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CALVERT CLIFFS NUCLEAR POWER PLANT UNIT 3

EVALUATION OF POTENTIAL IMPACTS OF CONSTRUCTION PUMPING ON DECLINING POTENTIOMETRIC LEVELS IN THE AQUIA AQUIFER

Bechtel Power Corporation
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Abbreviations

ft	feet
ft/day	feet per day
ft^2/day	square feet per day
ft^3/day	cubic feet per day
in/yr	inches per year
gpd	gallons per day
gpm	gallons per minute
msl	mean sea level

Acronyms

CCNPP	Calvert Cliffs Nuclear Power Plant
MGS	Maryland Geological Survey
USGS	United States Geological Survey

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1. INTRODUCTION

1.1 Objective

The objective of this analysis is to provide an approximate estimate of the groundwater impact of increased pumping at the Calvert Cliffs Nuclear Power Plant (CCNPP) during construction of Unit 3.

For this purpose a simple groundwater flow model was used. The model includes a part of the Aquia aquifer within an approximately 10-mile radius around Calvert Cliffs and is based on information and data from the regional groundwater model developed by the Maryland Geological Survey (MGS) documented in References 1 and 2. The MGS model covers the entire Aquia aquifer as well as all other regional aquifers.

A two-dimensional, single layer numerical groundwater model was set up for the Aquia aquifer using the code MODFLOW 2000. MODFLOW solves the groundwater flow equation using a finite-difference method. It has been widely used in the industry since its development by the U.S. Geological Survey (USGS) in 1984.

To facilitate the development of the model the user interface Visual MODFLOW was used. Visual MODFLOW was developed by Waterloo Hydrogeologic Inc., which is now owned by Schlumberger Water Services.

1.2 Limitations

The analysis presented here is based on several simplifying assumptions, and its sole purpose is to assess the impact of incremental pumping at CCNPP. The results presented here are not predictions of actual potentiometric levels and should not be used for any other purpose.

Because of the many simplifying assumptions made in this analysis, the model should not be viewed as an accurate predictor tool of future groundwater conditions. However, it is considered adequate for predicting relative changes in the potentiometric surface due to the changes in the rate of pumping at CCNPP.

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2. THE GROUNDWATER MODEL

2.1 Input Data

The model was developed using the following data drawn primarily form References 1 and 2.

The **elevation of the top of the Aquia aquifer** is obtained from the contour map shown in Figure 1 (reproduced from Figure 7, page 21, of Reference 1).

According to the MGS Report of Investigations 64 ,transmissivity maps for the Aquia aquifer presented in Reference 3 show a general conformity to the Aquia thickness map (Reference 2). According to MGS Report of Investigations 76, the transmissivity of the Aquia aquifer is 875 to 1,060 ft^2/day near Scientists Cliffs and 935 ft^2/day at the Calvert Cliffs Power Plant and Chesapeake Ranch Estates (Reference 1). In the model the transmissivity of the aquifer is calculated from its thickness and its hydraulic conductivity.

The **thickness** of the Aquia aquifer is from the contour map shown in Figure 2 (reproduced from Figure 8, page 22, of Reference 1).

The **hydraulic conductivity** distribution in the Aquia aquifer is based on the calibrated MGS model as shown in Figure 3 (reproduced from Figure 64, page 112, of Reference 2). There are two hydraulic conductivity zones within the area covered by the present model, one north of the Patuxent River with a value of 5 ft/day, and the other south of Patuxent River with a value of 12 ft/day.

The **specific storage** of the Aquia aquifer is obtained from the MGS model. The specific storage value used in the calibrated MGS model is $2x10^{-6}$ ft^{-1} (Reference 2, page 29).

The **major groundwater users** within the model domain value are listed in Table 1, which also gives the groundwater abstraction rate by each user in 1982, 1994, and 2002. The data presented in Table 1 are from Reference 2, Appendix E, page 224. The location of the major users is shown in Figure 4 (reproduced from Figure 52, page 100, in Reference 2).

The **potentiometric surface** of the Aquia aquifer in 2002 is given Figure 5 (reproduced from Figure 13, page 61, in Reference 2). Figure 6 (reproduced from Figure 77, page 126, in Reference 2) shows the potentiometric surface of the Aquia aquifer in 2002 as simulated with the MGS model. Figure 7 (reproduced from Figure 89, page 138, in Reference 2) shows the predicted potentiometric surface of the Aquia aquifer in 2030 as simulated with the MGS model based on the assumption that pumping at all wells in the Aquia aquifer continues at the same rate as in 2002.

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Table 1. Major groundwater users within the area of the model domain

Map ID*	GAP number	User Name	Pumpage, gpd		
			1982	1994	2002
4	CA53G102	Scientists Cliffs Water Association, Inc...	17,000	13,000	11,000
8	CA60G002	Chesapeake Ranch Water Company	135,000	483,000	791,000
9	CA62G201	Beaches Water Company, Inc., Long Beach	0	7,000	39,000
11	CA69G010	Calvert Cliffs Nuclear Power Plant, Inc.	177,000	166,000	392,000
12	CA70G005	CA Co Board of Education, Calvert High Schl .& Career Ctr.	4,000	12,000	39,000
16	CA73G014	Dominion Cove Point LNG	4,000	1,000	6,000
17	CA74G005	CA Co Comm., Town of Prince Frederick	86,000	255,000	347,000
19	CA77G016	CA Co Comm., Jail & Alcohol Rehab Center	0	16,000	21,000
21	CA78G008	CA Co Comm., Mason Rd, Woodridge Subdivision	3,000	6,000	5,000
22	CA84G003	CA Co Comm., Solomons Island	0	187,000	319,000
24	CA86G007	CA Co Comm., St. Leonard municipal supply	0	0	32,000
28	CA93G048	Navy Recreation Center, Solomons	0	89,000	64,000
58	SM84G070	San Souci Estates	0	0	0
59	SM74G018	NAS Patuxent River	910,000	812,000	712,000
60	SM94G004	SMMC, Laurel Glen Subdivision	0	0	212,000
64	SM76G004	SMMC, St. Mary's Industrial Park	8,000	24,000	0
67	SM76G025	Int'l. Assoc. of Machinists, Placid Harbor Training Center	5,000	5,000	10,000
68	SM74G04	SMMC, Fenwick Manor Subdivision	17,000	21,000	27,000
Total			1,366,000	2,097,000	3,027,000

GAP = Groundwater Application Permit
* The Map ID refers to the numbers assigned to each major water user in Figure 4 and Figure 8

2.2 Assumptions

As already mentioned in Section 1.2, the model developed and used in the present analysis is based on the MGS regional groundwater model. The MGS model itself was not available for this analysis. The only available information and data for this model are those presented in the MGS Report of Investigations 64 (Reference 1). To fill in major information and data gaps it was necessary to make several assumptions. Additional assumptions were also necessary to keep the present analysis relatively simple. The major such assumptions are listed below.

2.2.1 Extent of the Model Domain

The area covered by the groundwater model was selected to minimize the impact of incremental pumping at CCNPP on the potentiometric levels of the aquifer at the boundaries of the model. Figure 8 shows the area covered by the model.

Assumption: The radius of influence of pumping at Calvert Cliffs is less than 5 miles; therefore, the impact changes in the pumping rate at Calvert Cliffs can be evaluated using a model that extends about 5 miles from CCNPP in each direction and uses constant head boundary condition along the three sides of the model.

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Rationale: The transmissivity of the Aquia aquifer in the area of the CCNPP is of the order of 1,000 ft^2/day. The maximum pumping at CCNPP during construction of Unit 3 will be equal to the permitted value of 450,000 gpd, plus an additional 200 gpm (=288,000 gpd), i.e. 738,000 gpd. Using these data in a simple solution for a confined aquifer overlaying by a leaky aquitard gives a quite small drawdown at 5 miles from the well. This suggests that the impact of the CCNPP at a distance of 5 miles from the site is minimal.

2.2.2 Boundary Conditions

Assumption: The potentiometric levels (heads) along the model boundary in 2002 and 2030 are those predicted by the MGS model (see Figure 6 and Figure 7)

Rationale: The MGS model has been calibrated by comparing the simulated potentiometric surface in 2002 (Figure 6) with that based on measurements (Figure 6). The agreement between computed and observed values is good. Therefore, it is reasonable to accept the predictions of the MGS model for 2030.

Assumption: The potentiometric levels (heads) along the model boundary between 2002 and 2030 vary linearly in time between those predicted by the MGS model for 2002 and 2030.

Rationale: This assumption is made by necessity because no predicted heads from the regional MGS model are available at times between 2002 and 2030. Assuming a linear variation in time is considered a reasonable approximation because the pumping rate in the simulations made in this report is kept constant at all wells, with the only exception of CCNPP, where it is higher during the years of the construction of the proposed Unit 3.

Assumption: The southern boundary of the model domain can be treated as a no flow.

Rationale: Inspection of the potentiometric 2002 surface based on data (see Figure 6) and the predicted 2030 potentiometric surface predicted by the MGS model (see Figure 7) suggests that a no flow condition can be assumed along the southern boundary of the present model.

Assumption: Two leakage rate zones are defined over the model domain (see Figure 9). In the first zone covering most of the model domain (R_1 in Figure 9) the net leakage rate into the Aquia aquifer is 0.2 inches per year. In the second zone, in the northeastern corner of the model domain (R_2 in Figure 9) is zero.

Rationale: Leakage rates estimates presented in Reference 2, Table 12, page 203, suggest that under pre-pumping conditions the net leakage into the Aquia aquifer was very small. The same estimates suggest that after development and use of the aquifer in 2002 the leakage rate into the Aquia aquifer from the overlying aquifer was 2,050,348 ft^3/day, and the leakage out of the Aquia into the underlying aquifer was 453,080 ft^3/day. Therefore, the net leakage into the Aquia aquifer is

$$2{,}050{,}348 - 453{,}080 = 1{,}597{,}268 \text{ ft}^3\text{/day, i.e. about } 1{,}600{,}000 \text{ ft}^3\text{/day.}$$

This net leakage is due to pumping. In the absence of other data it is assumed that this leakage is distributed over the part of the aquifer where there are active wells. The area of this part of the aquifer is estimated to be of the order of 1,200 square miles. Therefore, the average leakage rate over this area is estimated to be

$$1{,}600{,}000 / (1{,}200 \times 5280^2) = 4.78 \times 10^{-5} \text{ ft/day} \approx 0.2 \text{ in/yr.}$$

In the northeastern part of the model domain where there are no pumping wells it is reasonable to assume that there is no leakage into or from the Aquia aquifer.

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2.2.3 Transmissivity

In Visual Modflow the transmissivity is calculated from the aquifer thickness and the hydraulic conductivity. The aquifer thickness is calculated as the difference between the top and the bottom of the aquifer. Therefore, the input data required by Visual Modflow to estimate the transmissivity of a confined aquifer are the hydraulic conductivity distribution and the elevation of the top and bottom of the aquifer. The assumptions made for these three parameters are discussed below.

Assumption: The hydraulic conductivity distribution used in the model is shown Figure 10. The hydraulic conductivity value is 5 ft/day in the K_1 zone and 12 ft/day in the K_2 zone.

Rationale: These hydraulic conductivity zones and values are obtained from the calibrated MGS model (Figure 64, page 112 of Reference 2). See also Section 2.1.

Assumption: The surface describing the top of the aquifer is a plane as shown in Figure 11.

