien & Gere (March, 2003) suggest a range of K values from 6 to 110 ft/day. The lower K values in the current version of the model are necessary because of the assumed low recharge rates. If higher recharge rates were assumed, the model could be calibrated to observed water levels by using K values more in line with those estimated by O’Brien & Gere.

Attachment 2 – Documentation of Recharge Rates

The response on page 3 from SSPA states "The recharge rates used in model Version 3.0 (and Version 3.01) for the wastebeds are identical to the recharge rates used in model Version 1.0. In model Version 1.0 these recharge rates were based on *a priori* information that is described in Attachment D of the Lake Feasibility Study." It is stated in the FS (page DA.9-1) that "The groundwater recharge rate was specified as 6 inches (15 cm) per year, except along Onondaga Creek adjacent to SMU 6 and SMU 7. In this area, the recharge rate was specified as 2 inches (5 cm) per year due to the amount of paved areas and the Carousel Mall property, which contains a groundwater dewatering system. Winkley (1989) estimated that 6 inches (15 cm) per year is the average groundwater recharge rate for Onondaga County."

It is unclear how this makes the recharge rate of 6 inches per year *a priori*. Second, a review of Winkley (1989) reveals that there is no analysis of recharge rates that include a discussion on assumptions or parameters which were considered for the determination of that rate. There is one sentence on page 75 stating "In Onondaga County this figure [infiltration] is nearly six inches [per year]" [bracketed text added for clarity]. Third, this value is apparently stated for the entire county, not for Wastebeds 1-8. Finally, the major focus of this thesis was well yield and water quality. Accurate values for recharge were not within the primary interests of the document.

There needs to be a justification, and not a simple dismissal as *a priori*, as to why this apparent arbitrary value assigned by Winkley in his Master's thesis was used rather than the value of 8.5 inches per year suggested by Kantrowitz (1970, page 57) in his joint report for the USGS and NYS Water Resources Commission or the nearly 13 inches per year suggested by BBL on page 4-44 of their 1989 report prepared for Honeywell (Allied-Signal). Both of these values were determined by calculations considering aspects affecting recharge such as evapotranspiration, ground cover, rainfall, soil type, runoff, etc. On a finer note, Winkley was referring to infiltration, not recharge.

Similarly, the Wastebeds 1-8 Focused FS states (Appendix I, page 2): "Groundwater recharge values for the region that includes the model area range from a low of 4.3 inches/year for urban areas (Yager, *et al*. 2007) to a high of 16.5 inches/year for rural areas (Yager, *et al*. 2007). A value of 6 inches/year was specified in the Honeywell Ground Water Flow Model Version 2.0 based on a representative estimate from *The Hydrogeology of Onondaga County, New York* (Winkley 1989)." Note that Version 2 of the model was never reviewed or approved by NYSDEC and all references to that model should be deleted. In this series of statements, it is interesting to note that the 6 inches per year used in the model is very similar to that suggested by Yager *et al*. for urban areas. There is some blacktop on the wastebeds, but only for the access road, not in the parking lots, which are very loosely covered with a coarse gravel, which would not impede infiltration. It is also interesting to note that the upper end of the range proposed by Yager *et al*. is higher than the two values from Kantrowitz and BBL.

It is therefore strongly suggested that use of the 6 inches per year as an infiltration rate be justified through a calculation similar to those employed by Kantrowitz or BBL. It is unacceptable to assign values with a highly variable range (Yager *et al*.) as *a priori*.

S.S. PAPADOPULOS & ASSOCIATES, INC.
Environmental & Water-Resource Consultants

Memorandum

Date: February 16, 2010

From: Charles Andrews

To: Onondaga Lake Groundwater Modeling Subgroup

Subject: **Response to NYSDEC Comments on "Honeywell Groundwater Flow Model, Version 3"**

The NYSDEC prepared preliminary comments dated January 11, 2010 on the preliminary draft "Honeywell Groundwater Flow Model, Version 3" dated November 2009 (Model Report). This memorandum provides responses to the NYSDEC comments. Some changes have been made to the groundwater model based on the responses to comments. Revised electronic model files that incorporate these changes, which were relatively minor, accompany this memorandum and this model is referred to as Version 3.01. In addition, the model report has been revised to incorporate responses to the comments as described below. This revised report (Revised Model Report) is provided in electronic format. This memorandum and the NYSDEC comment letter have been included as Attachment A in the revised report.

Specific Comments

1) Model Structure, Boundary Conditions and Parameters

Model Layering

The comment letter states: "*…the layer thicknesses described in the report are different from the layer thicknesses described in Memo 3 (Layer Thickness, October 6, 2008) and there does not appear to be any acknowledgement or explanation of these changes.*"

The layer thicknesses described in the Model Report are similar to those described in Memo 3 dated October 6, 2008 with a few exceptions. The main difference between the layer thicknesses in the Model Report and in Memo 3 relate to the manner in which the thicknesses for layers 1 and 2 were specified. In the Model Report, the thicknesses of layers 1 and 2 are the same; Layer 1 is specified to include the upper half of the total thickness of the Fill, Solvay and Onondaga Lake deposits and Layer 2 is specified to include the lower half. In Memo 3 it was stated that Layer 1 would only be defined within the lake and would be five feet thick. This proposed layering scheme created a numerical dichotomy along the shoreline that did not correspond with a physical change in aquifer sediments and as a result was modified in preparing the model. The only other changes in model layering between the Model Report and Memo 3 are the result of corrected observed layer thicknesses at a few boring locations (several typographic errors were noted in thicknesses reported in Memo 3), and a change in the contouring method used to generate the model layer thicknesses. For the Model Report, the layer thicknesses were generated using a custom kriging program in which thicknesses were calculated at the center of each grid cell. A linear variogram was used in the kriging and the search radius included all data points. The model layer thicknesses depicted on the figures in Memo 3 were generated by kriging the observed data on a square grid. The kriging procedure was changed for efficiency reasons and the model grid has non-uniform grid spacing.

Till Layer in Upland Portion of the Model

The comment letter notes that in upland areas a till layer was not included. In model Version 3.0 in the upland areas only a bedrock layer (layer 9) was included for simplicity. The thickness of the till unit in the upland areas is poorly known, the till unit is generally thin, and in much of the upland area the water table is within the bedrock. As a result, since understanding groundwater flow in the till in the upland areas is not important to the objectives of the groundwater modeling, the till unit was not explicitly simulated in the model. Implicitly, the flow in the till is incorporated within the bedrock unit. Groundwater flow from the till/bedrock uplands to t he valley aquifers is appropriately accounted for in the model.

Groundwater Inflow from the Onondaga Trough

The comment letter correctly notes that groundwater inflow into the model domain from the Onondaga Trough upgradient of the model area was not simulated. The model has been revised and this inflow has been simulated. Constant head cells were specified in model layers 5 and 6 to simulate this inflow. The total flow calculated into the model domain from these boundary conditions is less than 10 gpm.

Drain and River Conductance Values

The comment letter notes that some large conductance values were used in the model. These large values were the result of an incorrect scalar in the PEST control file. In reviewing the drain and river conductances it was noted that there was some inconsistency in the assignment of conductance values. As a result, the drain and river conductances were modified such that the conductance at every cell is equal to:

$$C = K_i * L * W * k \tag{1}$$

where: C = conductance (ft^2/day), K_i= hydraulic conductivity of model cell (ft/day), L= length of surface water features within the cell (ft), W=width of surface water feature in cell (ft), and k= scalar. The width and length of the surface water features were calculated based on orthophoto images. In the upland areas, groundwater discharge to surface water features was assumed to be primarily from horizontal flow towards the feature; as a result, the horizontal hydraulic conductivity was used in calculating the conductance.

Correlation Between Recharge and Hydraulic Conductivity

The comment letter states *"Recharge rates and hydraulic conductivity parameters appear to be highly correlated in the model."*

The recharge rates in the groundwater model are highly correlated with hydraulic conductivity as is the case in most groundwater models. In the near shore areas of the lake adjacent to Wastebeds 1-8 and Wastebed B, the magnitude of groundwater discharge to the lake is a strong function of the recharge rates on the wastebeds. The recharge rates used in model Version 3.0 (and Version 3.01) for the wastebeds are identical to the recharge rates used in model Version 1.0. In model Version 1.0 these recharge rates were based on *a priori* information that is described in Attachment D of the Lake Feasibility Study. If recharge rates on the wastebeds were higher than 6-inches per year, groundwater discharge rates to the lake adjacent to the wastebeds would be higher than calculated in the calibrated model.

