## 2.3 Water

This section describes the physical and hydrological characteristics of the VEGP site and surrounding region that could affect or be affected by the construction and operation of two new AP1000 units at the VEGP site. The new units will be referred to as VEGP Units 3 and 4. The potential construction and operational impacts of the project on near- and far-field water resources are discussed in Chapters 4 and 5, respectively.

The 3,169-acre VEGP site is located high on a coastal plain bluff on the west bank of the Savannah River in eastern Burke County Georgia. The new AP1000 units will be located approximately 220 feet above mean sea level (msl). This site is located at River Mile 151; approximately 30 river miles upstream of the U.S. Highway 301 Bridge and directly across the river from the Department of Energy's Savannah River Site (Barnwell, South Carolina). It is approximately 26 miles southeast of Augusta, Georgia.

### 2.3.1 Hydrology

This section describes surface water bodies and groundwater resources that could be affected by the construction and operation of VEGP Units 3 and 4. The site-specific and regional data on the physical and hydrologic characteristics of these water resources are summarized in the following sections

#### 2.3.1.1 Surface Water Resources

The watershed of the Savannah River extends into the mountains of North Carolina, South Carolina, and Georgia near Ellicott Rock, the point where the borders of those three states meet. The river system drains a basin of 10,577 sq mi, divided between the three states as follows **(SR 2006)**:

- 4,581 sq mi in South Carolina
- 5,821 sq mi in Georgia
- 175 sq mi in North Carolina

Within the three states, the Savannah River basin includes portions of 44 counties and two major metropolitan centers, Augusta and Savannah. The lower 50-mi reach of the river is tidally influenced **(USACE 1996)**.

The Savannah River watershed and sub-basins, as delineated by the National Weather Service **(NWS 2005)** and further subdivided by USGS Hydrologic Unit Code (HUC-12) sub-basins **(USGS 2006f)**, are shown in Figure 2.3.1-1. The drainage areas of the NWS sub-basins are given in Table 2.3.1-1.

The watershed crosses through three distinct physiographic provinces: the Mountain, Piedmont, and Coastal Plain. The Mountain and Piedmont provinces are within the Appalachian Mountain range, with the border between them extending from northeast to southwest, crossing the Tallulah River at Tallulah Falls. The Fall Line, or division between the Piedmont province and the Coastal Plain province, also crosses the basin in a generally northeast to southwest direction, near Augusta, Georgia **(USACE 1996)**.

Watershed elevations range from 5,030 ft msl at Little Bald Peak in North Carolina, to sea level at Savannah. The approximate range of elevations for each physiographic region is **(USACE 1996)**:

- 5,030 to 1,800 ft msl within the Mountain province
- 1,800 to 500 ft msl within the Piedmont province
- 500 to 0 ft msl within the Coastal Plain province

The Savannah River, together with certain of its tributaries, forms the border between the states of Georgia and South Carolina. The confluence of the Seneca and Tugaloo rivers, formerly known as "The Forks" but now inundated by Hartwell Lake, marks the upstream end of the Savannah River. The length of the Savannah River from The Forks to its mouth on the Atlantic Ocean is about 312 mi **(USACE 1996)**.

The following principal streams make up the Savannah River stream system **(USACE 1996)**:

- The Tallulah and Chatooga Rivers combine to form the Tugaloo River at River Mile 358.1
- Twelve Mile Creek and the Keowee River join to form the Seneca River at River Mile 338.5.
- The Tugaloo and Seneca rivers join to form the Savannah River proper at River Mile 312.1, at the point known as The Forks.

The entire 312-mi length of the Savannah River is regulated by a series of three U.S. Army Corps of Engineers (USACE) multipurpose projects, forming a chain along the Georgia–South Carolina border 120 mi long. The three lakes, from upstream to downstream, are:

- Hartwell Lake and Dam, with 2,550,000 acre-feet of gross storage
- Richard B. Russell Lake and Dam, with 1,026,000 acre-feet of gross storage
- J. Strom Thurmond (also known as Clarks Hill) Lake and Dam, with 2,510,000 acre-feet of gross storage

Of the 6,144 sq mi drainage basin above Thurmond Dam, 3,254 sq mi (53 percent) are between Thurmond and Russell Dams, 812 sq mi (13 percent) are between Russell and Hartwell Dams, and 2,088 sq mi (34 percent) are above the Hartwell Dam **(USACE 1996)**. Table 2.3.1-2 is a list of key natural and manmade landmarks along the Savannah River with the distance in river miles upstream of the mouth of Savannah Harbor noted.