Rationale: This surface is an approximation of the contours for the top of the Aquia aquifer shown in Figure 1. An inspection of this figure suggests that the surface of the top of the aquifer in the area covered by the present model could be approximated by a plane. Even though these contours shown Figure 1 could have been digitized to represent them in the model exactly as they are shown in Figure 1, it was decided that this would not add much to the accuracy of the predictions with present model considering its approximate nature.

Assumption: The surface describing the bottom of the aquifer is a plane as shown in Figure 12

Rationale: This surface was obtained by subtracting the thickness of the aquifer (given in Figure 2) from the elevation of the top of the aquifer (given in Figure 1). The resulting surface was approximated by a plane. As in the case of the top of the aquifer the contours of the bottom of the aquifer could have been digitized to represent them in the model exactly. However, it was decided that this would not add much to the accuracy of the predictions with present model considering its approximate nature.

2.2.4 Specific Storage

Assumption: The specific storage of the Aquia aquifer is $2x10^{-6}$ ft^{-1}.

Rationale: This value is obtained from the calibrated MGS model is $2x10^{-6}$ ft^{-1} (Reference 2, page 29).

2.2.5 Groundwater Pumping

Assumption: Groundwater pumping from the Aquia aquifer is as given in Table 1. In the 1982 to 2002 simulation, it is assumed that the 1982 pumping rates apply until 1988, the 1994 rates apply from 1989 until 1998, and the 2002 rates from 1999 until 2002.

Rationale: These pumping rates are taken from Reference 2, Appendix E, page 224. Reference 2 does not give any more information on how pumping varied between years 1982, 1994, and 2002. In the absence of such information it is assumed that the pumping rates for each of the years listed apply to the mid-point in time from the next data point. This means that for the 12 years between 1982 and 1994 it is assumed that during the first half of this period, i.e. the first 6 years (1982-1988), the pumping is equal to that in 1982, and during the second 6 years (1989-1994), the pumping is equal to that in 1994. Similarly, for the 8 years between 1994 and 2002 it is assumed that during the first half of this period, i.e.

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the first 4 years (1994-1998), the pumping is equal to that in 1994, and during the second 4 years (1998-2002), the pumping is equal to that in 2002.

Assumption: The pumping rate at CCNPP during construction of Unit 3, i.e. for a period of 6 years, will be 738,000 gpd.

Rationale: This value was estimated as equal to the permitted value of 450,000 gpd, plus an additional 200 gpm (=288,000 gpd) needed for construction.

For the simulation of future conditions the 2002 pumping rates are kept constant. This is the same assumption as Scenario 1 in the 2002-2030 simulation presented in Reference 2. It is noted that the groundwater level variation monitored in the last eight years has not been significant. For example, Well Ed 42 of the USGS monitoring network shows little change between 2002 and 2008. **Figure 13** shows the monitored water levels at Ed 42 from 1979 to 2008, and **Figure 14** shows the location of this well (Reference 4).

2.2.6 Initial Conditions

Assumption: In predicting future groundwater conditions during construction of the proposed Unit 3 at CCNPP, it is assumed that the starting groundwater conditions would be those prevailing in 2002.

Rationale: There is evidence that there hasn't been much change in pumping rates over the last 8 years

2.3 Summary of Model Input

Table 2 summarizes all the input data used in the model.

Table 2. Summary of major model input parameters

Description	Value or Source of Data
Boundary conditions on east, west & north boundary	Constant head from Figure 6 & Figure 7
Boundary condition on south boundary	No flow
Net leakage into the Aquia aquifer	0 to 0.2 in/yr per Figure 9
Hydraulic conductivity	5 to 12 ft/day per Figure 10
Top of aquifer elevation	per Figure 11
Bottom of aquifer elevation	per Figure 12
Specific storage	2 x 10-6 ft-1
Pumping at all wells shown in Figure **8**	per Table 1

2.4 The Numerical Model

2.4.1 The Numerical Code

A two-dimensional, single layer numerical groundwater model was set up for the Aquia aquifer using the code MODFLOW 2000 (Reference 5). MODFLOW solves the groundwater flow equation using a finite-difference method. It has been widely used in the industry since its development and release by the USGS in 1984.

From its inception MODFLOW had a modular structure that allowed the incorporation of additional modules and packages to solve other equations that are often needed to handle specific groundwater problems (Reference 6). Over the years several such modules and

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packages have been added to the original code. MODFLOW 2000 is major revision of the code that expanded upon the modularization approach that was originally included in MODFLOW.

To facilitate the development of the present model the user interface Visual MODFLOW (Reference 7) was used. Visual MODFLOW was developed by Waterloo Hydrogeologic Inc., which is now owned by of Schlumberger Water Services.

Visual MODFLOW includes several solvers for the numerical solution of the groundwater flow equations. The WHS solver was used for all the simulations presented here. A brief description of the method used by this solver is given in Reference 7.

2.4.2 The Numerical Grid

The model was developed using a uniform numerical grid of 100 by 100 cells. Each cell is 1,000 by 1,000 ft. The model is shown in Figure 8. The 1,000 ft discretization is appropriate for the purpose of determining groundwater drawdown in the area around the CCNPP. However this discretization provides an average drawdown within each cell and is not appropriate for evaluating predicted drawdown at the withdrawal wells themselves.

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3. IMPACT OF INCREASED PUMPING AT CCNPP

To predict the impact of increasing the pumping rate at CCNPP during the construction of the proposed Unit 3, two simulations of future groundwater conditions were made, one with increased pumping at CCNPP and one without. The starting point for these simulations is the 2002 conditions. The 2002 groundwater conditions are obtained by simulating the pumping history of the Aquia aquifer from 1982 to 2002. The 1982-2002 simulation used as initial condition the solution of a steady state simulation with the 1982 pumping rates.
Table 3 lists the four computer runs made for this purpose. Table 3 also lists the names of the folders with the Visual Modflow computer files for each of these runs.

Table 3. Summary of Predictive runs and computer folders with Visual Modflow files

Run #	Description	Computer Folder Name
1	Steady-state run using 1982 pumping rates	Aquia-ss-1982
2	1982-2002 transient run	Aquia-tr-1982-2002
3	2002-2030 transient run using 2002 pumping rates for all wells	Aquia-tr-2002-2030
4	2002-2030 transient run using 2002 pumping rates for all wells, but increasing pumping at CCNPP from 392,000 gpd to 738,000 gpd.	Aquia-tr-2002-2030+CCNPP

Table 4 presents the groundwater flow simulations for the four runs. Sections 2.1 and 2.2 give more information on the data and assumptions used for each of these four runs.

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Table 4. Groundwater flow simulations

Run #	Steady state or transient	Simulation Period	Initial Potentiometric Surface (Heads)	Constant Head Boundary Conditions	Pumping Rates	Main result
1	steady state		-	2002 Heads from Reference 2, Figure 77	1982	Approximate 1982 potentiometric surface used as initial condition in Run 2
2	transient	1982-2002	1982 heads from Run 1	2002 Heads from Reference 2, Figure 77	1982-2002 from Table 1 (see Section 2.2.5 for an explanation of how these rates vary in time)	Approximate 2002 potentiometric surface to define initial heads for Run 3 (shown in Figure 15)
3	transient	2002-2030	2002 heads from Run 2	Linearly varying in time between heads in 2002 (from Reference 2, Figure 77) and 2030 (from Reference 2, Figure 89)	2002 from Table 1	Head vs. time at all wells (examples are shown in Figure 18 and Figure 19)
4	transient	2002-2030	2002 heads from Run 2	Linearly varying in time between heads in 2002 (from Reference 2, Figure 77) and 2030 (from Reference 2, Figure 89)	2002 from Table 1 plus additional 288,000 gpd at CCNPP	Head vs. time at all wells (examples are shown in Figure 18 and Figure 19)

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Figure 15 shows the simulated potentiometric surface in 2002 obtained from Run 2. Figure 16 shows the simulated potentiometric surface after 6 years of pumping obtained from Run 3. Figure 17 shows the simulated potentiometric surface after 6 years increasing the pumping rate at CCNPP from 392,000 gpd to 738,000 gpd, obtained from Run 4.

Figure 18 compares the change in potentiometric level at well 16 with and without the increase in pumping at CCNPP. As can be seen in the Figure, the increased pumping at CCNPP increases the drawdown at well 16 by up to over 13 ft. When the increased pumping at CCNPP ceases then within two to three years the drawdown returns to the value that it would have if pumping at CCNPP had never been increased. The overall drawdown at this well over the 28-year simulation period is about 27 ft and is independent of whether or not the pumping rate at CCNPP is increased or not. This drawdown is consistent with that estimated by MGS (see for example the 2002-30 drawdown contour map in Figure 94, page 143, or Reference 2).

Figure 19 shows similar results for well 9. The behavior of the drawdown is similar, with the drawdown increase due to higher pumping at CCNPP increasing during the 6 years of construction up over 13 ft, and then becoming practically identical to that without higher pumping at CCNPP.

Table 5 gives the maximum difference in drawdown between the two simulated scenarios, with and without increased pumping at CCNPP.

Table 5. Incremental Drawdown at different wells when pumping at Calvert Cliffs is increased from 392,000 to 738,000 gpd

Map ID	GAP number	User Name	Maximum incremental drawdown, ft
4	CA53G102	Scientists Cliffs Water Association, Inc.	3.4
8	CA60G002	Chesapeake Ranch Water Company	8.0
9	CA62G201	Beaches Water Company, Inc., Long Beach	13.6
11	CA69G010	Calvert Cliffs Nuclear Power Plant, Inc.	51.8
12	CA70G005	CA Co Board of Education, Calvert High Schl .& Career Ctr.	0.1
16	CA73G014	Dominion Cove Point LNG	13.8
17	CA74G005	CA Co Comm., Town of Prince Frederick	0.3
19	CA77G016	CA Co Comm., Jail & Alcohol Rehab Center	0.1
21	CA78G008	CA Co Comm., Mason Rd., Woodridge Subdivision	0.4
22	CA84G003	CA Co Comm., Solomons Island	9.0
24	CA86G007	CA Co Comm., St. Leonard municipal supply	7.7
28	CA93G048	Navy Recreation Center, Solomons	5.9
58	SM84G070	San Souci Estates	4.7
59	SM74G018	NAS Patuxent River	5.3
60	SM94G004	SMMC, Laurel Glen Subdivision	3.9
64	SM76G004	SMMC, St. Mary's Industrial Park	2.5
67	SM76G025	Int'l. Assoc. of Machinists, Placid Harbor Training Center	4.4
68	SM74G04	SMMC, Fenwick Manor Subdivision	2.6

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4. CONCLUSIONS

A simple groundwater model of a part of the Aquia aquifer was developed. The model covers the area within a 5-mile radius from CCNPP. The model is largely based on data from the MGS regional groundwater model (Reference 2).

The model was used to evaluate the impact of increased groundwater pumping at CCNPP during the construction of the proposed Unit 3. The evaluation was based on the assumption that during a 6-year period pumping at CCNPP will increase from 392,000 gpd to 738,000 gpd to meet the needs of the construction of Unit 3.

The analyzed effects of the increased withdrawal during the construction of the CCNPP Unit 3 are transient. The maximum effect to the closest water user is about 13 ft of additional drawdown during the time of increased water withdrawal during construction. At the completion of the increased water withdrawal during construction, the return to the conditions assuming pumping were continued at 2002 rates takes about 3 years.
The maximum impact on drawdown at other wells or well clusters is given in Table 5. This ranges to an increase in drawdown of about 13 ft at the location of the nearest groundwater user (Dominion Cove Point LNG, shown as well 16 in Figure 8) to less than one foot at the location of more distant groundwater users.