Drains Along the Lakeshore

The comment letter notes that there are more drains along the lake shore than in previous model versions.

Drain boundary conditions were specified in the model in areas where groundwater seepage has been observed. For example, drain boundary conditions are specified in model Layer 1 around the perimeter of Wastebeds 1-8 where seeps have been observed. The total calculated groundwater discharge to the seeps is small; the calculated discharge to the seeps at the base of Wastebeds 1-8 along the lakeshore is only 4 gpm. The model calculated discharge to the drain boundary conditions are listed on Table 12 in the Model Report.

2) Model Calibration

4) Calibration Process

Model Residuals

The comment letter notes "*that there seems to be a relatively high concentration of high-value residuals (5 to12 feet) along the shore of the lake from Wastebeds 1-8.*"

The areal distribution of residuals in the model layers are shown on Figures 27 to 32 of the Model Report. Overall the match between observed and model calculated water levels is quite good and there are very few wells along the lakeshore where the difference between observed and calculated water levels is greater than five feet.

It is important to note, as indicated in the Readme.txt file that accompanied the Model Report, that the model residuals shown in the Groundwater Vistas interface are inaccurate. In Groundwater Vistas each well with observed water levels is assumed is be screened within a single model layer and screened over the entire thickness of the model layer; whereas in reality, monitoring wells are often screened over multiple layers and are almost never screened over the entire thickness of the model layer. The model residuals that are shown on Figure 27 to 32 and are reported on Table 11 of the Model Report were calculated based on the mid-screen elevations of the screen and a hydraulic conductivity weighted linear interpolation between the closest model grid cells.

Number of Water-Level Calibration Targets

The comment letter states "*Memo 2 lists 491 calibration targets, the model report cites 409 calibration targets and the model files have 390 calibration targets with non-zero weights. Please explain.*"

The revised Memo 2 dated March 17, 2009 listed 403 calibration targets which is the same number of calibration targets described on page 14 and listed on Table 11 of the Model Report. Thirteen of the calibration targets were assigned a zero weight for purposes of model calibration for several reasons. The rationales used for assigning zero weights are as follows:

- A zero weight was specified for well HB-MW-27, which is located along Ley Creek in SYW-12, because this well is located on the boundary of the modeled area;

- Zero weights were specified for wells WB18-OW4S, WB18-TW-02S and OW-03S which were constructed for conducting a pumping test because these wells are located in very close proximity to WB18-MW-02S;
- Zero weights were specified for wells WB18—TW-03G, WB18-OW-06G and WB18—OW-05G because these wells, which were constructed for purposes of a pumping test, are located in close proximity to WB18-MW-04G;
- A zero weight was specified for well SB15-PZ-07N because it is located adjacent to SB15-PZ07I and is screened in the same model layer but with its screen midpoint located near the base of the model layer;
- Zero weights were specified for wells SB915-PZ-05 and SB915-PZ-04 because the water levels observed at these wells (440.5 and 438.3 feet NGVD88, respectively) are inconsistent with the mid-screen elevations of these wells (389 and 381 feet NGWV88, respectively).
- A zero weight was specified for well SB915-WB-01L because the adjacent well SB915-WB01, which has a non-zero weight, has a similar observed water level;
- Zero weights were assigned to SB915-WB-15B and SB915-MW-35S because these shallow monitoring wells are screened in Solvay waste located on the edge of wastebeds where they onlap the bedrock.

Calibration of Drain and River Conductances

A comment letter states *"Were recharge and drain and river conductivities included as calibration parameters? If so, what sorts of ranges were set for these parameters and how were they determined"*

Recharge rates, except for recharge on the bedrock, was specified based on existing knowledge and not varied during model calibration. The recharge rate of 6-inches per year used on the wastebeds is the same recharge rate used in model Version 1.0. The recharge rate in the upper part of the Ninemile Creek Valley was specified as 16 inches per year based on recharge rate used for rural areas by Yager and others (2007).

The drain and river conductances were calculated as described above. These conductances were not varied in the model calibration process because of limited data on water level changes in close proximity to surface-water features. Rather, it was assumed that streambed conductance was not a limiting factor in determining groundwater discharge rates.

Aquifer Test at TW-1

The reference to calibration of the groundwater model to the aquifer test at TW-1 was incorrect and has been removed. The data from this aquifer test were used to define the likely range of hydraulic conductivities for the sand and gravel unit.

Aquifer Test and Slug Test Estimates of Hydraulic Conductivity

The comment letter states *"On page 14, the report states 'The aquifer test and slug test estimates of hydraulic conductivity were incorporated in the calibration process as a constraint on the estimated hydraulic conductvities.' This seems like it would be doubly weighting these data"*

The aquifer test and slug test estimates were used to define the reasonable range of aquifer parameters. These ranges were subsequently used in the calibration process to constraint the parameter values; values were not allowed outside of these ranges.

Surface Water Flow Measurements

The comment letter states *"On page 18, the report states 'Unfortunately, the reliability of observed flows in the model domain as an accurate representation of average conditions is poor.' This requires some discussion. If the data were known to be poor beforehand, why was it used."*

All available flow data were considered in the model calibration. It is a fact, though, that data for some surface-water features was sparse. For example, for the West Flume, as described in Memorandum 2 dated March 17, 2009, only one measurement was available for purposes of estimating the average flow rate. The observed flow of the West Flume on the date of the measurement was about 180 gpm. Recent discussions with O'Brien & Gere staff who have observed the West Flume on numerous occasions suggest that the actual base flow of this surface water feature is significantly less than 180 gpm (N. Kranes, O'Brien & Gere, personal communication).

3) Missing Sensitivity and Uncertainty Analyses

The comment letter states:

"The model was calibrated to one potential distribution of assumed parameters and provides one set of heads and fluxes. However, there are numerous potential sets of parameters that the model could be equally well calibrated to but would result in major changes in predicted fluxes."

The model does provide one set of heads and fluxes based on a set of specified parameters. These model parameters were determined through the model calibration process and produce a model that minimizes the sum of the squared residuals between observed and model calculated water levels and flows. A large number of model calibration runs were conducted to derive this set of model parameters and no other sets of realistic model parameters that were evaluated produced as good a fit to the observed data. This does not imply, though, that there is not another set of realistic model parameters that would produce an equally good fit to the observed data, but this does indicate that finding such a parameter set is a non-trivial exercise.

The results of a model sensitivity analysis were not included with the Model Report. Two additional figures have been prepared and added to Revised Model Report to visually display the results of sensitivity evaluations that have been conducted. In addition, a column has been added to Table 6 to indicate the relative sensitivity of each model parameter. The new materials on sensitivity that have been added are consistent with ASTM D 5611-94 ("Standard Guide for Conducting a Sensitivity Analysis for a Ground-Water Flow Model). The new figures and the revised Table 6 are attached to this memorandum.

The two new figures added to the Revised Model Report are Figures 38 and 39. Figure 38 displays sensitivity plots for selected hydraulic conductivity parameters and Figure 39 displays sensitivity plots for selected ratios of the horizontal to vertical hydraulic conductivity. The sensitivity plots shown on these figures are plots of parameter values on the x-axis versus the calibration objective function on the y-axis. The plots of parameter values versus values of the objective function for sensitive model parameters typically has a "U" shape; whereas, plots for insensitive model parameters typically are a nearly horizontal line. Sensitivity plots are shown for a total of 32 model parameters.

The comments also indicated that draft model documentation did not include an uncertainty analysis, though the comments did state: *"A sensitivity and uncertainty analysis may be* *difficult to effectively accomplish at this phase of the model because there is currently no specific application for which the model is being applied in the document reviewed".* We agree that it is difficult to accomplish an analysis of model uncertainty when the model is not being used to make a prediction. An uncertainty analysis is an important component of any model application and in our opinion should be included when the model is used to make a prediction.

An example of an uncertainty analysis, that could be included as a component of a model application, is included as an attachment to this memorandum. For the purposes of this example a hypothetical model application was developed. This hypothetical application consisted of estimating the groundwater flow rate to a 4,000-foot long trench along the shoreline adjacent to the southern portion of Wastebeds 1-8.