The climate in the upper Savannah River watershed is classified as temperate, with generally mild winters and long summers. The basin is protected by the Blue Ridge Mountains from the extremes of winter continental weather experienced in the adjacent Tennessee Valley. The annual mean temperature for the basin is 60°F. January, which is usually the coldest month of the year, frequently has night temperatures of 20°F or lower. July and August, the hottest months of the year, have many days with temperatures over 90°F. In the lower section of the basin, the winters are milder and the summer temperatures higher **(USACE 1996)**.

There are generally two periods of maximum rainfall in the upper basin: February–March and July–August, although heavy rainfall has occurred in practically every month. The mean annual precipitation decreases from 83.5 in. at the upper end of the watershed, near Highlands, North Carolina, down to 49.2 in. at Savannah, Georgia **(USACE 1996)**.

#### 2.3.1.1.1 USGS Topographic Maps

USGS seven-and-one-half-minute topographic maps are available for the entire Savannah River watershed. The river miles upstream of the mouth of the Savannah River are marked off along the stream centerline on each of the quadrangles photo-revised in 1989.

Figure 2.3.1-2 provides an index map showing an identification number and the outline of each USGS quadrangle superimposed on a line map of the Savannah River watershed. The name and map identification number of each quadrangle is listed with its reference coordinates (latitude and longitude of the lower right hand corner of the quadrangle) in Table 2.3.1-3, ordered from upper left to lower right throughout the coverage area.

#### 2.3.1.1.2 Local Site Drainage

The VEGP site is bordered on the east by the Savannah River and by Beaverdam Creek to the south. The Savannah River Plant Site (SRS) is located directly across the river to the east.

Local drainage is shown in Figure 2.3.1-3, which was developed from the Shell Bluff Landing, Girard NW, Alexander, and Girard USGS quadrangle sheets (see Figure 2.3.1-2 and Table 2.3.1-3). The site is on a high, steep bluff on the west bank of the Savannah River. State Road 23 (River Road) runs roughly parallel to the river, about 4 miles from the VEGP site. It runs along the ridge line that separates local drainage running northeast to the river from runoff draining generally to the southwest.

An unnamed, highly incised creek drains the area of the site north of River Road into the Savannah River just upstream of the site, at the point denominated Hancock Landing on the USGS quadrangle Shell Bluff Landing.

To the west, the site is drained by the Red Branch and Daniels Branch, which join with Beaverdam Creek just upstream of Telfair Pond, south of the site. A small, unnamed stream running parallel to and about 2,000 ft to the west of River Road outfalls to Beaverdam Creek downstream of the pond.

The names, estimated channel lengths, and slopes of the natural channels draining the VEGP site area are provided in Table 2.3.1-4.

#### 2.3.1.1.3 Savannah River Flow Series Data

The USGS maintains stream flow records for nine stream gages on the Savannah River between River Miles 288.9 and 60.9, upstream and downstream of the VEGP site. A tenth gage was recently installed at the VEGP intake at Waynesboro, Georgia (Gage 21973269), but the period of record is too short to support statistical analysis. The location, datum elevation, upstream drainage area, start and stop date, and number of flow records for each of the ten gages are presented in Table 2.3.1-5.

As indicated in Table 2.3.1-5, the nearest USGS gage upstream of the VEGP site with a significant period of record is Gage 2197320, near Jackson, South Carolina (5.9 River Miles upstream); the nearest gage downstream of the VEGP site is Gage 2197500 at Burtons Ferry near Millhaven, Georgia (about 39 River Miles downstream of the site). While the Jackson gage is less than 6 mi upstream of the site, the record length for Gage 2197000, at Augusta, Georgia (48.7 River Miles upstream) is much longer, making it desirable to evaluate all three sets of records.