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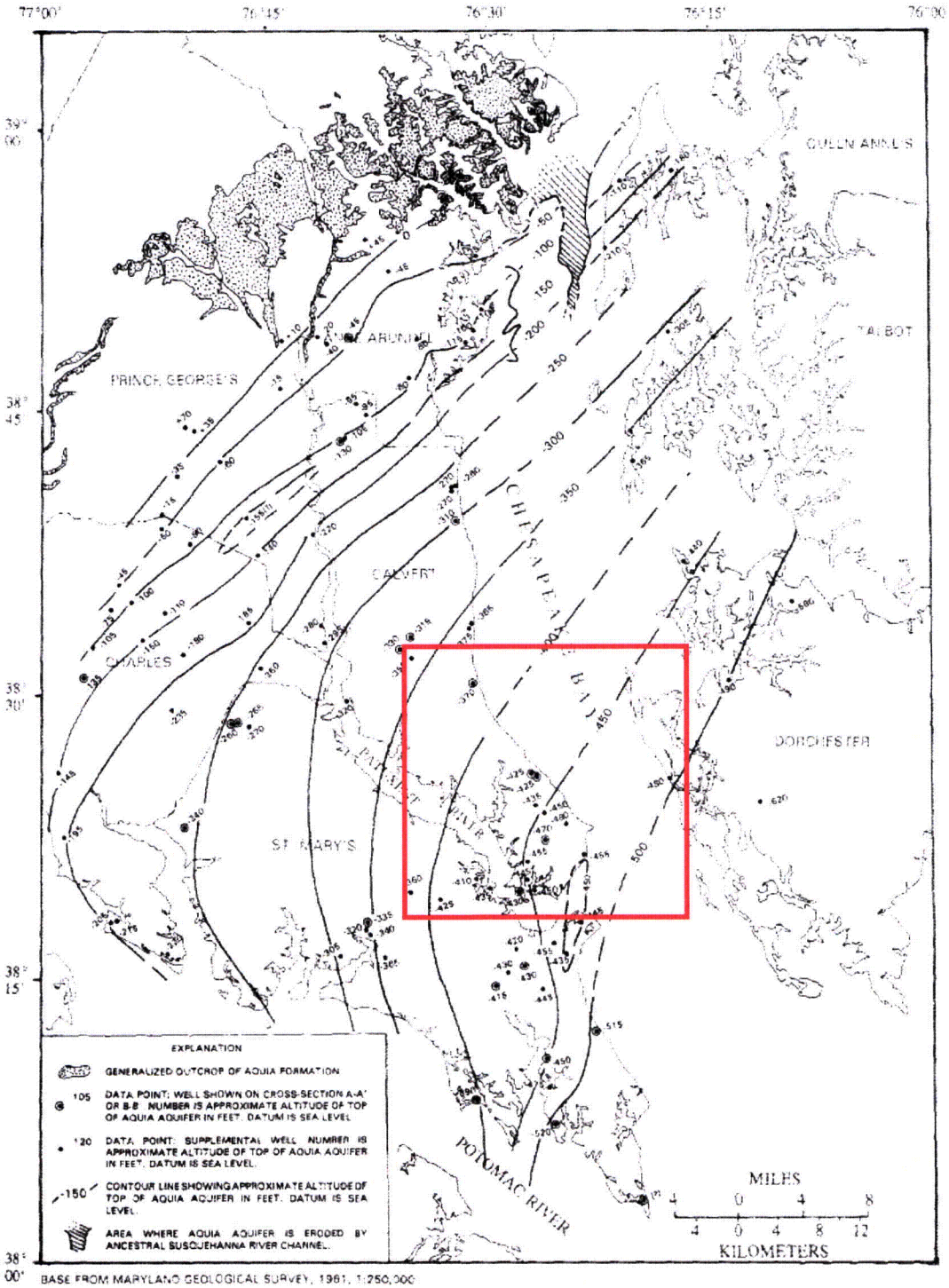

Figure 1. Approximate altitude of the top of the Aquia aquifer (Figure 7 in Reference 1). The red box indicates the boundaries of the present model.

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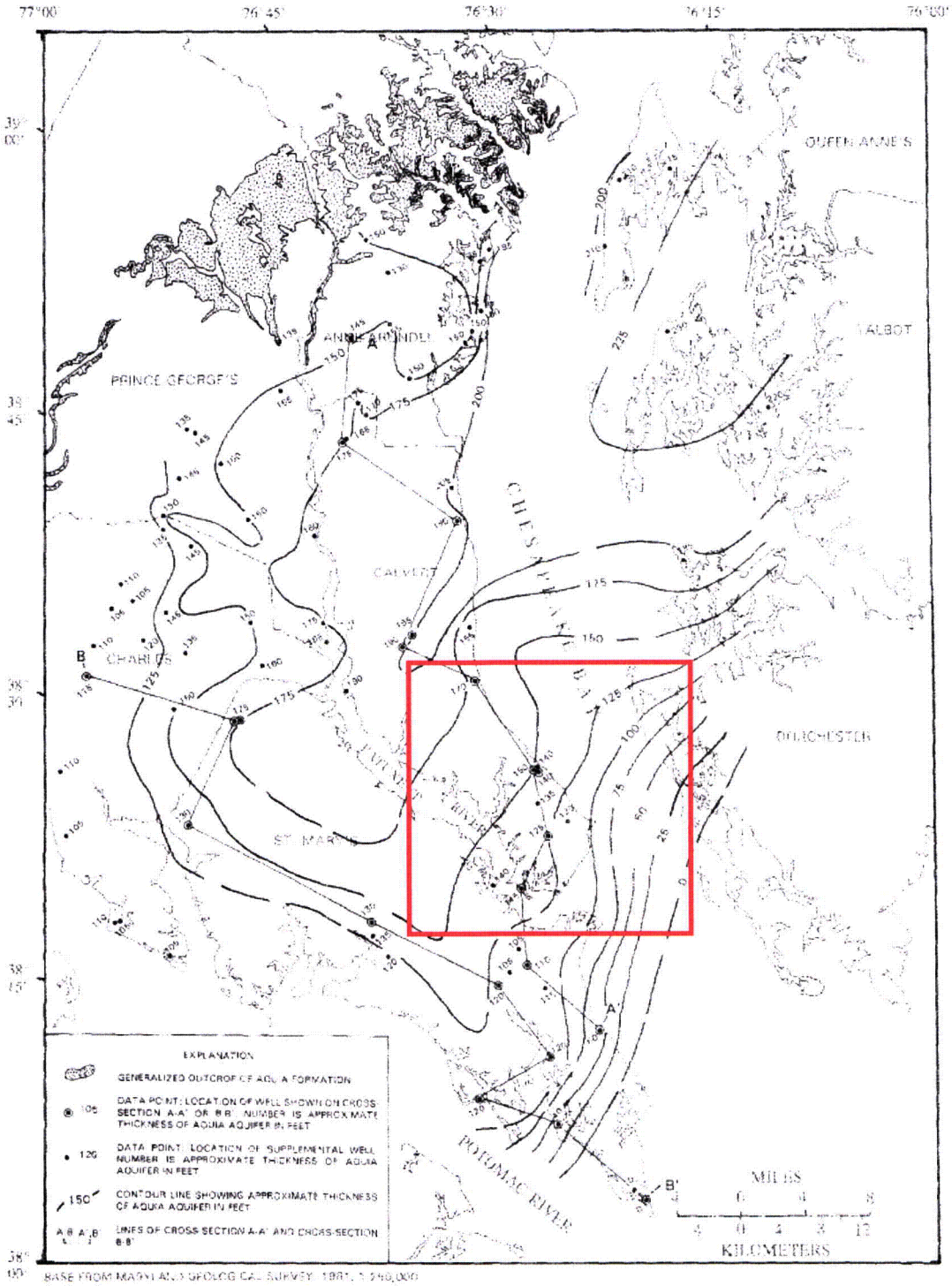

Figure 2. Approximate thickness of the Aquia aquifer (Figure 8 in Reference 1). The red box indicates the boundaries of the present model.

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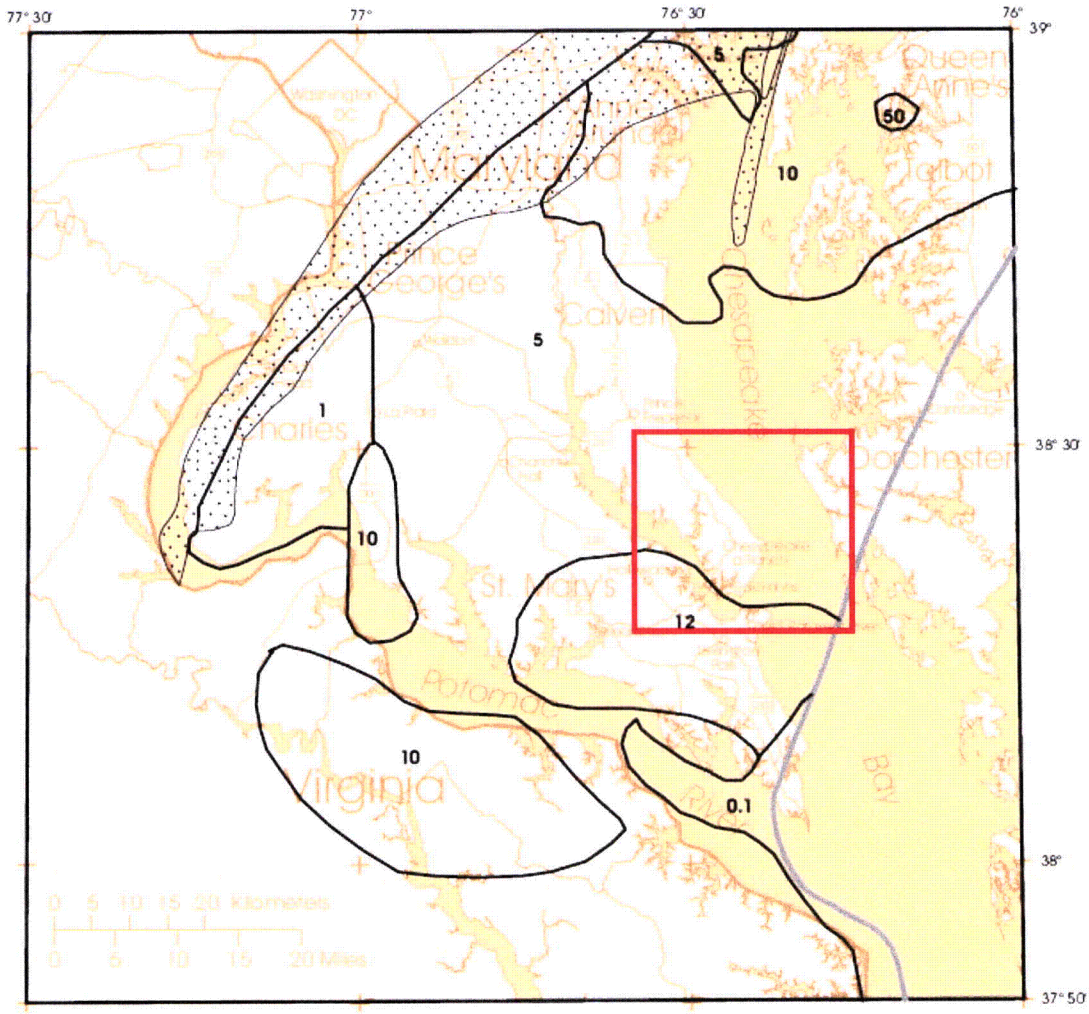

Figure 3. Hydraulic conductivity distribution in the Aquia aquifer used in the MGS model (Figure 64 in Reference 2). The red box indicates the boundaries of the present model.