The comment letter states that *"The calibration process is far from clear".*

This comment was made in reference to the process by which parameter values were adjusted from initial estimates to the final calibrated values in the model calibration process. The Model Report, in fact, provided little detail on this process stating merely *"The fourth step in the calibration process is calibration using the computer program PEST to assist the analyst in the evaluation of model parameters and in modifications to the model structure. The result of this step is the calibrated groundwater model. (page 14)"* This fourth step of the model calibration process is described in detail in the following paragraphs.

In this step model parameters were adjusted from a set of initial values selected based on values used in previous model versions and the estimated range of reasonable parameter values to a final set of parameter values. The initial values of the model parameters and the final parameter values, as well as the parameter values used in model Version 1.0, are listed on Table 6 Revised which is attached. A copy of the PEST control file used to arrive at the final set of calibration values is included with the electronic model files.

The computer program PEST is a versatile utility program that assists the analyst in the calibration of a groundwater model through the following features: 1) provides a convenient interface that allows the user to easily modify parameter values in the groundwater model by merely changing values in a tabular listing; 2) efficiently and easily calculates sensitivities of model parameters, which provides the analyst with an understanding of more sensitive model parameters; 3) provides the ability to iteratively run the groundwater model in an automatic mode in which the parameters are adjusted by the program to minimize an objective function (which is based on minimizing the difference between observed and calculated values); and 4) provides a convenient interface for organizing and weighing observations that are used to calculate an objective function for the calibration process.

The computer program PEST automates the process of model calibration but for complex models such as the Honeywell Model Version 3.0 the program does not make the calibration process either simple or automatic. It is often wrongly assumed that model calibration with PEST consists merely of setting up the PEST input files and running the program which then produces a calibrated groundwater model. This is most often not the case because in the process of model calibration new insights are gained regarding the structure of the groundwater system that require modifications to be made to the initial model structure. In addition many model parameters have only a minor effect on calculated water levels and flows at observation locations and as a result PEST is unable to provide meaningful estimates of these parameters. As noted in the model report, the program PEST was used to assist in the evaluation of model parameters and in modifications to model structure.

The fourth step of the model calibration process consisted of an extremely large number of iterations in which, 1) the computer program PEST was used to calculate model sensitivities and to provide information on parameter adjustments that would minimize the objective function, 2) the magnitude and spatial distribution of model residuals and the reasonableness of the parameter adjustments calculated by PEST were evaluated, 3) the model structure was evaluated and alterations in the model structure were identified to implement in subsequent iterations, and 4) appropriate initial parameter values for the next iteration were selected.

During this iterative procedure the following major modifications were made to the initial model structure that resulted in an improved model and are incorporated in model Version 3.01 (many other modifications were evaluated and were found not to result in significant improvements in the model):

- The structure of model layers 1 and 2 was modified such that each layer has equal thickness. Layer 1 includes the upper half of the total thickness of the Fill, Solvay, and Onondaga Lake Deposits and Layer 2 includes the lower half. Initially, Layer 1 was defined as 5 feet thick and only under Onondaga Lake. This specification was determined to be unsatisfactory because it produces a dichotomy in water levels at the lake boundary.
- The structure of the contact between the upland and valley areas was modified to simulate layers 1 through 8 onlapping on layer 9 at the contact between the upland and valley areas. This onlap was simulated by specifying a larger vertical hydraulic

conductivity in the cell adjacent to the contact in layers 1 through 8 (this effect could also have been simulated with the MODFLOW hydraulic barrier package).

- Additional streams, not represented in previous versions of the model, were added in the portion of the model where only Layer 9 is active. All perennial streams as represented on the U.S. Geological Survey 1:24000 topographic maps were explicitly represented with the MODFLOW drain package in the model. The drain package, rather than the stream package, was used for simplicity as streams in the bedrock areas are generally gaining streams.
- Two bedrock recharge zones were defined based on topographic slope; one for areas with gentle slopes and one for areas with steep slopes.
- Areas within the model domain where groundwater seeps have been observed were simulated with the MODFLOW drain package. An example of the seeps that were simulated are the seeps at the base of Wastebeds 1-8.
- The hydraulic properties of model layers 1 through 5 were adjusted when the calculated thickness was less than three feet. This value was chosen to avoid the simulation of very thin layers that potentially did not exist as continuous horizons in the subsurface. In cases where the specified model thickness was less than three feet, as calculated using the kriging procedure described above, the hydraulic properties of the layer were specified as being equal to the hydraulic properties of the underlying layer.

This model calibration process identified a number of structural issues with the groundwater model that could not be appropriately resolved with available information. These issues are discussed below.

a) Sand and Gravel Unit in the Vicinity of the LCP Bridge Street Facility

The water levels measured in the sand and gravel unit in the vicinity of the LCP Bridge Street Facility are not significantly higher than water levels in this unit along the lakeshore. The model structure is such that groundwater flows from the bedrock upgradient of this area into the sand and gravel unit. The amount of flow in the bedrock is not insignificant and the computer program PEST indicates that increasing the hydraulic conductivity to values greater than 150 feet per day in the sand and gravel unit provides a better fit to the observed data. The lithology of the sand and gravel unit in this area is such that it is improbable that the hydraulic conductivity is greater than 150 feet per day. Our evaluations suggest that the groundwater flow from the bedrock is greatly overestimated, likely because the effective hydraulic conductivity of the bedrock is much lower than represented in the groundwater model. Since we have insufficient information to specify variations in hydraulic conductivity in the bedrock, a uniform hydraulic conductivity distribution was specified for the bedrock in the calibrated groundwater model. As a result, the hydraulic conductivity of the sand and gravel unit in this area is specified at 150 feet per day, which in our opinion likely overestimates the actual hydraulic conductivity. Even with this relatively high hydraulic conductivity the model calculated water levels in some wells in this area are as much as seven feet greater than observed water levels.

b) Vertical Hydraulic Conductivity of Silt and Clay Unit Beneath the Lake

The vertical hydraulic conductivity of the silt and clay unit beneath the lake is an important parameter for purposes of determining the total groundwater flux to Onondaga Lake. The groundwater model can be calibrated such that a reasonable match is achieved between observed and calculated water levels at monitoring wells with a wide range of values for this parameter. Thus obtaining a good correspondence between observed and calculated water levels does not provide a good estimate for this parameter.

The potential groundwater flow through the silt and clay unit is described in detail in the report "Groundwater Upwelling Velocities in Remediation Areas, Onondaga Lake Bottom Subsites" dated December 2009. The vertical hydraulic conductivity of the silt and clay unit has been estimated to be about 10^{-7} cm/second based on studies by the USGS (Yager and others 2007) and evaluations of the persistence of the brines in the unit (SSP&A 2009), and this is the value specified in model Version 3.0. The calculated total upward groundwater flow rates in the profundal zone of Onondaga Lake in Model Version 3.0 are on the order of about 1 cm/year; somewhat higher than upwelling velocities estimated from other methods as described in the December 2009 report. The calculated upward flux is sensitive to the vertical hydraulic conductivity of the silt and clay unit; since the model-calculated fluxes are similar to the fluxes estimated by other methods, this provides some confidence that the specified value of the vertical hydraulic conductivity of layer 4 is appropriate.

c) Groundwater Recharge in the Bedrock

The recharge rate specified for most of the model area where Layer 9 (bedrock) is the upper active layer is 6-inches per year. This recharge is a dominant factor in determining the total groundwater discharge that occurs to the major streams in the model domain: Ninemile Creek, Geddes Brook, and Harbor Brook. In model Version 3.0, the calculated groundwater discharge to these streams is about one half of the estimated base flows of these streams. We were unsuccessful in attempting to calibrate the groundwater with both uniform hydraulic properties in the bedrock and higher recharge rates. As noted above, we suspect that there are significant areal variations in the hydraulic conductivity of the bedrock, and that insufficient information to specify these variations results in an underestimation of total recharge and in groundwater discharge to the streams in the model domain.

d) Sand Units beneath the Marl

Three zones in model Version 3.0 represent areas where there is a sand unit between the marl and silt and clay units; parameter zones 3-2A, 3-2B, and 3-2C. In the model, these sand units were represented in model Layer 3 with the overlying marl unit. The horizontal hydraulic conductivity of layer 3 is undoubtedly higher in areas where it represents marl and sand than where it represents only marl. As a result, the horizontal conductivities in these parameter zones were specified to be consistent with the sand unit. In the model calibration process, though, there was insufficient information to estimate the values of horizontal hydraulic conductivity in these parameters based on minimizing the objective function.