A number of statistics are presented in this section for flow data on these three gages to facilitate the evaluation of the water supply and flood hazard characteristics of the site, including:

- Average daily and monthly flow series
- Low flow series
- Historic flooding and analytical annual peak flood frequencies

After 1952, flows on the Savannah River at the three gage sites, were impacted by regulation from upstream reservoirs: J. Strom Thurmond (a.k.a. Clarks Hill) Lake and Dam in 1952, Hartwell Lake and Dam in 1961, and Richard B. Russell Lake and Dam in 1984 **(USACE 1996)**. The records for the Augusta, Georgia and Burtons Ferry gages include regulated and unregulated periods. The entire length of record for the Jackson, South Carolina, gage occurs after closure of upstream dams and is, in that sense, homogenous. In this subsection, stream flow statistics for each of the gages is presented as necessary for both the regulated and the unregulated period, as detailed in the text.

2.3.1.1.3.1 Annual Average Daily and Mean Daily Flow Series

Table 2.3.1-6 **(USGS 2006c)** presents the mean daily flow for each day of the year for the Savannah River at Augusta, Georgia, based on the entire 98-year gage record, without respect to upstream regulation after 1952.

Table 2.3.1-7 **(USGS 2006d)** presents the mean daily flow for each day of the year for the Savannah River near Jackson, South Carolina, based on the entire 31-year (regulated) gage record.

Table 2.3.1-8 **(USGS 2006g)** presents the mean daily flow for each day of the year for the Savannah River at Burtons Ferry, near Millhaven, Georgia, based on the entire 52-year gage record, without respect to upstream regulation after 1952.

The mean daily flow series for each of these gages are plotted together in Figure 2.3.1-4. For all sites, the average daily flow exhibits a strong seasonality, with higher flows in the winter season and lower average flows in the summer.

Additionally, the figure gives a qualitative indication of the impact of upstream regulation on flow: daily averages at Jackson, South Carolina, are based on a fully regulated period of record, while the daily averages for the Augusta and Burtons Ferry gages are based on periods of record that include substantial periods prior to the completion of the upstream dams; as a consequence, these gages show a substantially higher average daily flow in the winter season compared with the Jackson average flows based on records during the regulated period only. Taking average daily flows for only the unregulated period of record exacerbates this difference.

In addition to the mean of the average daily flows for each day of the year, the USGS publishes statistics on the annual average daily flow, which provide a lumped annual statistic masking all seasonality.

Table 2.3.1-9 **(USGS 2006c; USGS 2006g)** presents the annual average daily flows for the periods of record at Augusta, Georgia, and Burtons Ferry. Data are not presented for the Jackson, South Carolina and Waynesboro, Georgia (VEGP intake) gages because of insufficient record length.

2.3.1.1.3.2 Monthly Flow Series

Table 2.3.1-10 **(USGS 2006d)** presents average daily discharges by month for the Savannah River at Jackson, South Carolina, for the period of record between 1971 and 2002. A number of "holes" in the USGS series occur where a sufficient number of daily readings were not available to make meaningful monthly averages.

Table 2.3.1-11 **(USGS 2006c)** presents average daily discharges by month for the Savannah River at Augusta, Georgia, upstream of the VEGP site, for the period of record between 1883 and 2003.

Table 2.3.1-12 **(USGS 2006g)** presents average daily discharges by month for the Savannah River at Burtons Ferry, near Millhaven, Georgia, downstream of the VEGP site, for the period of record between 1939 and 2003.

Average daily flows for the Jackson, Augusta, and Burtons Ferry gage sites for each month are provided in Table 2.3.1-13.

Figure 2.3.1-5 provides a plot of the seasonal variation in average daily flows for each month on the Savannah River between Augusta, Georgia, for the full-period and regulated periods, and Jackson, South Carolina, for the full, unregulated period. It can be inferred from the plot that the operation of the upstream dams has had a significant impact on the average daily flow for each month in the period from January to May, inclusively.

#### 2.3.1.1.3.3 Low Flow Series

Flow duration curves are developed by ranking the recorded average daily flows for the period of record to estimate the percentage of days that a flow of a given value is equaled or exceeded. Flow duration curves for the Savannah River at Augusta, Georgia, for the entire period of record (1883 to 2003) and the period after closure of the three upstream dams (1984 to 2003) are presented in Figure 2.3.1-6. As would be expected, the curves indicate that regulation has increased minimum daily flows and has reduced maximum daily flow on the Savannah River downstream.