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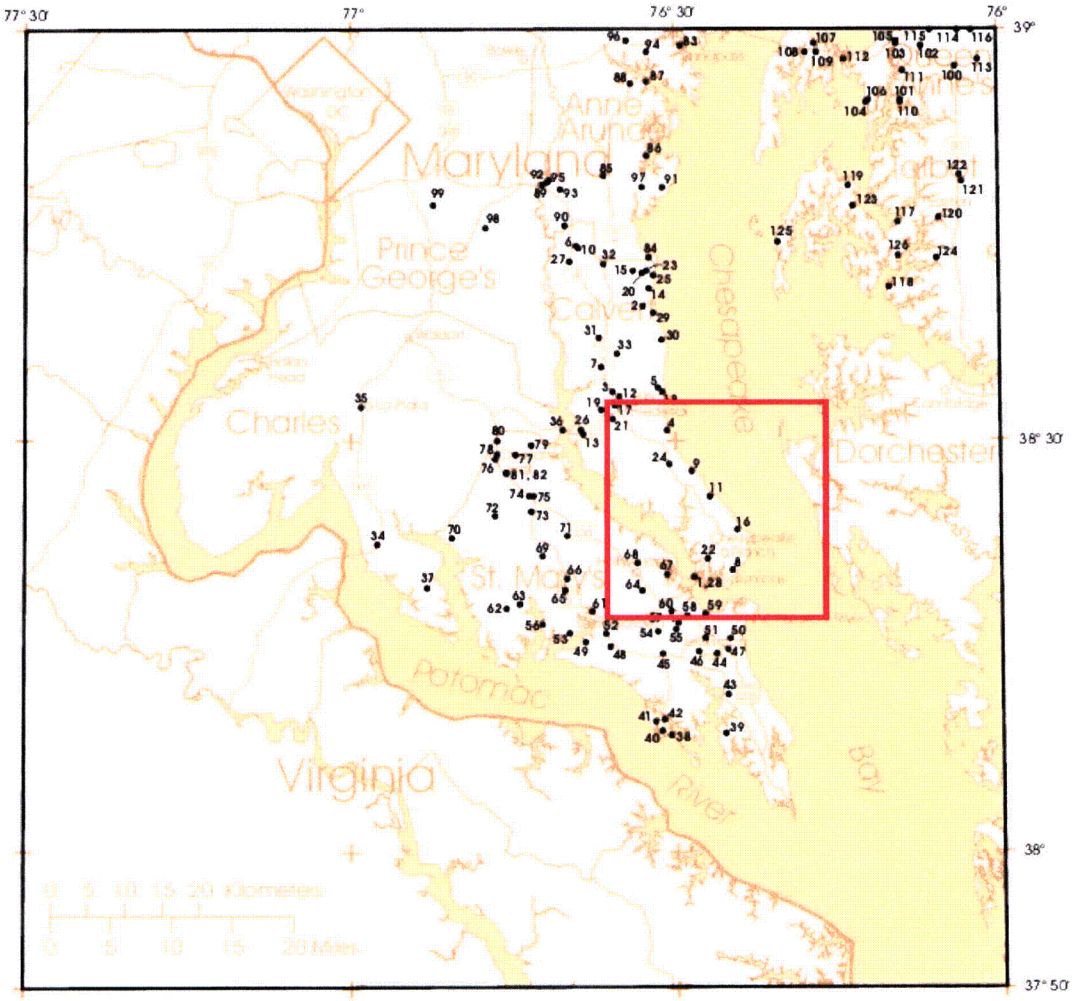

Figure 4. Major groundwater users in the Aquia aquifer, 2002 (Figure 52 in Reference 2). The red box indicates the boundaries of the present model.

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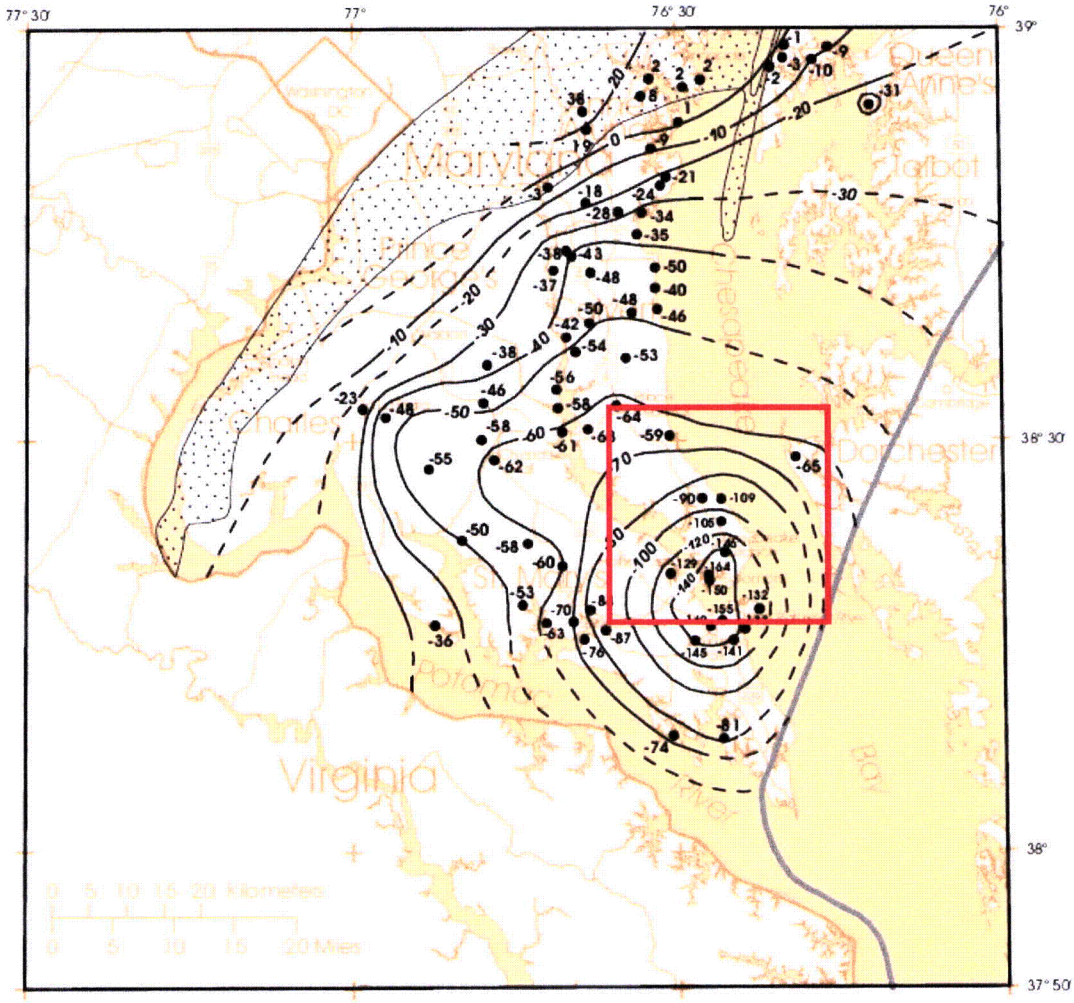

Figure 5. Potentiometric surface in the Aquia aquifer, 2002 (Figure 13 in Reference 2). The red box indicates the boundaries of the present model.

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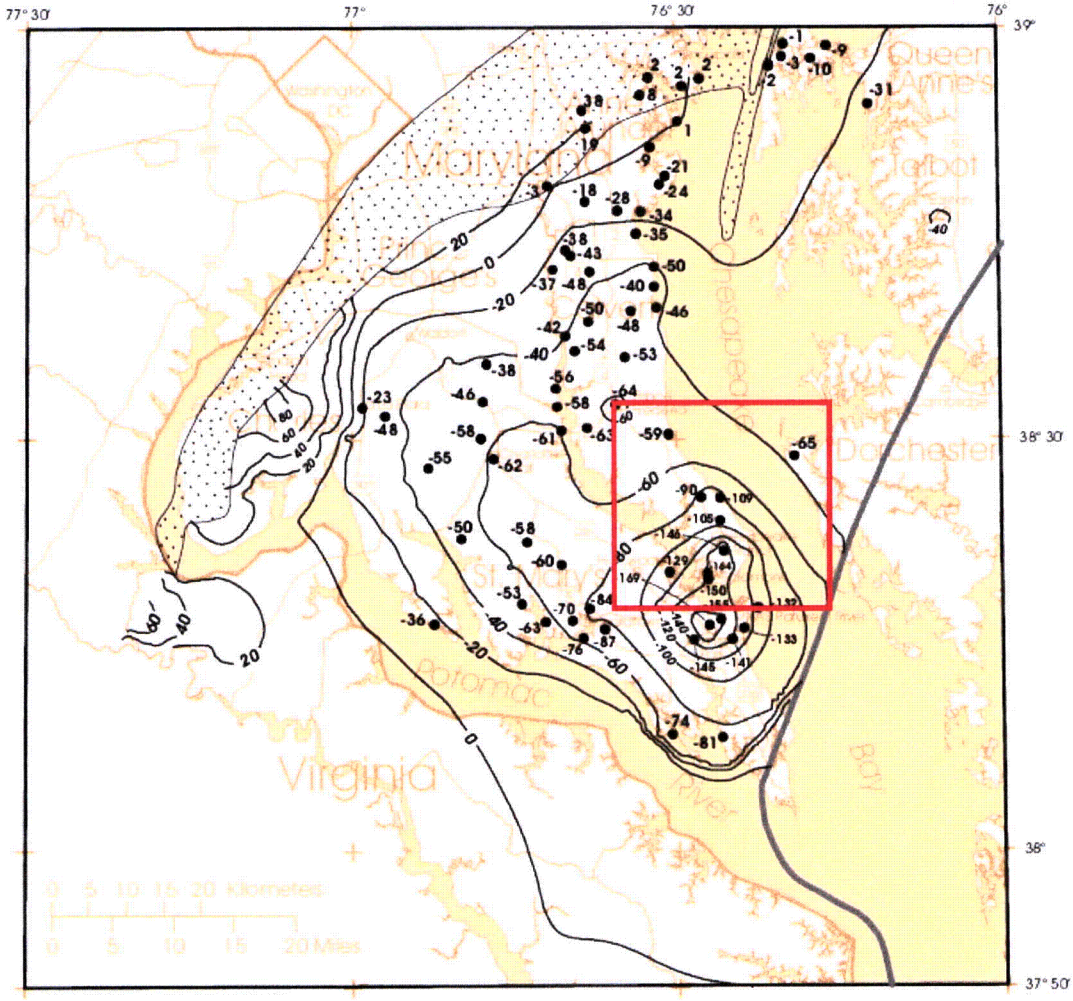

Figure 6. 2002 potentiometric surface in the Aquia aquifer, simulated with the MGS model (Figure 77 in Reference 2). The red box indicates the boundaries of the present model.