Additional Specific Comments

1. *"Page 4, Paragraph 3, Last Sentence. Section 5.0 does not contain any discussion of upward flow through the silt and clay, nor is there any discussion of this subject elsewhere in the text. This omission needs to be corrected as the confining unit plays a significant role in local and regional hydraulics."*

   Upward flow through the silt and clay unit is described in detail in the report "Groundwater Upwelling Velocities in Remediation Areas, Onondaga Lake Subsites", Section 5 dated December 7, 2009. A reference to this report was added to the Version 3.01 model report.

2. *"Page 5, Partial paragraph continued from page 4, Last Sentence. It is assumed that the decrease in pressure refers to the period of active brine removal (1797 to 1917) and not current conditions. This should be clarified in the sentence"*

   The sentence referenced states: "The production of these brines most likely decreased groundwater pressures in the more permeable zones beneath the lake". We believe that since the past tense of decrease ("decreased") was used in reference to "production of these brines" that it is clear that current conditions are not referenced.

3. *"Page 5, Paragraph 1, General. There appears to be some confusion as to the natural brines in the area. The USGS "remnant brine" is found beneath Onondaga Lake and was reportedly formed by glacial erosion and dissolution of the evaporate beds and surrounding rock units, resulting in elevated bromide content. There is another sodium-rich brine in the area, the Appalachian Basin brine, which can be found to the north of the lake outlet."*

   We do not believe that there is any confusion regarding brines in first full paragraph on page 5. This paragraph merely states that there are more than one type of natural brine and brines results from the wastebeds with a different chemical composition than the natural brines. For clarity the second sentence of the referenced paragraph "*These brines formed by the dissolution of evaporate beds with the Vernon Shale and overlying bedrockunits."*

4. *"Page 14, Paragraph 1, First Sentence. There needs to be more detail provided to further develop the statement that the "hydraulic properties of the Solvay Waste are a function of the time period in which the materials were deposited." Specifically, what is the basis for this statement (hydraulic testing, disposal records, etc.)".*

   In the referenced sentence the words "*are a function of*" will be modified to "*are potentially a function of the time period in which the materials were deposited.* so as not to imply that the characteristics of the wastebed materials are known to have varied as a function of time. Rather, this implies merely that the calibration process was flexible in that potential variations in properties among wastebeds were considered and does not imply that we understand why the properties may vary from wastebed to wastebed.

5. *"Page 17, Paragraph 2 (continued on page 18). This discussion is not clear. Table 6 states that pilot points were used for certain zones. Were there different methods employed for different zones?"*

   The PEST control file was structured to provide the ability to use pilot points to estimate aquifer parameters in some zones as listed on Table 6 of the Model Report. With pilot points it is possible to estimate a variable parameter distribution within a zone. As noted on page 17 of the Model Report, variations in parameter values within the zones did not produce a better calibration than a uniform value within the zone. Therefore, even though the PEST control file had the flexibility to use pilot points, pilot points were not used in the calibration process.

6. *Table 1. The elevation unit shown is MSL (mean sea level). This is not the same as the model elevation datum (NAVD88). Please clarify or revise.*

   In the Model Report the datum for elevation is NAVD88 (North American Vertical Datum of 1988. The table will be revised to indicate that the vertical elevation datum is NAVD88.

7. *Table 7. Units should be included in the table headings.*

The units of hydraulic conductivity of Table 7 are feet per day, and the table has been revised..

Revised Report

The revised "Honeywell Groundwater Flow Model Version 3" report, which is provided in electronic format, is a modified version of the November 2009 report that incorporates the responses described above. In addition, because the model parameters were modified as a result of the responses decribed above, the following figures and tables were revised to incorporate the results of the additional model calibration that was completed:

- Figures 20 to 24 which depict the hydraulic conductivity distributions in model layers 1 through 6;
- Figures 27 through 33 which display the model calibration targets and simulated hydraulic heads in model layers 1 through 8;
- Figure 26 which depicts calibration resdicutals and scatter plot and histograms for entire model area;
- Figures 34 and 35 which depict scatter plots of model residuals in model layers 2 through 9;

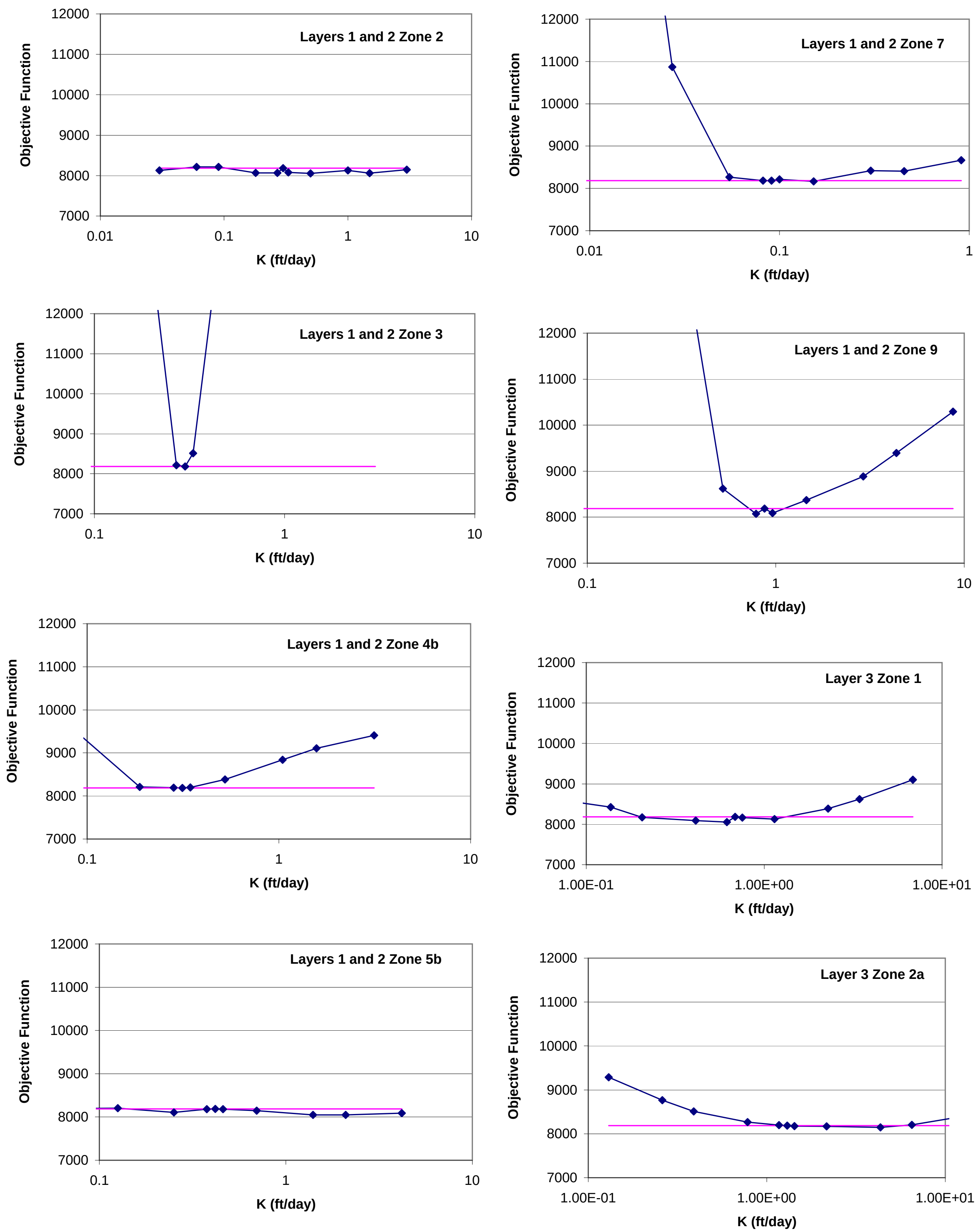
- Figures 36 and 37 which are histrograms of model residuals for model layers 2 through 9;
- Table 11 which is a listing of calculated water levels and residuals at all calibration targets;
- Table 10 which is a summary of calibration statistics; and
- Table 12 which is a summary of the model water balance.