The n-day low flow for a stream is the average flow measured during the n consecutive days of lowest flow during any given year. The 7-day, 10-year low flow statistic, 7Q10, is an estimate of the lowest average flow that would be experienced during a consecutive 7-day period with an average recurrence interval of 10 years, and is used as an indicator of low flow conditions during drought periods **(McMahon and Mein 1986)**.

Table 2.3.1-14 shows the 3-, 7-, 10-, 30-, 60-, 90-, 183-, and 365-day average low flows for each year of record for the Savannah River gage at Augusta (Gage 2197000) as determined from the daily flow data using the USGS program SWSTAT **(USGS 1994)**.

The 7-day low flow data for each complete low-flow year (defined as April 1 to March 31 to prevent splitting the low-flow season into two parts each year) from 1986 to 2003 with continuous upstream regulation is used **(USGS 1994)** to estimate 7-day low flow frequency, from which the 7Q10 low flow parameter is estimated as 3,828 cfs (see Table 2.3.1-15 and Figure 2.3.1-7).

#### 2.3.1.1.3.4 Historic Flooding and Annual Peak Flood Frequencies

Table 2.3.1-16 **(USGS 2006a)** provides the date, stage elevation, and annual peak discharge for the entire period of record for USGS Gage 02197000 on the Savannah River at Augusta, Georgia, approximately 48.7 River Miles upstream of the VEGP site. The annual peak floods include estimated values from historic floods reported in 1796, 1840, 1852, 1864, and 1865.

The maximum annual peak flood discharge for the period of record is 350,000 cfs, from the storm of October 2, 1929. The storm of January 17, 1796, estimated from reported stages using slope-conveyance methods, is the oldest event used to extend the record length. The estimated value of the peak flow for this storm ranges between 280,000 cfs for a reported stage of 38 ft **(USGS 2006a)** and 360,000 cfs for a reported maximum flood stage of 40 ft **(USGS 1990a)**. This puts the maximum flood elevation of the Savannah River at Augusta, Georgia, for the historic period between 134.6 and 136.6 ft msl, based on an El. 96.58 ft msl for the Augusta, Georgia, stream gage datum (see Table 2.3.1-5).

After 1952, annual peaks on the Savannah River at Augusta, Georgia, are attenuated by regulation from upstream reservoirs: J. Strom Thurmond (a.k.a. Clarks Hill) Lake and Dam in 1952, Hartwell Lake and Dam in 1961, and Richard B. Russell Lake and Dam in 1984 **(USACE 1996)**. This attenuation of floods is shown in Figure 2.3.1-8 **(USGS 1990a)**, which is based on the historic record from 1796 to 1985.

Annual peak flood frequency curves for regulated and unregulated conditions for the Savannah River at Augusta, Georgia, were developed for the period between 1796 and 1985 and are presented in Figure 2.3.1-9 **(USGS 1990a)**. Unregulated annual peak discharge values for the period after 1952 and regulated annual peak discharge values for the years previous to 1952 were generated by modeling reservoir operation based on the stage-storage-discharge characteristics reported for the three projects, using the 1990 operating rule set for the entire period **(USGS 1990a)**.

Figure 2.3.1-9 clearly shows the convergence of the regulated and unregulated annual flood frequency plots as discharge increases. On the left-hand side of the graph, for the 80 percent chance-of-exceedence event (a return period of 1.25 years), the unregulated peak discharge exceeds the regulated peak by a factor of about 2.14; on the left-hand side, for the 0.2 percent chance-of-exceedence event (a return period of 500 years), the unregulated peak discharge exceeds the regulated peak by a factor of about 1.29. On this basis, regulation would not be expected to significantly affect the probable maximum flood on the Savannah River downstream of Augusta, provided that the upstream dams do not fail.

#### 2.3.1.1.4 Dams and Reservoirs

There are a number of water control structures on the Savannah River and its major tributaries, as identified in **USGS (1990a)**, **USACE (1993)**, and **USACE (1996)**. Table 2.3.1-17 presents a list of these structures with hydraulic design information for each project and identification of its location with respect to the VEGP site.