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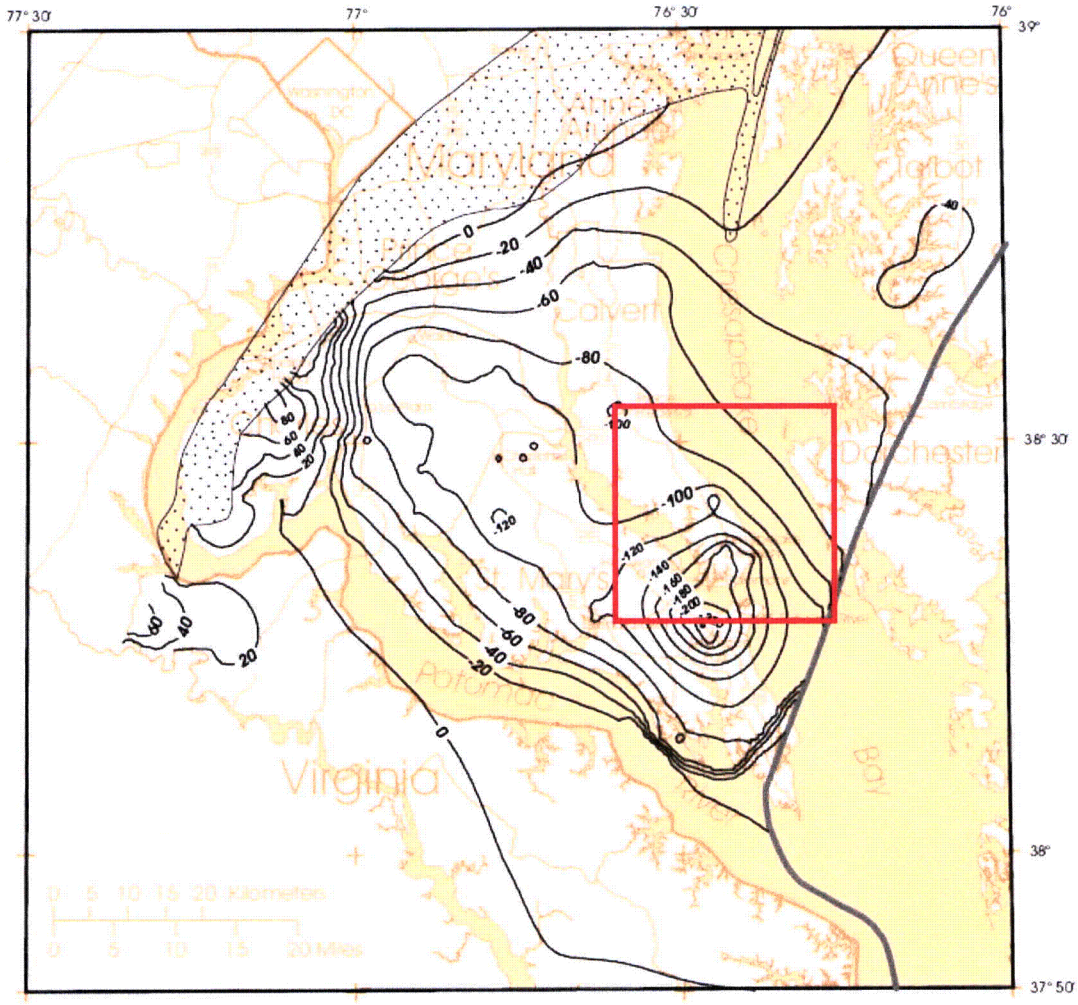

Figure 7. 2030 potentiometric surface in the Aquia aquifer, simulated with the MGS model (Figure 89 in Reference 2). The red box indicates the boundaries of the present model.

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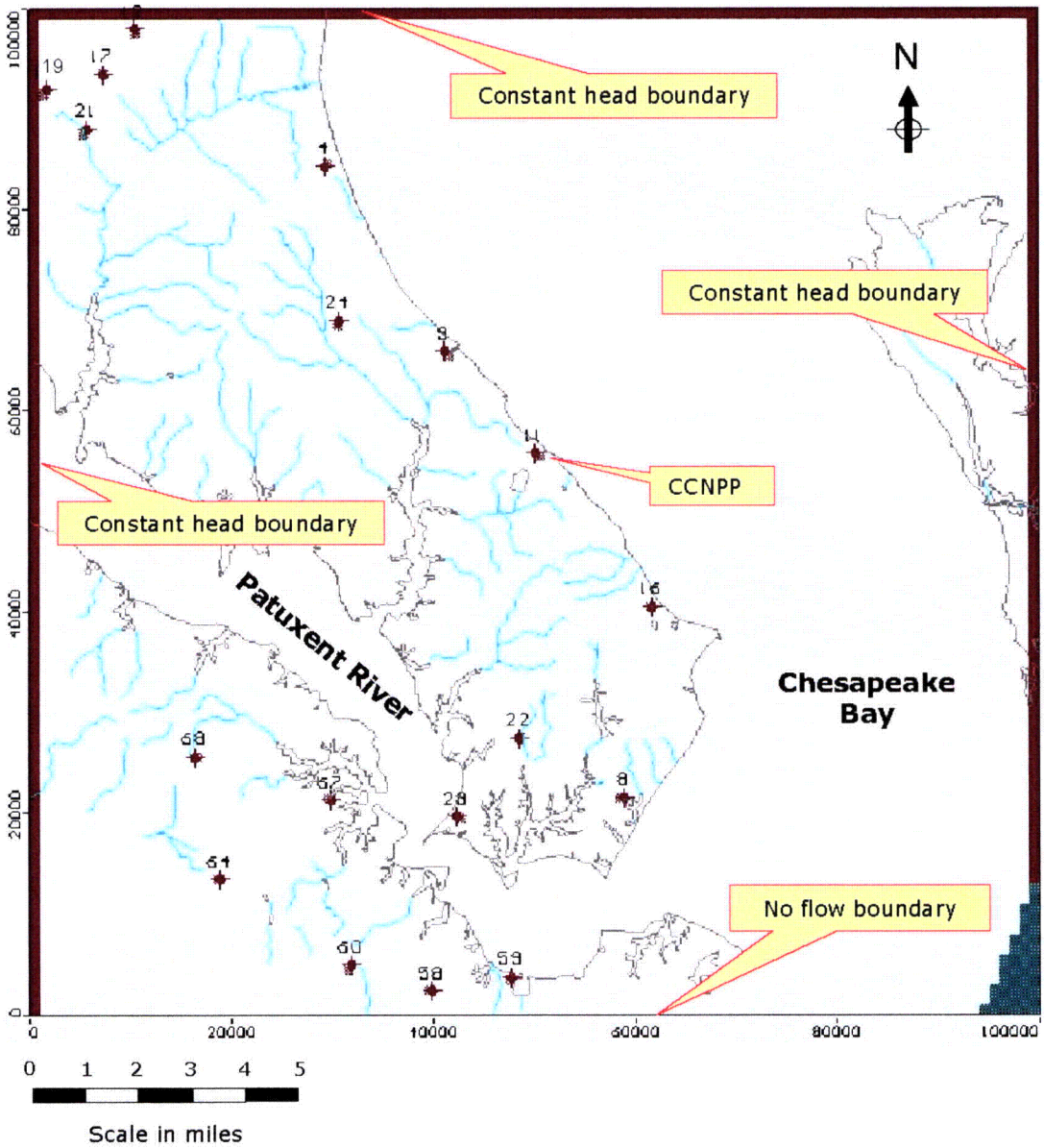

Figure 8. Model domain, boundary conditions and major groundwater users. More information for the users shown here is given in Table 1.

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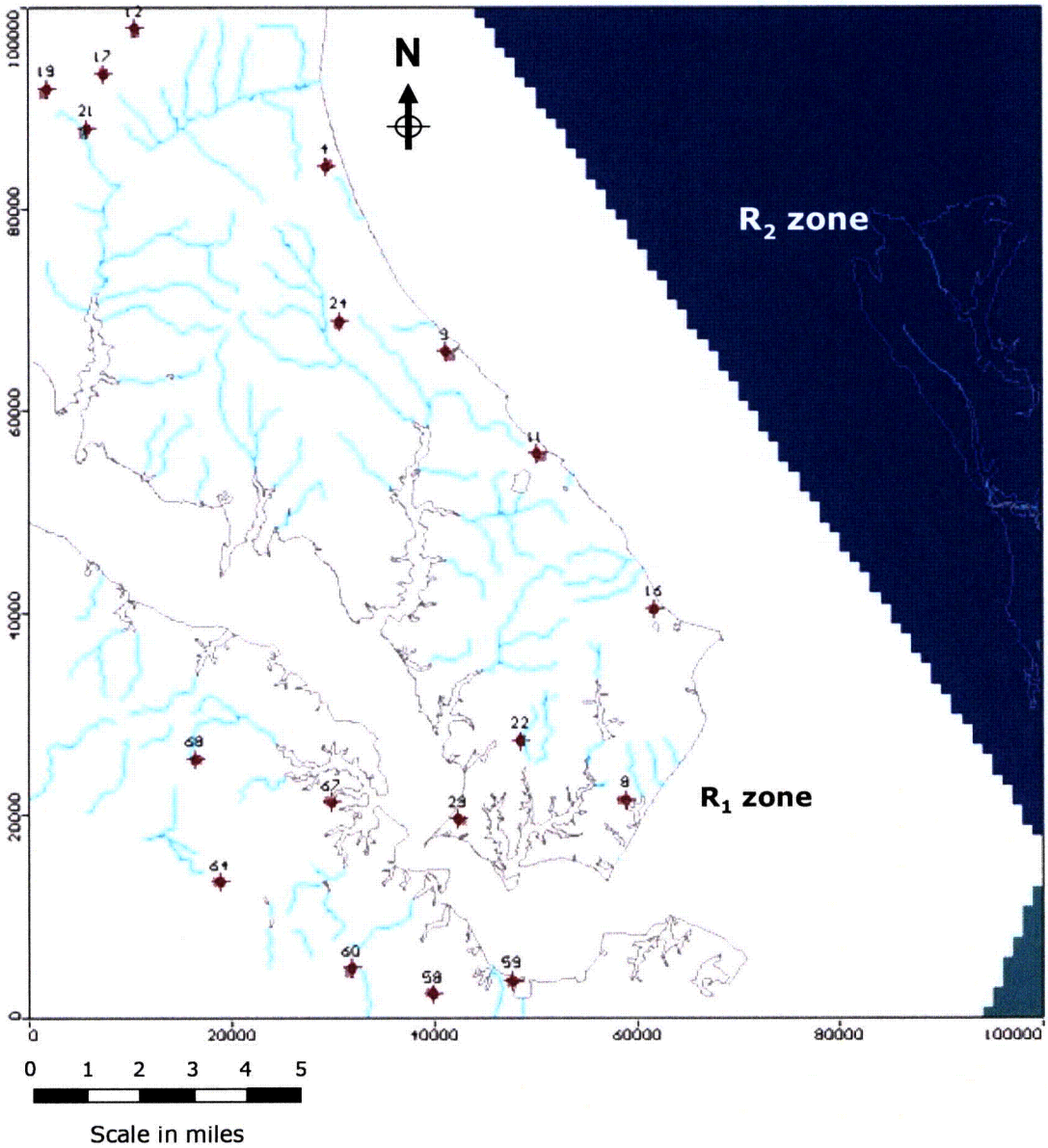

Figure 9. Zones of net leakage into the Aquia aquifer.