Table 6

Parameters in Groundwater Model with Initial Values

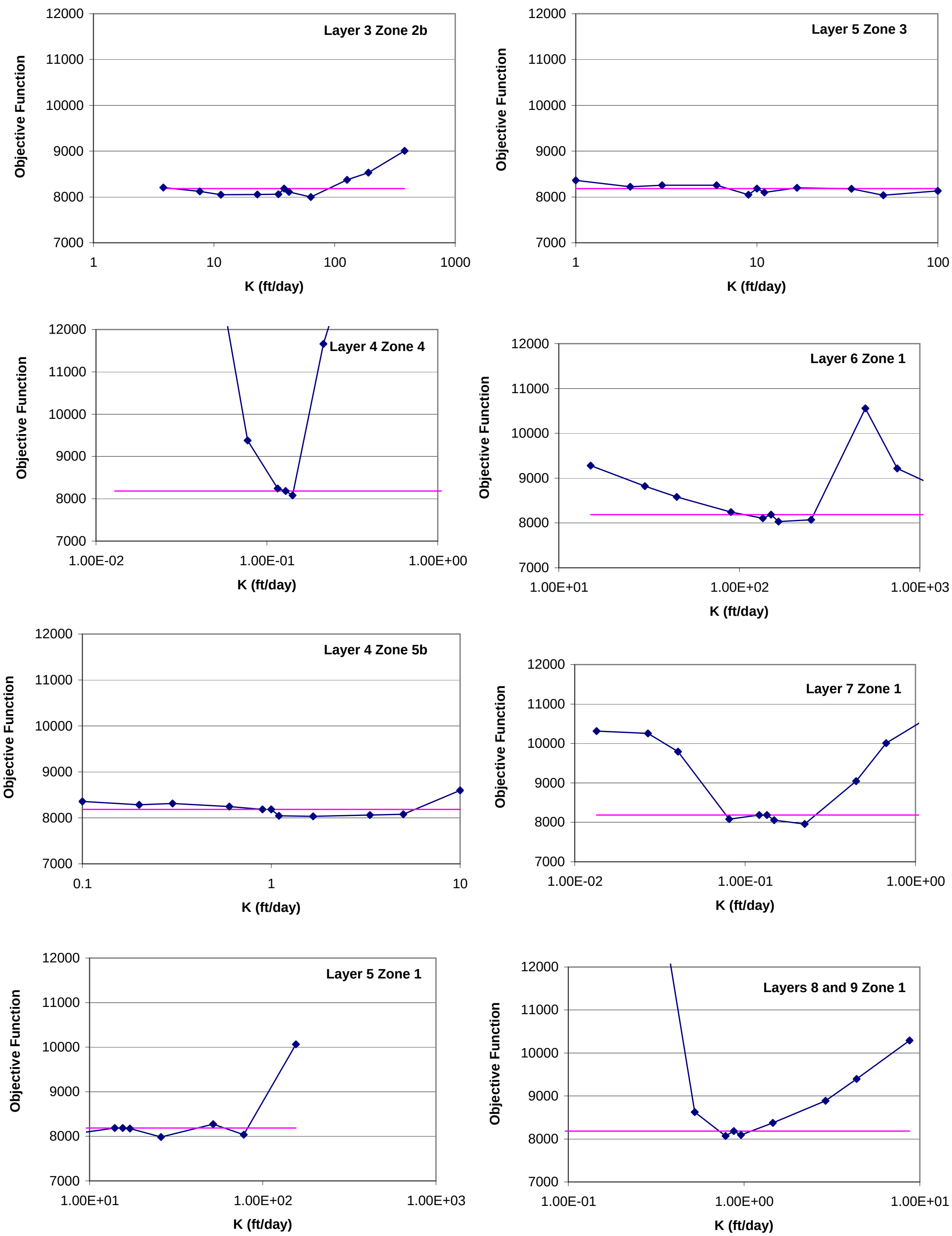
Layer	Parameter Zone	Description	Parameter Type	Version 3.01 Values			Version 3.0 Values		Version 3.0 Initial Values		Parameter Sensitivity[1]		Acceptable Range of Parameter	Version 1.0 Values	
				Kh (feet/day)	Kv (feet/day)	Kh/Kv	Kh (feet/day)	Kh/Kv	Kh (feet/day)	Kh/Kv	Kh	Kv	Kh (feet/day)	Kh (feet/day)	Kv (feet/day)
1 and 2	2-1	Lake deposits	Zone	5	0.33	15	5	15	10	50	3	3	0.1 - 20	20	0.2
	2-2	In-lake Solvay deposits	Zone	0.3	0.01	21	0.3	21	0.02	14	3	3	0.01 - 5	20	0.2
	2-3	Solvay deposits -- SB12-15	Zone	0.3	0.00	200	0.3	200	0.02	14	1	1	0.01 - 5	0.4	0.004
	2-4A	Solvay deposits -- SB11	Zone	0.5	0.00	1270	0.4	1500	0.02	14	1	1	0.01 - 5	0.4	0.004
	2-4B	Solvay deposits -- SB9-10	Zone	0.3	0.00	350	0.4	700	0.02	14	2	1	0.01 - 5	0.4	0.004
	2-5A	Solvay deposits -- SB1-6	Zone	0.3	0.00	250	0.3	250	0.3	109	1	1	0.01 - 5	0.4	0.004
	2-5B	Solvay deposits -- shoreline	Zone	0.3	0.06	5	0.3	5	0.3	109	3	3	0.01 - 5	0.4	0.004
	2-5C	Solvay deposits -- WB7-8	Zone	0.5	0.00	660	0.3	521	0.3	109	2	3	0.01 - 5	0.4	0.004
	2-6	Solvay deposits -- Settling Basin B	Zone	0.3	0.30	1	0.8	1	0.7	200	2	3	0.01 - 5	2	0.2
	2-7	Solvay deposits --Settling Basin A	Zone	0.1	0.00	310	0.3	231	0.9	240	2	3	0.01 - 5	0.6	0.006
	2-8	Fill -- south of lake and northern area	Pilot points	10	0.11	94	10	100	25	625	2	3	0.1 - 20	1 - 12	0.1 - 1.2
	2-9	Near surface sediments --Ninemile Creek Valley	Zone	3.8	0.27	14	10	20	25	625	1	3	1-50	1.4	0.14
	2-10	Near surface sediments -- LCP-Matthews Avenue Area	Zone	8.1	0.16	51	5	50	25	625	1	3	1-50	11	0.11
	2-11	Fill Main Plant area and Railroad Area	Zone	20	2.20	9.1	10	10	25	625	1	3	1-50	1.2	0.12
	2-12	Fill Willis-Semet Shoreline	Zone	3	0.30	10	5	10	25	625	3	3	1-50	13	0.13
	2-13	Fill -- Railroad Area	Zone	0.7	0.00	600	0.7	500	25	625	3	2	1-50	0.6	0.13
3	3-1	Marl	Pilot points	0.7	0.07	9.7	1.3	13	0.8	35	1	2	0.01 - 10	0.01	0.001
	3-2A	Marl with underlying sand unit -- WB1-8	Zone	1.3	0.10	13	1.3	13	5	400	1	3	1 - 50	5	0.01
	3-2B	Marl with underlying sand unit -- Willis-Semet	Zone	41	0.20	210	30	150	5	400	2	3	1 - 50	5	0.01
	3-2C	Marl with underlying sand unit -- Wastebed B	Zone	11	0.19	57	30	150	5	400	1	3	1 - 50	5	0.01
	3-3	Marl in area without peat	Zone	5	0.01	400	5	400	0.8	35	3	3	0.01 - 10	0.01	0.001
4	4-1	Silt and clay under lake	Pilot points	0.01	0.0003	36	0.01	36	0.06	40	3	2	0.01 - 1	0.06	0.0006
	4-2	Mixed Ninemile Creek deposits	Pilot points	1	0.01	100	1.7	100	2.5	12	1	3	1 - 100	5	0.5
	4-3	Silt and clay -- Ninemile Creek region	Pilot points	10	0.91	11	10	10	2.5	12	3	3	0.1 - 10	5	0.5
	4-4	Silt and clay -- Settling Basin 12-15	Zone	0.12	0.0003	346	0.14	500	2.5	12	1	1	0.1 - 10	not in modeled area	
	4-5A	Silt and clay -- Fairgrounds	Zone	3	0.06	50	3	50	2.5	12	3	3	0.1 - 10	27	0.27
	4-5B	Silt and clay -- Fairgrounds	Zone	1	0.05	19	1	50	2.5	12	3	3	0.1 - 10	27	0.27
	4-6	Silt and clay -- LCP - Matthews Avenue area	Pilot points	10	0.0004	25000	10	10000	2.5	12	1	2	0.1 - 10	5	0,5
5	5-1	Fine sand and silt	Pilot points	7.4	1.72	4.3	10	10	28	110	2	3	1 - 50	28	0.2
	5-2	Mixed Ninemile Creek deposits	Pilot points	1.7	0.09	20	1.7	20	2.5	12	3	3	1 - 100	5	0.5
	5.3	Fine sand and silt -- Ninemile Creek region	Zone	10	0.91	11	10	10	2.5	12	3	3	1 - 100	not in modeled area	
	5.4	Fine sand and silt -- Settling Basin 12-15	Zone	10	0.10	100	10	100	2.5	12	1	2	1 - 100	not in modeled area	
	5-5	Fine sand and silt -- Fairgrounds	Zone	10	0.56	18	10	20	2.5	12	3	3	1 - 100	1.6	
	5-6	Fine sand and silt --LCP - Matthews Avenue	Zone	1.8	0.0037	490	1	500	2.5	12	1	2	1 - 100	1.6	
6	6-1	Sand and gravel unit -- lake area	Pilot points	150	15	10	150	10	50	10	2	3	10 - 1000	10 - 100	10
	6-2	Sand and gravel - Upper Ninemile Creek	Pilot points	150	15	10	150	10	50	10	2	3	10 - 1000	not in modeled area	
	6-3	Sand and gravel -- LCP - Mathews Avenue Area	Pilot points	150	15	10	150	10	50	10	2	3	10 - 1000	10	1
7	7-1	Till	Zone	0.15	0.09	1.6	0.09	1	0.04	16	2	2	0.01 -10	0.05	0.006
8	8-1	Shallow bedrock	Zone	0.88	0.09	10	1	10	1.7	8	1	3	0.1-10	1	0.1
9	9-1	Bedrock	Zone	0.88	0.09	10	1	10	1.7	8	1	3	0.1-10	1	0.1