Three projects operated by the Corps of Engineers upstream of the VEGP site have a significant influence on the discharge of the Savannah River:

- Hartwell Lake and Dam, with 2,550,000 acre-feet of gross storage
- Richard Russell Lake and Dam with 1,026,000 acre-feet of gross storage
- J. Strom Thurmond Lake and Dam, with 2,510,000 acre-feet of gross storage

The authorized water management goals of the three-dam, multiuse project are specified for normal operation, flood operation, and drought condition operation in the Corps Water Control Plan as follows:

- For normal conditions, the operation policy is designed to maximize the public benefits of hydroelectric power, flood damage reduction, recreation, fish and wildlife, water supply, and water quality **(USACE 1996)**.
- Under flood conditions, the water management objective is to operate the reservoir system to minimize flooding downstream by timing turbine discharge, gate openings, and spillway discharge as required.
- For drought conditions, the water management objectives of the project are:
  - To prevent draw-down of lake levels below the bottom of the conservation pool
  - To make use of most of the available storage in the lake during the drought-of-record
  - To maintain hydroelectric plant capacity throughout the drought
  - To minimize adverse impacts to recreation during the recreation season (generally considered from May 1 through Labor Day)

The Corps also operates the New Savannah Bluff Lock and Dam, 36.8 River Miles upstream of the VEGP site. This project has very little impact on flows at the site, due to its run-of-river status and negligible storage volume **(USACE 1996)**.

The four projects are described briefly in the following paragraphs **(USACE 1996)**.

**The Hartwell Lake and Dam** is located at River Mile 288.9, 7 mi east of Hartwell, Georgia, and 138 River Miles upstream of the VEGP site. The top of the conservation pool is set at El. 660 ft msl. At this level, the reservoir extends 49 mi up the Tugaloo River in Georgia and 45 mi up the Seneca and Keowee rivers in South Carolina. The shoreline at El. 660 ft msl is about 962 mi long, excluding island areas. The project became operational in 1965.

The reservoir has a total storage capacity of 2,550,000 acre-feet below El. 660 ft msl, and 293,000 acre-feet of flood control storage between El. 660 ft msl and El. 665 ft msl. The dam consists of a concrete gravity section, which is 1,900 ft long and rises about 204 ft above the streambed, and two earth embankment sections extending to high ground on the Georgia and South Carolina shores of the river, for a total length of 17,880 ft.

**The Richard B. Russell Lake and Dam** is located at River Mile 259.1 in Elbert County, Georgia, and Abbeville County, South Carolina, 108.2 River Miles upstream of the VEGP site. The dam is 18 mi southwest of Elberton, Georgia; 4 mi southwest of Calhoun Falls, South Carolina; and 40 mi northeast of Athens, Georgia. Operation of the project began in 1985.

The top of the conservation pool is set at El. 475 ft msl, at which elevation the reservoir has a total storage volume of about 1,026,000 acre-feet and a useable storage capacity of 126,800 acre-feet. The flood control pool provides about 140,000 acre-feet of additional storage between elevations 475 and 480 ft msl.

The dam consists of a concrete gravity section, which is 1,883.5 ft long, and two earth embankment sections, 2,180 ft long in Georgia and 460 ft long in South Carolina. A concrete overflow spillway section is located in what was formerly the stream channel. It has an ogee-shaped crest controlled by 10 tainter gates.

**The J. Strom Thurmond Lake and Dam** (also known as the Clarks Hill Lake and Dam) is at River Mile 221.6 on the Savannah River, 22 mi upstream of Augusta, Georgia, and 70.7 River Miles upstream of the VEGP site. The project became operational in 1952. The reservoir at the top of the flood control pool, El. 335 ft msl, has an area of 78,500 acres. At El. 330 ft msl, the top of the conservation pool, the reservoir extends about 40 mi up the Savannah River and about 30 mi up the Little River in Georgia and has about 1,050 mi of shoreline, excluding island areas.

The reservoir has a total storage capacity of 2,510,000 acre-feet below El. 330 ft msl, with an additional 390,000 acre-feet of flood control storage between El. 330 ft msl and El. 335 ft msl. The dam consists of a concrete gravity section, which is 2282 feet long, and two earth embankment sections extending to high ground on the Georgia and South Carolina shores, with at total length of 5680 feet,

**The New Savannah Bluff Lock and Dam** is at River Mile 187.7, 36.8 river miles upstream of the VEGP site. The structure is located on the Savannah River about 13 mi below Augusta. It is a concrete dam 360 ft long containing five vertical-lift crest control gates. The lock chamber, located on the Georgia side of the river, is 56 ft by 360 ft and is closed by miter gates. The lift is 15 ft. The normal pool elevation is about 115.0 ft msl. The dam was originally constructed to provide a lock to support navigation to Augusta, Georgia. Currently it is used primarily to re-regulate upstream releases for downstream water supply withdrawals.