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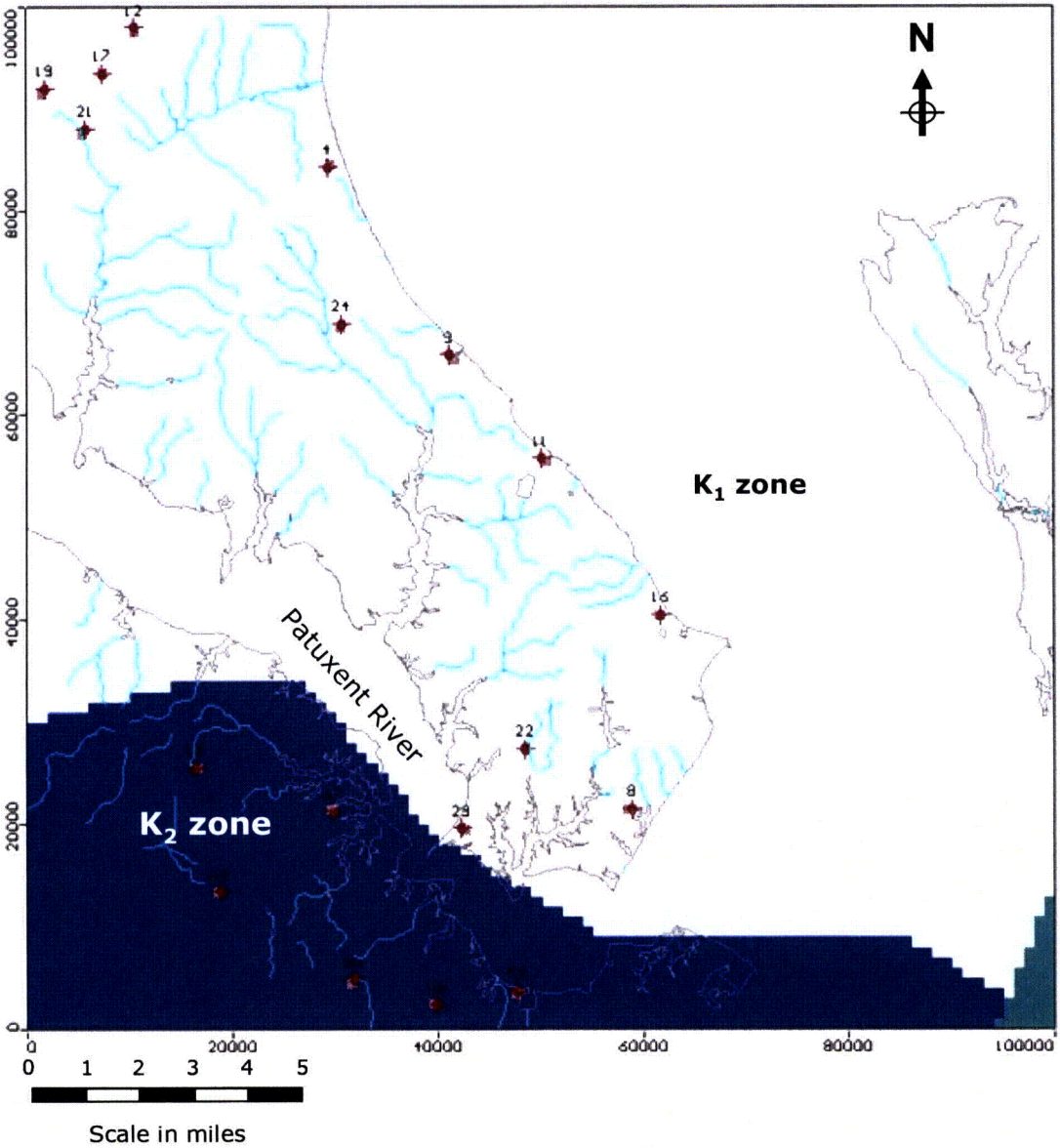

Figure 10. Hydraulic conductivity zones.

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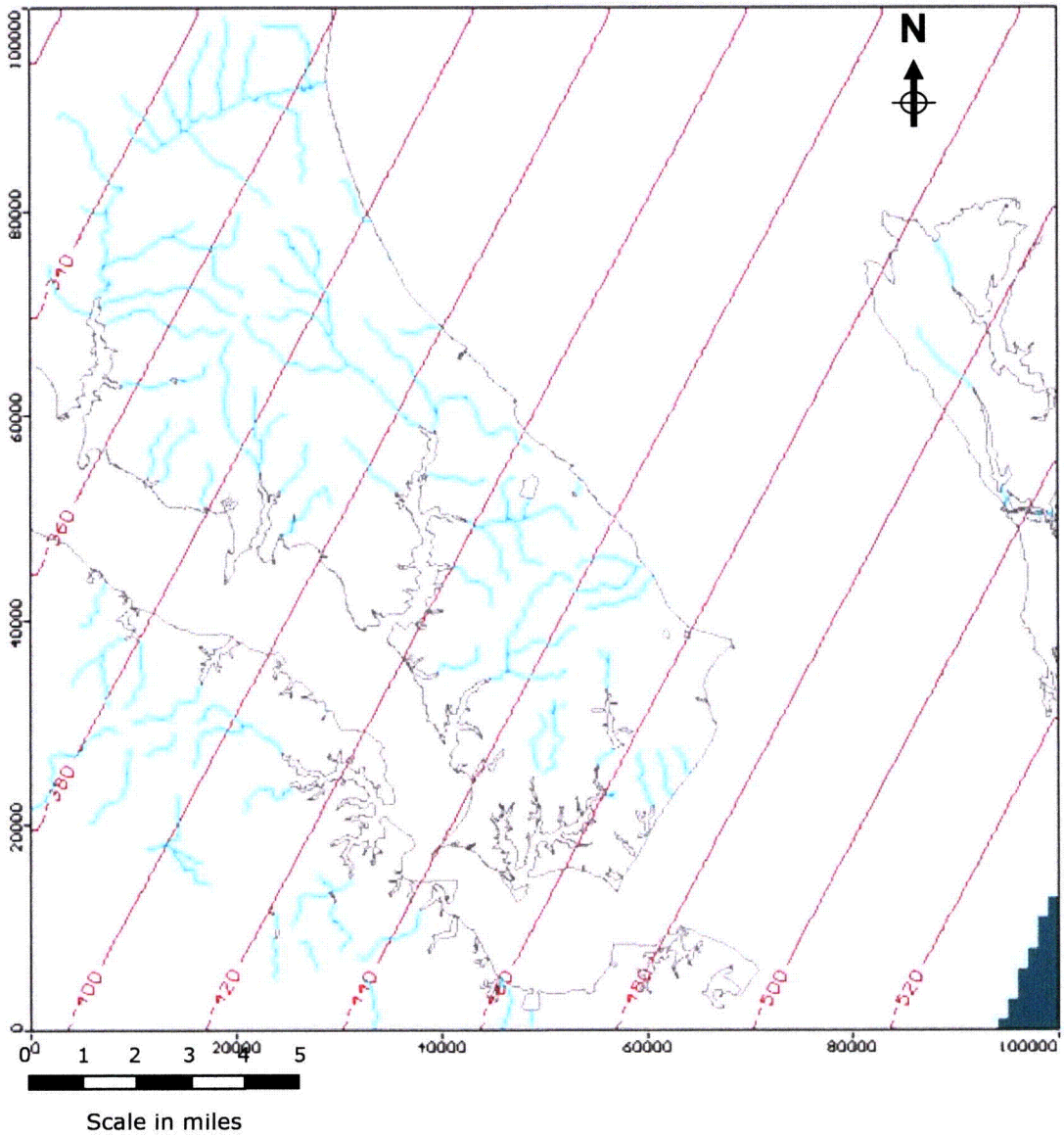

Figure 11. Elevation contours of the top the Aquia aquifer used in the model.

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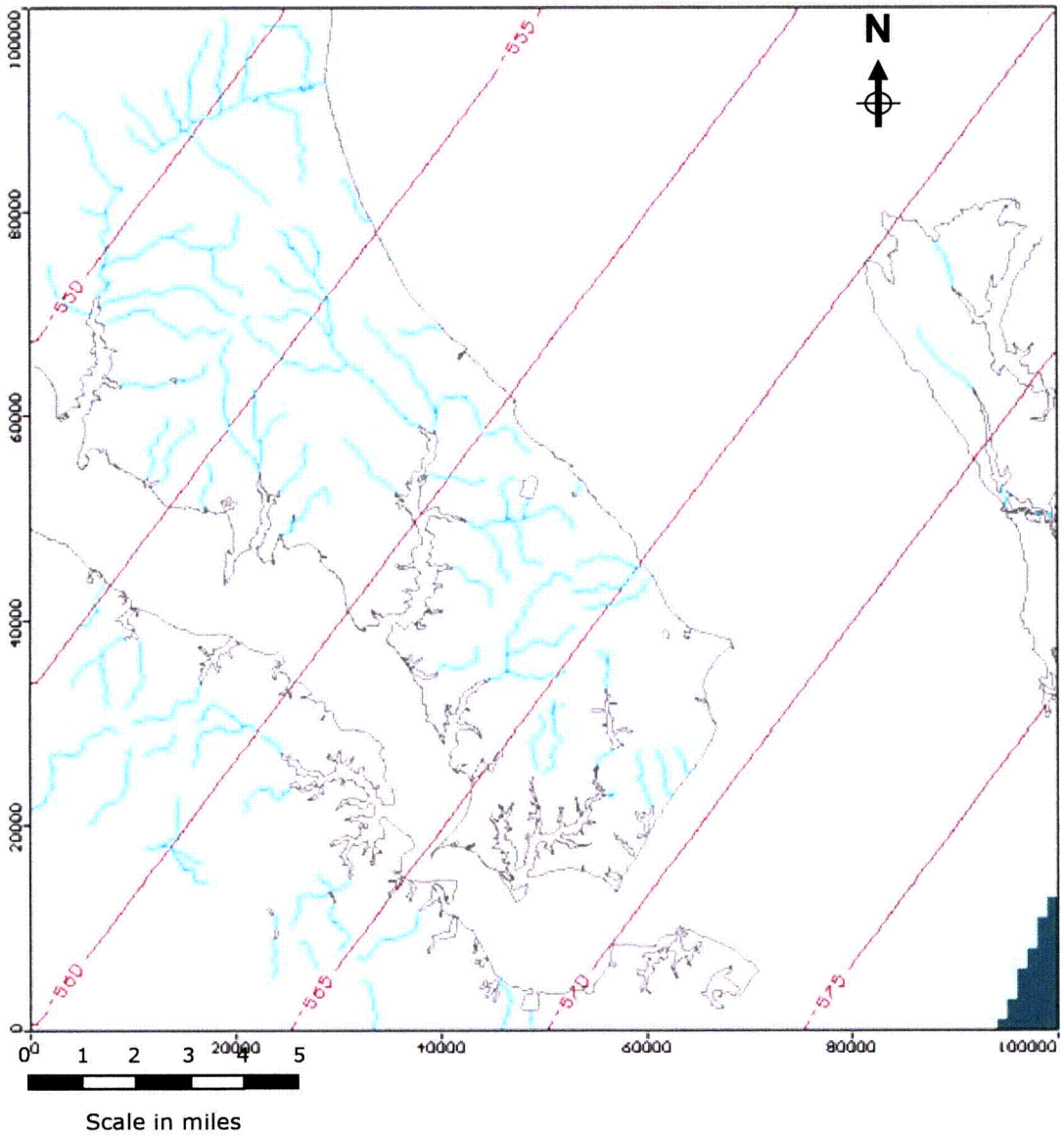

Figure 12. Elevation contours of the bottom the Aquia aquifer used in the model.