Note: 1 -- Parameter sensitivity is classed "1" for high sensitivity, "2" for medium sensitivity, and "3" for low sensitivity.



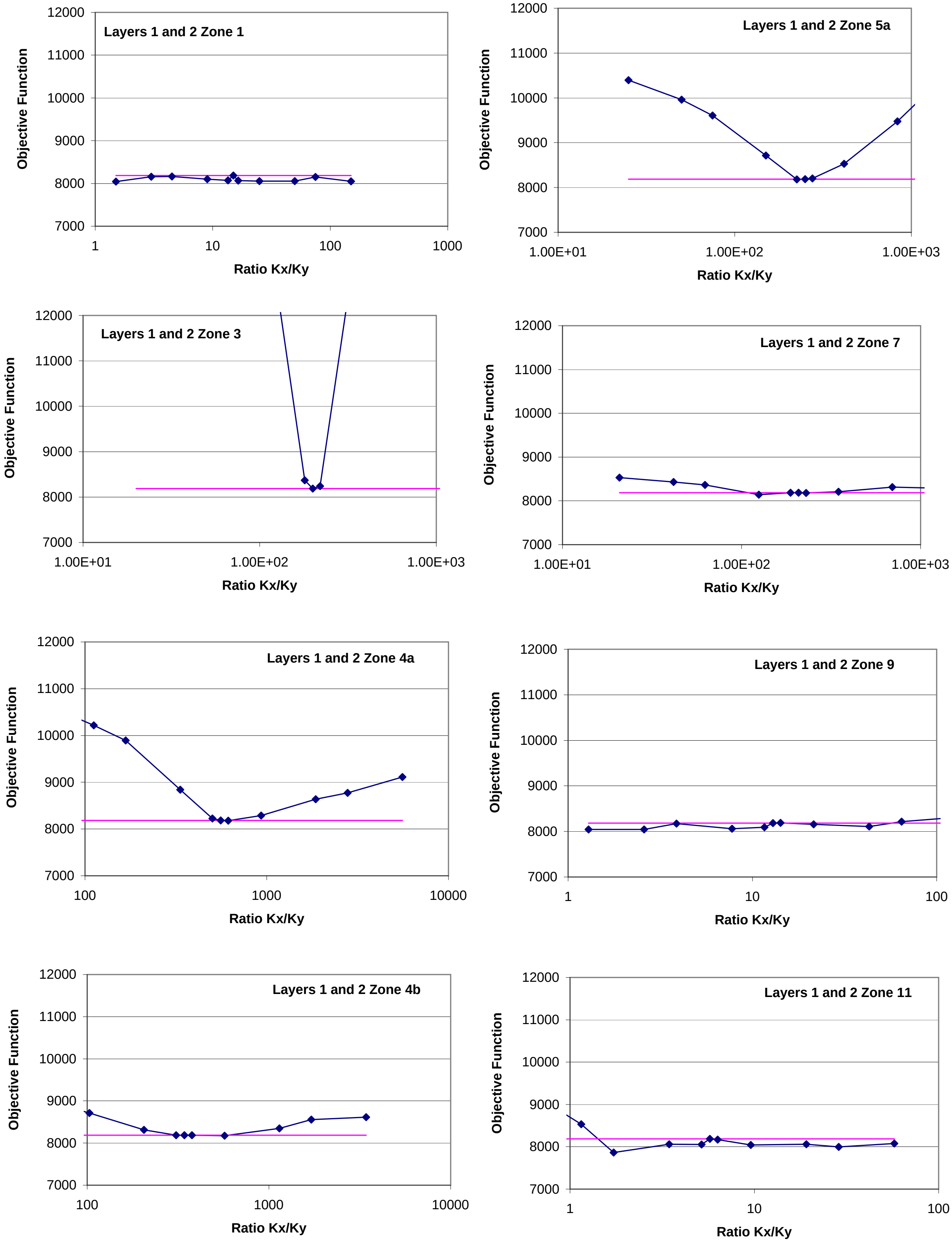
Note: The solid horizonal line represents the minimum objective function obtained with all parameters. The blue triangles represent the objective function calculated for various values of the selected parameter.