In 2000, the Savannah District Corps of Engineers issued a Disposition Study under Section 216 of the Flood Control Act of 1970 to examine the current uses of the New Savannah Bluff Lock and Dam and recommend disposition for the future. The study concluded that the only feasible option was to remove the dam. This result was met with vehement opposition by property owners, water supply, recreational interests and in 2005 a decision was made to repair the lock chamber and keep the dam in service. This decision has no significant impact on existing or proposed units at VEGP.

### 2.3.1.2 Groundwater Resources

The VEGP site lies within the Coastal Plain Physiographic Province. The site is underlain by approximately 1,000 ft of Coastal Plain sediments. The hydrogeologic conditions within the Coastal Plain sediments can be summarized as permeable coarse-grained materials separated by less-permeable fine-grained materials, resulting in a multiple aquifer system.

#### 2.3.1.2.1 Regional Hydrogeology

The region within a 200-mi radius around the VEGP site encompasses parts of four physiographic provinces. These include, from northwest to southeast, the Valley and Ridge, Blue Ridge, Piedmont, and Coastal Plain Physiographic Provinces. Several major aquifers or aquifer systems are present within these physiographic provinces. Figure 2.3.1-10 illustrates the extent of these major aquifers or aquifer systems at the land surface. The VEGP site and associated groundwater are located within the Coastal Plain Physiographic Province. However, groundwater within the other provinces is discussed below to provide a complete picture of regional hydrogeologic conditions.

The Valley and Ridge Physiographic Province lies about 180 mi northwest of the VEGP site. Aquifers underlying the Valley and Ridge province occur within Paleozoic-age folded and faulted sedimentary rock. The sedimentary strata consist predominantly of sandstone, shale, and limestone, with minor amounts of dolomite, conglomerate, chert, and coal. The carbonate and sandstone layers form the principal aquifers in the province. Typical well yields are from 10 gpm in sandstone formations to 10 to 50 gpm within the limestone units. Locally high yields, equal to 100 gpm or greater, are possible within highly fractured strata or solution cavities. Localized weathered rock and alluvium can provide lesser, but adequate, groundwater yields for domestic use. **(Miller 1990)**

The Piedmont and Blue Ridge Physiographic Provinces are hydrologically similar in nature. The provinces are composed primarily of metamorphic rocks with igneous intrusions. Surface materials consist of overlying saprolite with alluvium. Groundwater occurs both in the fractured portions of bedrock and within the saprolite and alluvium material. Well yields generally depend on the local fracture density of the bedrock and range from a few to 30 gpm. Localized groundwater well yields of 100 gpm or greater are possible. **(Miller 1990)**

The majority of Georgia's groundwater use occurs in the Coastal Plain Physiographic Province. The Coastal Plain sediments are thin, less than 200 ft thick, along the western boundary of the province (where they terminate at the contact with the Piedmont province) and thicken to over 4,000 ft in an eastern-to-southeastern direction. The sediments range in age from Holocene to

Cretaceous and overlie crystalline igneous and metamorphic bedrock, which is an eastward extension of the Piedmont province **(Miller 1990)**.

Groundwater in the Coastal Plain is withdrawn from both unconfined, shallow aquifer systems and deeper, confined aquifer systems. These aquifers are recharged principally from their outcrop area along the western boundary of the province near the Fall Line and from localized infiltration of precipitation within the province. Precipitation migrates downward and laterally through the unconsolidated surficial materials for discharge to nearby streams and low areas or percolates downward into the deeper unconsolidated and consolidated material. The thickness and areal extent of the Coastal Plain sediments result in a storage capacity for groundwater that exceeds that of any other physiographic provinces in Georgia **(Miller 1990)**.