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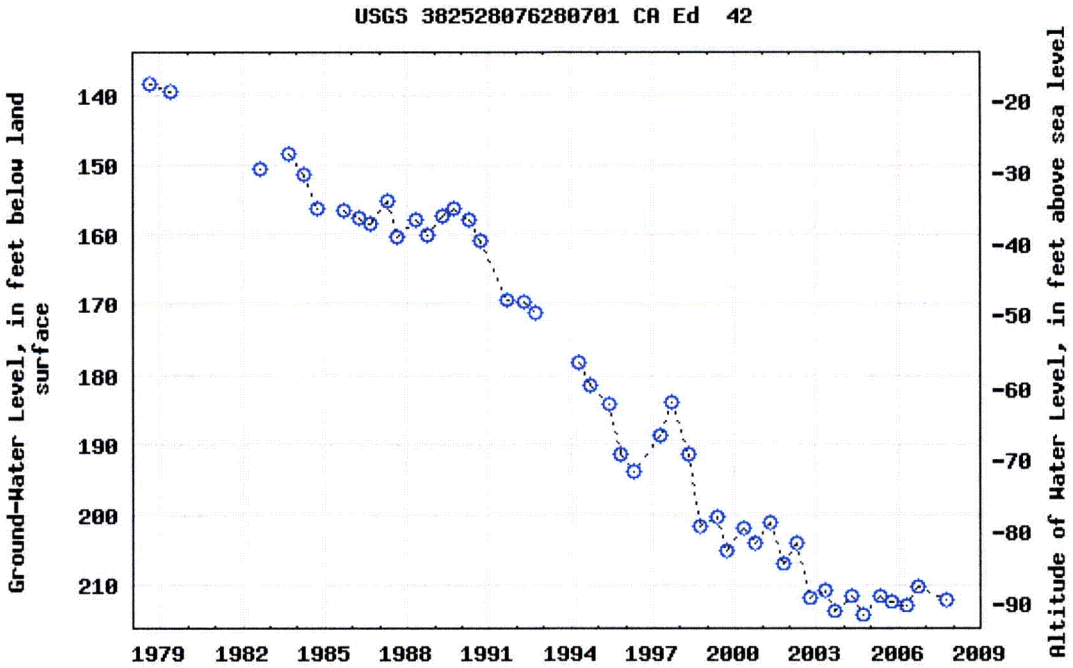

Figure 13. Potentiometric level at well Ed 42 (reproduced from Reference 4). The location of this well is shown in Figure 14.

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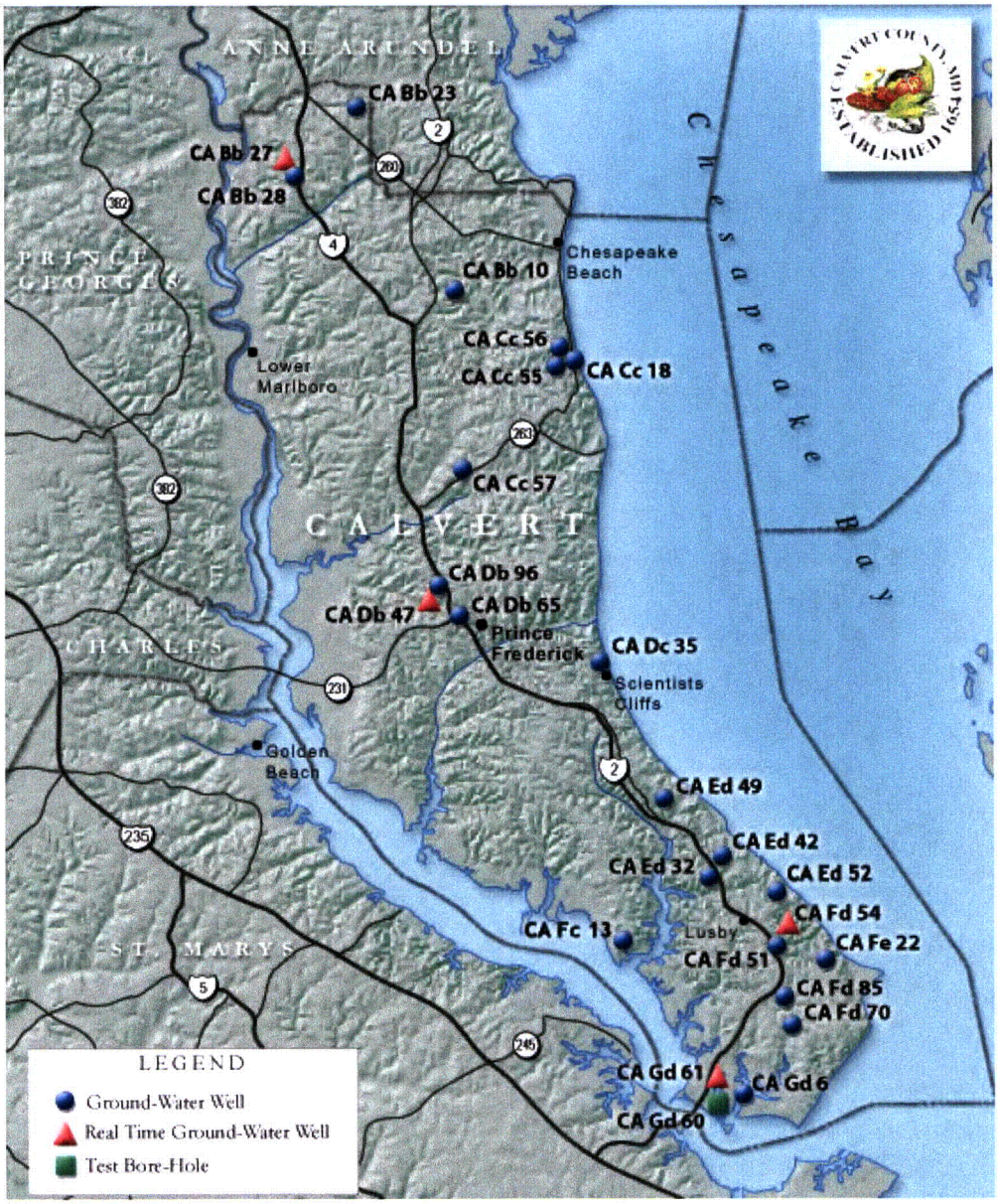

Figure 14. Location map of USGS monitoring wells (reproduced from Reference 4).

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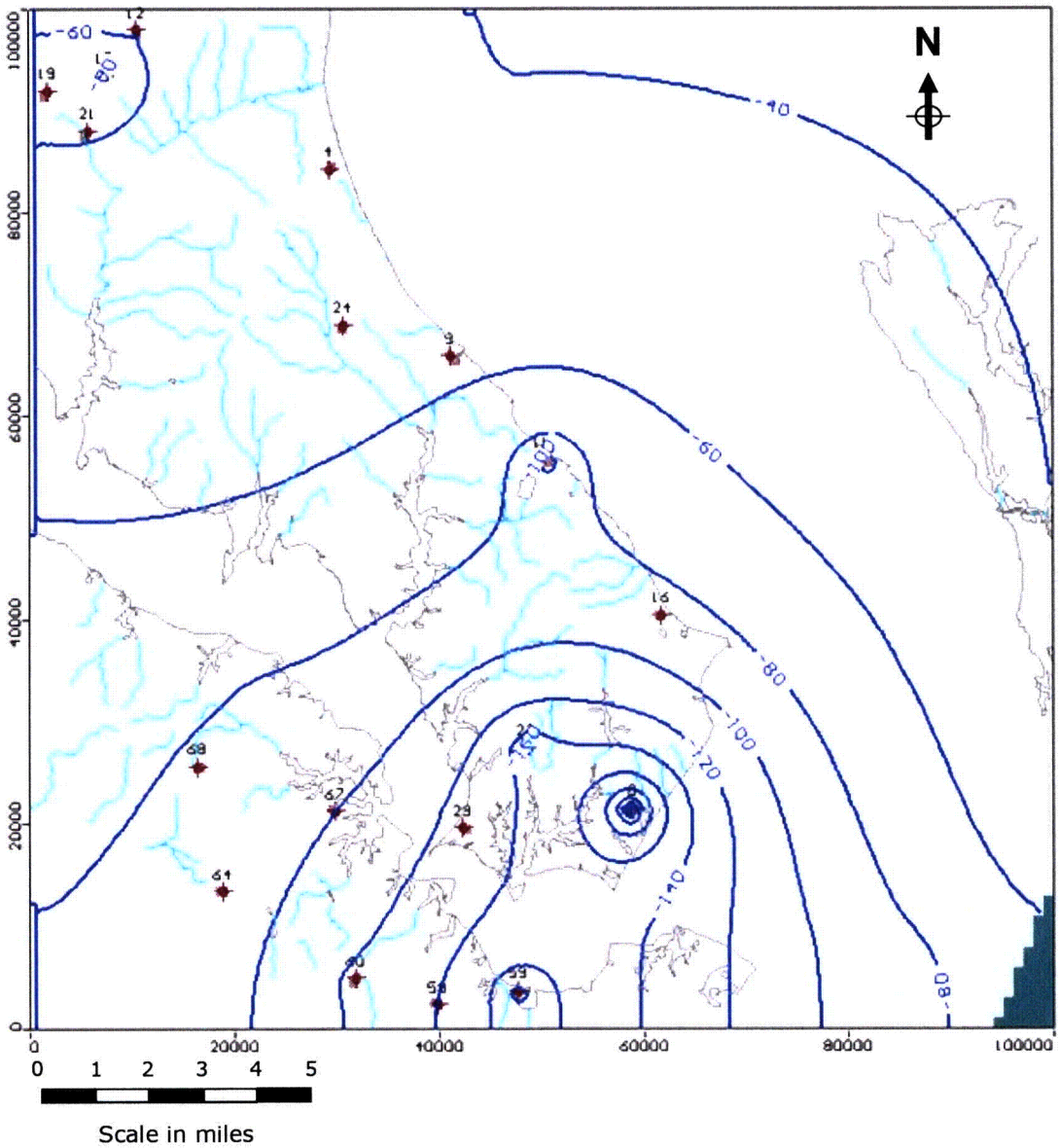

Figure 15. Simulated 2002 potentiometric surface in the Aquia aquifer from Run 1.