Figure 38a Sensitivity Plots for Selected Hydraulic Conductivity Parameters



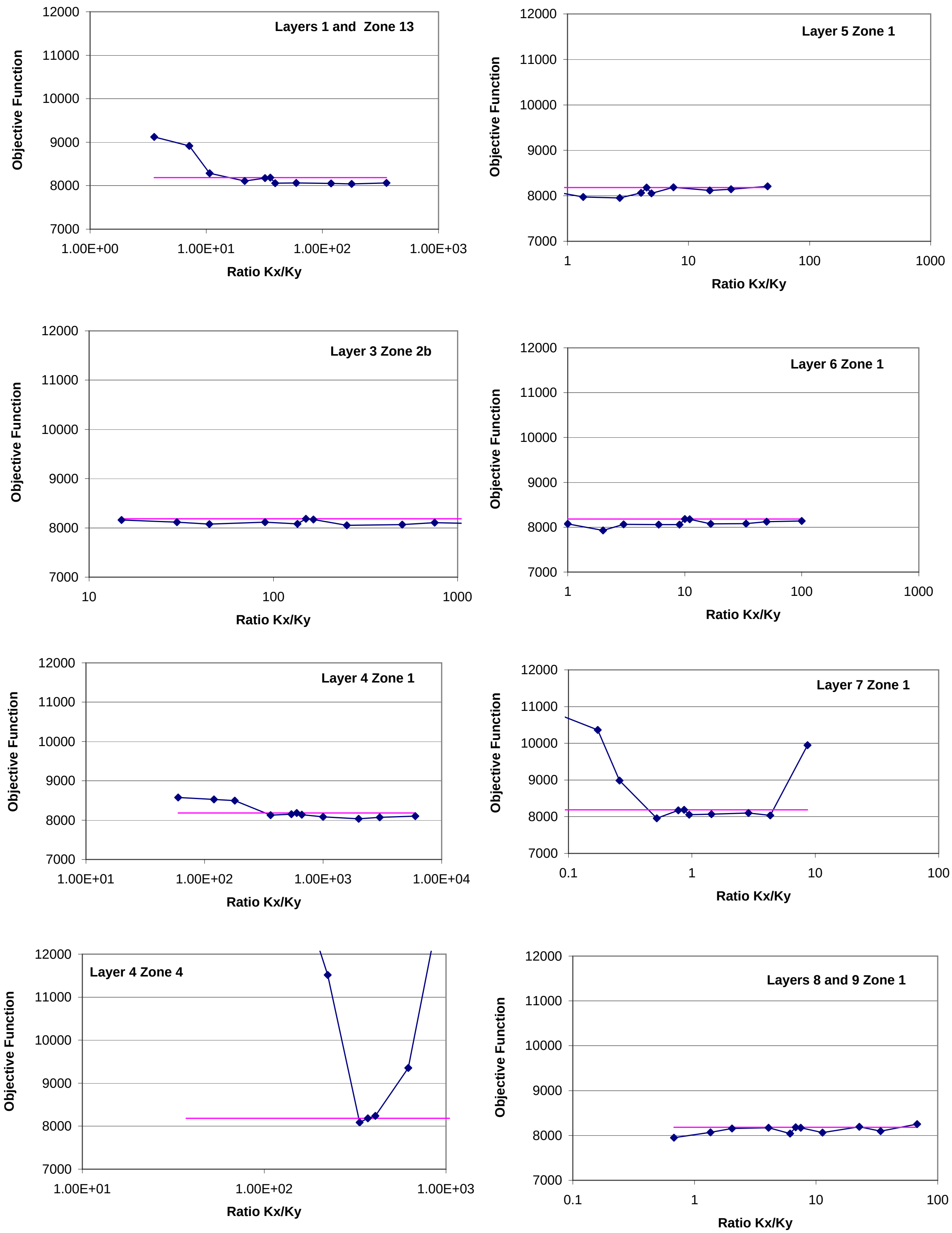
Note: The solid horizonal line represents the minimum objective function obtained with all parameters. The blue triangles represent the objective function calculated for various values of the selected parameter.

Figure 38b Sensitivity Plots for Selected Hydraulic Conductivity Parameters



Note: The solid horizonal line represents the minimum objective function obtained with all parameters. The blue triangles represent the objective function calculated for various values of the selected parameter.

Figure 39a Sensitivity Plots for Selected Ratios of Kx/Ky



Note: The solid horizonal line represents the minimum objective function obtained with all parameters. The blue triangles represent the objective function calculated for various values of the selected parameter.

Figure 39b Sensitivity Plots for Selected Ratios of Kx/Ky

Attachment
Uncertainty Evaluation

Problem

A hypothetical problem was simulated to illustrate the uncertainty associated with predictions made with Version 3.01 of the Honeywell Groundwater Model. The hypothetical problem consisted of a 4,000 foot long interceptor system located along the shoreline of Wastebeds 1-8. The interceptor system was simulated as drain cells in model layers 1 to 3 and the water level in these cells was maintained at 1-foot below lake level. The model prediction that was evaluated was the calculated flow to the interceptor system. The layout of the simulated interceptor system is shown on the figure to the right.

Model Result

The calculated flow to the interecptor system with the calibrated groundwater model is approximately 21 gpm. Approximately 1 gpm is derived from layer 1, 5 gpm from layer 2, and 15 gpm from layer 3.

Method for Uncertainty Evaluation

The uncertainty of the model prediction of flow to the interceptor trench was initially evaluated using the PEST utility PREDUNC1 (Doherty 2010). The PREDUNC1 utility calculates pre- and post-calibration uncertainty terms. The pre-calibration term is a function of the sensitivity of the prediction to each parameter and the variance – covariance of the parameters. As such, the pre-calibration term is an upper bound on the uncertainty as it does not take into account the role the calibration targets have in reducing this uncertainty through the calibration process. The post-calibration term is actually an estimate of how much the uncertainty is reduced owing to the calibration process. Subtraction of these two terms yields the uncertainty to the prediction. Using the PREDUNC1 utility the calculated uncertainty in the interceptor system flow was 21 gpm ± 2 gpm. This result clearly understates the actual uncertainty of the model calculation. In addition several of the methods described by Hill and Tiedeman (2007) that incorporate prior information into the estimate of uncertainty, primarily the Parameter-Prediction (PPR) statistic were evaluated. The PPR statistic provides a means of ranking parameters in terms of their importance to a prediction in addition to providing providing prediction uncertainty estimates. However, this method provides an even smaller estimate of the uncertainty owing to the reduction in the calculated error variance from inclusion of prior information and for this reason it was not considered further. In this exercise the prior information for each parameter was specified as the calibrated model values presented in Model Version 3.0.

To evaluate why the uncertainty of the calculated flow with PEST likely underestimates the actual uncertainty the sensitivity of model parameters to the calcualted flow was evaluated and the correlation among model parameters was evaluated. This evaluation indicated that the sensitive model parameters for the prediction, as expected, were the recharge rate on the wastebed and the hydraulic conductivity of model layers 1, 2 and 3 beneath and in the vicnity of the wastebeds. However, there are only head targets available in these waste beds with which to constrain estimates of the recharge and hydraulic conductivity limiting estimation of these parameters to their ratio. When these ratios are examined, it is determined that uncertainty in model calculated flow to the interceptor trench is almost entirely related to the uncertainty in the estimate of recharge rates.

A simple example can illustrate this point. Let's assume that the model parameter is the recharge rate (R) divided by the hydraulic conductivity of layer 1 (K_1). For Wastebeds 1 to 8 the specified recharge rate is 6-inches per year and the calibrated hydraulic conductivity of layer 1 is 0.3 ft/day; thus the model parameter R/K_1 is equal to 20 inches-day/year-feet. As a rough approximation, any combinations of parameter values for R and K_1 that give a ratio of 20 will produce an equally good calibrated model.

Values of the recharge rate are constrained by annual precipiation which is approximately 40-inches per year; as a result for practical purposes it is physically impossible that recharge rate is less than 0-inches per year and that recharge rate is greater than 40-inches per year. In fact, based on the characteristics of wastebed materials, runoff and evapotranspiration, it is very unlikely that recharge rates are less than 3-inches per year or greater than 15-nches per year.

For simplicity, let's assume that upper and lower bound estimates of recharge rate are 3-inches per year and 15-inches per year. If the parameter $R/K_1 = 20$, then the hydraulic conductivity corresponding to a recharge rate of 3-inches per year is 0.15 ft/day and the hydraulic conductivity corresponding to a recharge rate of 15-inches per year is 0.75 ft/day. Based on *a priori* information, such as slug tests and aquifer tests, hydraulic conductivity values in the range of 0.15 ft/day to 0.75 ft/day are reasonable. Therefore, the recharge rate and not the hydraulic conductivity is the dominant factor in determining the uncertainty associated with the model calcualted flow rate.

In the groundwater flow model the calculated flow rate to the interceptor system is sensitive to several model parameters, not just the single parameter discussed in the example above. As a result, the calculation of the uncertainty in flow rate is more complex than implied in the example, but even when all sensitive model parameters are considered, the fact remains the uncertainty in calculated flow rate is largely due to the uncertainty in the estimate of the recharge rate. Thus, if the lower and upper bound estimates of the recharge rate are 3-inches per year and 15-inches per year, lower and upper bound estimates on flow to the interceptor system are 12 gpm and 53 gpm.

Preliminary Comments on Preliminary Draft "Honeywell Groundwater Flow Model, Version 3" Prepared by S.S. Papadopulos & Associates and O'Brien & Gere for Honeywell, November 2009

General Comments

This is the latest effort in a process of developing a baseline groundwater flow model for the Onondaga Lake region that began in 2004. The goal of the modeling effort is to develop a framework for groundwater modeling that can be used as a basis for sub-regional groundwater models that will aid in designing and evaluating groundwater remedial activities at the various sites.