Three regional Coastal Plain aquifer systems are identified within a 50-mi radius of the VEGP site region: Surficial aquifer system, Floridan aquifer system, and Southeastern Coastal Plain aquifer system **(Miller 1990)**. The Surficial aquifer system is described as localized water-bearing sediments of Miocene age or younger. Typical well depths range from 11 to 300 ft, with well yields of 2 to 25 gpm. Well depths are dependent on location and material thickness. The Floridan aquifer system has typical well depths of 40 to 900 ft, with average well yields of 1,000 to 5,000 gpm. Multiple unconsolidated and consolidated water-bearing limestone formations exist within the aquifer system, separated by semi-confining to confining, fine-grained material. Typical well depths in the Southeastern Coastal Plain aquifer system are 30 to 800 ft, with well yields of 50 to 1,200 gpm. **(Leeth et al. 2005)**

The bedrock underlying the Coastal Plain sediments consists of crystalline rock and Paleozoic sedimentary rocks. Due to the sufficient amount of groundwater found in the overlying sediments, the bedrock is not typically used as a source of groundwater in the Coastal Plain Physiographic Province **(Miller 1990)**.

No sole-source aquifers have been designated within the VEGP site region **(EPA 2006)**.

#### 2.3.1.2.2 Local Hydrogeology

The VEGP site lies within the Coastal Plain Physiographic Province. The site is located approximately 40 mi southeast of the Fall Line, the northwestern boundary of the Coastal Plain province, and is adjacent to the Savannah River. Geologic conditions beneath the VEGP site generally consist of about 1000 ft of Coastal Plain sediments with underlying Triassic Basin rock and Paleozoic crystalline rock.

The Savannah River lies along the northeast border of the VEGP site and influences the local hydrogeologic conditions within the site area. This local hydrogeology discussion is restricted to the VEGP site vicinity (approximate radius of 5 mi) south of the Savannah River.

Geotechnical and hydrogeological investigations performed for this ESP application provide information on the VEGP site from the Triassic Basin rock to the ground surface. Results from these investigations indicate that there are three aquifers underlying the VEGP site, the Cretaceous, Tertiary, and Water Table (or Upper Three Runs), all of which belong to the Southeastern Coastal Plain aquifer system. Although present regionally, the Surficial aquifer system, consisting of Miocene (Hawthorne Formation) through Quaternary deposits, is not continuous over Burke County or the VEGP site **(Miller 1990)**. The Floridan aquifer system, also present regionally, is absent from the VEGP site as well **(Huddlestun and Summerour 1996)**.

The lower aquifer at the VEGP site overlies the bedrock and is comprised of Cretaceous-age sediments. Locally, this aquifer system is known as the Cretaceous aquifer. The sediments include sands, gravels, and clays of the Cape Fear Formation, Pio-Nono Formation and associated unnamed sands, Gaillard Formation, Black Creek Formation, and Steel Creek Formation. The middle aquifer is made up of Tertiary-age sediments occurring over the Cretaceous-age sediments described above. The middle aquifer system is locally known as the Tertiary aquifer. It consists primarily of the permeable sands of the Still Branch and Congaree Formations. The relatively impermeable clays and silts of the Snapp and Black Mingo Formations overlie and confine the Cretaceous aquifer, while the clays and clayey sands of the Lisbon Formation overlie and confine the Tertiary aquifer**.** The upper aquifer is unconfined and is comprised of Tertiary-age sands, clays, and silts of the Barnwell Formation, which overlie the relatively impermeable Lisbon Formation. This aquifer is known locally as the Water Table aquifer or Upper Three Runs aquifer. A hydrostratigraphic section showing geologic units, confining units, and aquifers for the VEGP site and surrounding areas is shown in Figure 2.3.1-11. Further discussion of the aquifers underlying the VEGP site and surrounding area is provided below.