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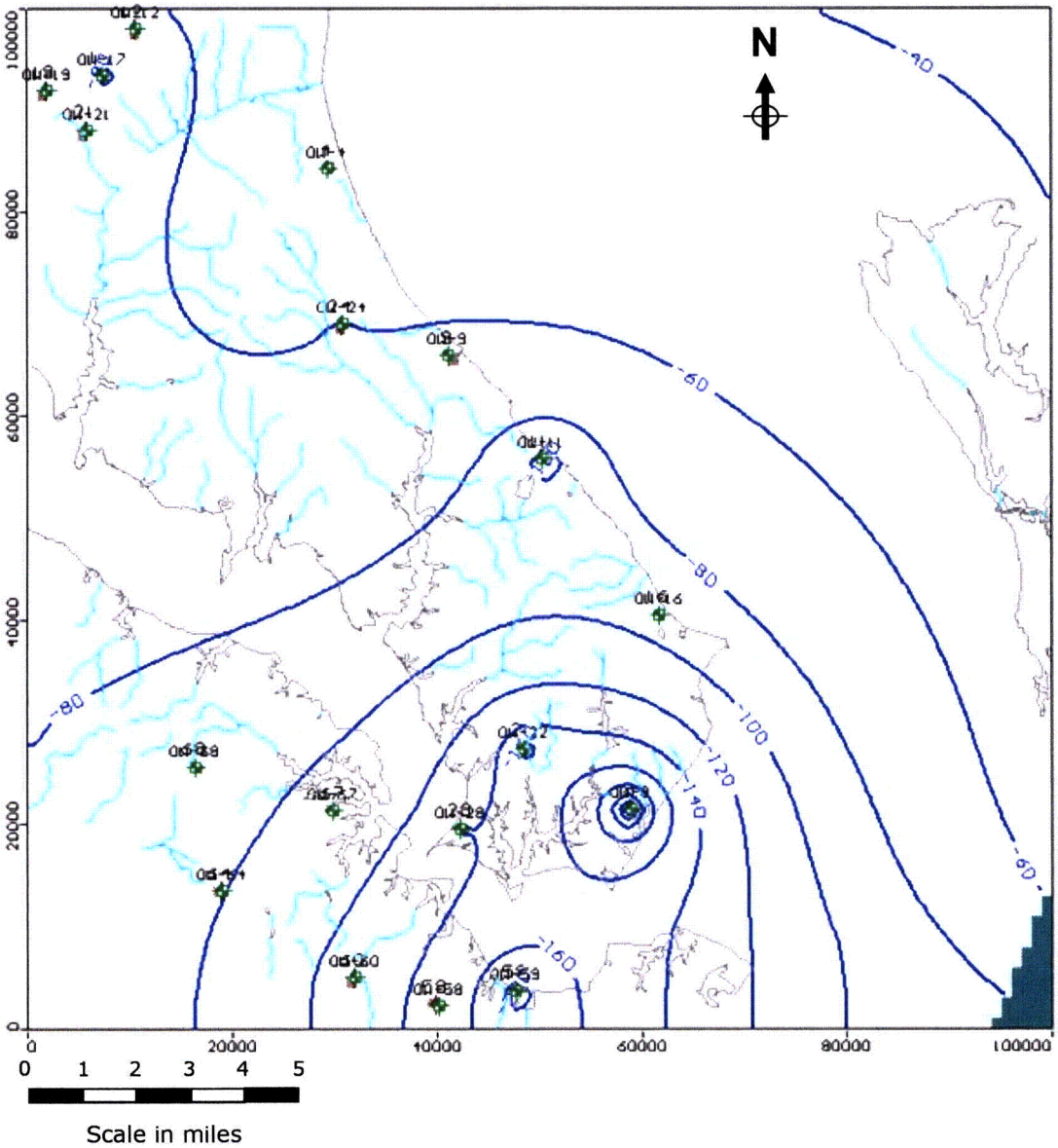

Figure 16. Simulated potentiometric surface after 6 years of all pumping at their 2002 pumping rates. CCNPP pumping 392,000 gpd. Assumed initial condition based on 2002 heads.

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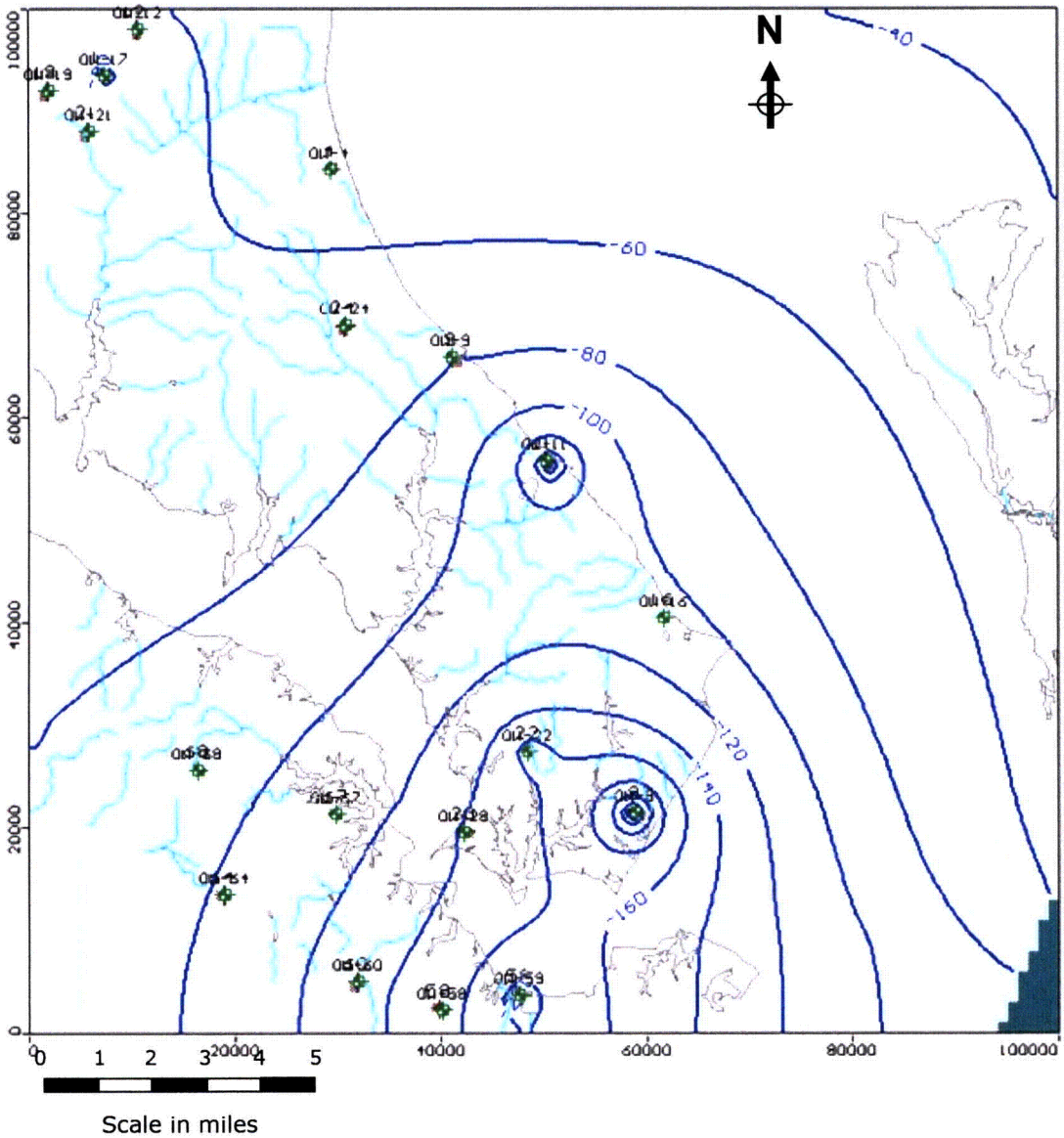

Figure 17. Simulated potentiometric surface after 6 years of all pumping at their 2002 pumping rates, except CCNPP pumping at 738,000 gpd. Assumed initial condition based on 2002 heads.

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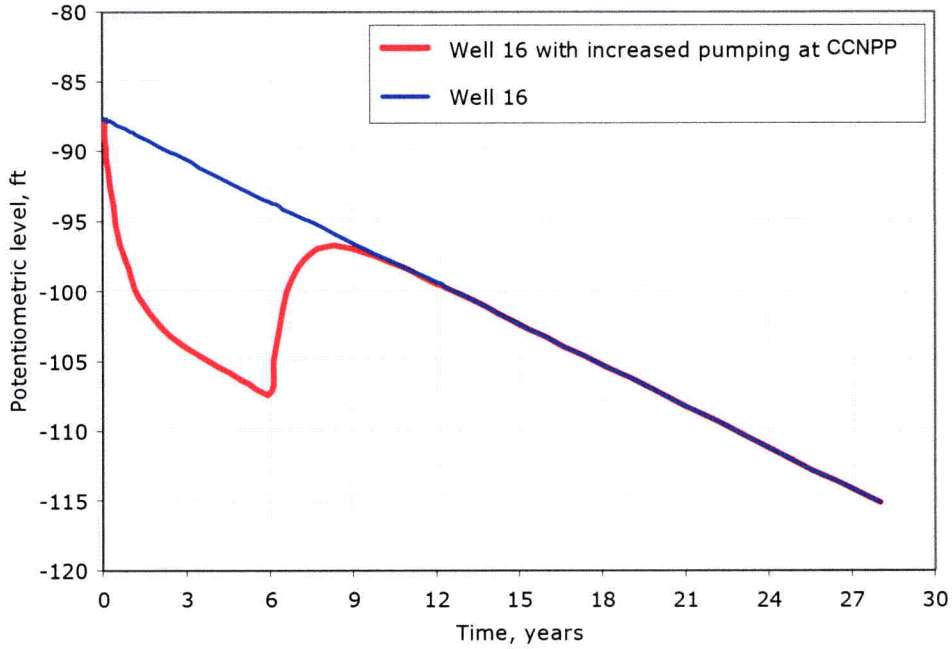

Figure 18. Potentiometric level at well 16 over the next 28 years starting with the 2002 heads, with and without increased pumping at CCNPP.

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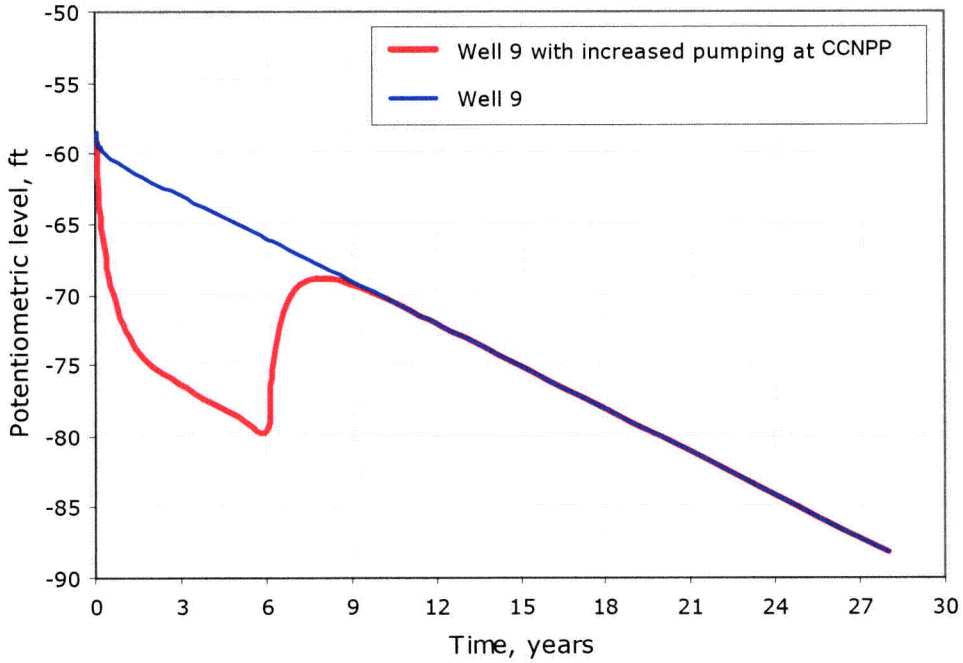

Figure 19. Potentiometric level at well 9 over the next 28 years starting with the 2002 heads, with and without increased pumping at CCNPP.

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