The present version of the model has a more coherent structure than previous versions. It is simpler in many ways. It is also based on a data set that has been refined, reviewed, and verified. There have been improvements in the structure of the model and the data sets that were used as the basis for the model parameters and the model parameters themselves reflect what is known about the subsurface hydrogeology of the site.

However, there still remain some questions about the usefulness of the model with respect to predicting fluxes and accurately simulating proposed remediation strategies. This is primarily because of the large number of aquifer parameters and the wide potential ranges of their values. The model was calibrated to one potential distribution of assumed parameters and provides one set of heads and fluxes. However, there are numerous potential sets of parameters that the model could be equally well calibrated to but would result in major changes in predicted fluxes. In order to have confidence in the model results, it is necessary to quantify the sensitivity and uncertainty of the predicted model results. The sensitivity refers to how much incremental changes in assumed parameter values affect the results of the model prediction. This type of analysis is a standard component of groundwater model documentation (ASTM D 5718, Standard Guide for Documenting a Ground-Water Flow Model Application). An uncertainty analysis examines the range of potential outcomes (primarily fluxes in this case) that could occur using a reasonable, but different, set of parameter values.

A sensitivity and uncertainty analysis may be difficult to effectively accomplish at this phase of the model because there is currently no specific application for which the model is being applied in the document reviewed. When the model is applied to specific circumstances, it will be necessary to develop sub-regional versions of the groundwater model. These sub-regional models will address fluxes and groundwater flows in specific areas and will need to be re-calibrated to water levels and fluxes within those areas. Nevertheless, a generalized sensitivity and uncertainty analysis needs to be conducted on Version 3 as well.

Below are more specific comments on the model report and a preliminary review of the model data files.

1. *Model Structure, Boundary Conditions, and Parameters*

In general, Version 3 reflects the proposed changes and data presented in the four memos prepared by Honeywell and previously reviewed by NYSDEC, but there are some exceptions which are noted below. The idea behind the modeling memos was to review and approve aspects of the proposed model before the calibration effort. This was partly done in order to provide a more efficient review process. Therefore, Honeywell should provide precise rationales for any and all deviations from what was proposed in those memos.

For example, the layer thicknesses described in the report are different from the layer thicknesses described in Memo 3 (Layer Thickness, October 6, 2008) and there does not appear to be any acknowledgement or explanation for these changes. Although the report generally explains the logic behind the layering of the model, an explanation of why it has changed since the prior proposed layering scheme should be provided.

Specifically, why was the till layer removed from the upland portion of the model? Only bedrock is simulated in the uplands.

Does the model account for the contribution of surface runoff and groundwater flow from the till/bedrock uplands to the valley aquifer?

The report states on page 11: "In the previous model version groundwater inflow into the model domain from the extension of the glacial trough to the southeast of Onondaga Lake was simulated with constant heads at the edge of the model domain. In this version flow into the model domain from the glacial trough was not simulated due to a lack of information to reliably specify the magnitude of the flux." Rather than have no flow at all, wouldn't it have been better to simulate a constant head and have it provide whatever flux would be associated with that head?

There is no discussion in the report about the conductivity values used in the rivers and drains, in spite of the fact that these parameters were apparently included in the calibration process. Honeywell should provide those conductivity values, the corresponding stream bottom vertical hydraulic conductivity values, and discuss their reasonableness. Based on our review of the model files, it appears that some extraordinarily high conductance values (greater than one million) are used in some of the drains and rivers. These need to either be justified or revised.

Recharge rates and hydraulic conductivity parameters appear to be highly correlated in the model. This means that similar head values can be obtained by either increasing or decreasing the value of both of these parameters simultaneously. The primary difference would be in the amount of water that enters the system. Honeywell should present a discussion of this correlation with respect to the model's ability to predict lake fluxes.

There are considerably more drains along the lake shore than there was in the previous version of the model. The result is that more water is discharging to the ground surface and not flowing as groundwater and discharging to the lake. Can this level of discharge be justified with data?

2. *Model Calibration*

The model report provides a different set of calibration targets than those presented in Memo 2. The primary reason appears to be a different methodology for calculating average water levels, and this methodology appears to be superior to the one previously presented.

There appears to be an issue in some areas of the model with large differences between observed and simulated water levels – referred to as residuals. Residuals greater than ±10 feet seem problematic for the accuracy of the model. Honeywell should provide a discussion of these problem areas and their potential effect on the model accuracy. In addition, the residuals in some areas of the model are more important than others. There seems to be a relatively high concentration of high-value residuals (5 to 12 feet) along the shore of the lake from Wastebeds 1 - 8 to Harbor Brook. Based on the model files, the simulated water levels in layer 1 seem to be significantly higher than observed and in layers 2 and 3 they are lower than observed. In other words, the distribution of residuals is non-random. It seems like this is something that could have been addressed in the calibration process, especially since these are critical areas of the model.

Memo 2 lists 491 calibration targets, the model report cites 409 calibration targets and the model files have 390 calibration targets with non-zero weights. Please explain.

On page 13, it is stated that the model was calibrated partially to an aquifer test at TW-1. The results of this test and a comparison of observed and modeled drawdowns are not presented. However, wouldn't the results of the pumping test be used as an input estimate of K in the vicinity of the test? How useful is it to "calibrate" the model to a small-scale pumping test? At any rate, a comparison and explanation should be provided.

Were recharge and drain and river conductivities included as calibration parameters? If so, what sorts of ranges were set for these parameters and how were they determined?

On page 14, the report states "The aquifer test and slug test estimates of hydraulic conductivity were incorporated in the calibration process as a constraint on the estimated hydraulic conductivities." This seems like it would be doubly weighting these data. They are used as initial estimates and then conditioned to those values even though there may be a considerable range in K values throughout a given zone. Also, isn't it fairly well documented that slug tests tend to provide low K values? Wouldn't it be more appropriate to simply use the range of parameters listed in Table 6?

On page 18, the report states "Unfortunately, the reliability of observed flows in the model domain as an accurate representation of average conditions is poor." This requires some discussion. If the data were known to be poor beforehand, why was it used? If the data were considered valid, then why are the simulated fluxes generally much lower than the observed fluxes?

3. *Missing Sensitivity and Uncertainty Analyses*

Sensitivity and uncertainty analyses should be completed and documented. Otherwise, it is not possible to make any judgment as to the usefulness of the model in predicting the effectiveness of proposed remediation techniques.

The calibration process is far from clear. The PEST (parameter estimation program used to calibrate the model) file that was provided was clearly assembled after the model was already calibrated. It would be useful to know the starting parameter values and how these changed through the calibration process. It also appears that the flux to the simulated lake was used as a calibration target, whether formally or informally, and this could be a bias in the calibration process with respect to the groundwater flux to the lake. It would be more useful, if not imperative, to know how great the flux to the lake could be under a reasonable calibration scenario (i.e., determining a reasonable worst-case scenario).

Additional Specific Comments

1. Page 4, Paragraph 3, Last Sentence. Section 5.0 does not contain any discussion of upward flow through the silt and clay, nor is there any discussion of this subject elsewhere in the text. This omission needs to be corrected as the confining unit plays a significant role in local and regional hydraulics.

2. Page 5, Partial paragraph continued from page 4, Last Sentence. It is assumed that the decrease in pressure refers to the period of active brine removal (1797 to 1917) and not current conditions. This should be clarified in the sentence.

3. Page 5, Paragraph 1, General. There appears to be some confusion as to the natural brines in the area. The USGS "remnant brine" is found beneath Onondaga Lake and was reportedly formed by glacial erosion and dissolution of the evaporate beds and surrounding rock units, resulting in elevated bromide content. There is another sodium-rich brine in the area, the Appalachian Basin brine, which can be found to the north of the lake outlet.

4. Page 14, Paragraph 1, First Sentence. There needs to be more detail provided to further develop the statement that the "hydraulic properties of the Solvay Waste are a function of the time period in which the materials were deposited." Specifically, what is the basis for this statement (hydraulic testing, disposal records, etc.)?

5. Page 17, Paragraph 2 (continued on page 18). This discussion is not clear. Table 6 states that pilot points were used for certain zones. Were there different methods employed for different zones?

6. Table 1. The elevation unit shown is MSL (mean sea level). This is not the same as the model elevation datum (NAVD88). Please clarify or revise.

7. Table 7. Units should be included in the table headings.