Cretaceous Aquifer

The Cretaceous aquifer locally comprises the Cape Fear Formation, Pio-Nono Formation/unnamed sands, Gaillard Formation/Black Creek Formation, and Steel Creek Formation. These formations generally consist of fluvial and estuarine deposits of cross-bedded quartzitic sand and gravel interbedded with silt and clay. The coarse-grained sediments are mostly unconsolidated and are generally permeable, while the fine-grained sediments are partially consolidated and are generally impermeable. In addition to the varying lithology, the formation also exhibits lateral facies changes, on-lap and off-lap relationships, and discontinuous lenses **(Huddlestun and Summerour 1996)**. The elevations, thicknesses, and descriptions of these geologic formations, as determined from VEGP geotechnical boring B-1003, are summarized below:

- The basal Cape Fear Formation overlies the Triassic Basin bedrock, which is of Paleozoic age and consists of alternating mudstone, sandstone, and breccia. Boring B-1003 encountered top of bedrock at an elevation of approximately -826 ft msl and was advanced an additional 289 ft to elevation of -1,115 ft msl. The Cape Fear Formation consists of interbedded sands, silts, clays, and gravels. The formation is approximately 191 ft thick, with the top of the formation being at El. -635 ft msl.

- The Pio-Nono Formation and other unnamed sands overlie the Cape Fear Formation. This formation consists of sand, silt, and clay. The formation is approximately 60 ft thick, while the top of the formation is at approximately El. -575 ft msl.

- The undifferentiated Gaillard Formation and Black Creek Formation overlie the Pio-Nono Formation and unnamed sands. Most of the formation consists of sand with silt and clay, and layers of gravel. The deposit is approximately 211 ft thick, with the top of the formation being at approximately El. -364 ft msl.

- The Steel Creek Formation overlies the undifferentiated Gaillard Formation and Black Creek Formation. It consists mainly of sand with clay and silt. The formation is approximately 110 ft thick; the top of the formation is at approximately El. -254 ft msl.

The Cretaceous aquifer system has not been extensively developed, primarily because the shallower Tertiary system is adequate for most groundwater needs and is available for use throughout the region. Quantitative data from the limited number of test and production wells in the Cretaceous strata, and inferred data from geologic and stratigraphic studies, indicate clearly that the Cretaceous aquifer system is highly capable of yielding large quantities of good quality groundwater.

Recharge to the Cretaceous aquifer system is primarily by direct infiltration of rainfall in its outcrop area, located north of the VEGP site in a 10- to 30-mile-wide belt extending from Augusta, Georgia, northeastward across South Carolina to near the state line separating North and South Carolina. In the outcrop areas, precipitation penetrates the Cretaceous sediments. Groundwater in the outcrop areas is under water table conditions, but as it moves progressively downdip, it becomes confined beneath the overlying Snapp and Black Mingo Formations in the vicinity of the VEGP site. Hence, the Cretaceous aquifer system is under confined conditions for most of its areal extent. Discharge of the Cretaceous aquifer system is primarily from subaqueous exposures of the aquifer that are presumed to occur along the Continental Shelf. Other discharge sources are to the Savannah River and by pumping.

Tertiary Aquifer

The most productive aquifer at the VEGP site consists of the Congaree and Still Branch Formations, which are hydraulically connected and are referred to as the Tertiary sand aquifer. The overlying Lisbon Formation, containing the Blue Bluff Marl, acts as a confining layer. The elevations, thicknesses, and descriptions of geologic formations comprising the Tertiary aquifer, as encountered in boring B-1003, are summarized below:

- The Black Mingo and Snapp Formations constitute a semi-confining hydrogeologic unit under the VEGP site that separates the underlying Cretaceous aquifer from the overlying Tertiary sand aquifer as they decline to the southeast. The Paleocene-age Black Mingo Formation is approximately 39 ft thick and consists of sand, clay, and silt. The top of the formation is at approximately El. -215 ft msl. The Snapp Formation overlies the Black Mingo Formation and consists of sand, clay and silt, and includes a basal gravel layer. The stratum is also Paleocene in age. The formation is approximately 107 ft thick. The top of the formation is at approximately El. -108 ft msl.

- Above the Snapp is the Eocene-age Congaree Formation. The Congaree Formation has a thickness of about 115 ft and consists primarily of sand with clay and silt, and a basal gravel layer. The top of the formation is at an elevation of approximately 7.3 ft msl. The overlying Still Branch and Bennock Millpond Sands Formation consist of sand, clay, and silt and has a weak carbonate component. The formation thickness is approximately 67 ft, with the top of the formation being approximately El. 74 ft msl.

- Overlying the Tertiary sediments is the Lisbon Formation. The Lisbon Formation is Eocene in age and is comprised of sand, clay, and silt with interbedded layers of fossiliferous limestone. The Lisbon Formation contains a marl known as the Blue Bluff Member (Blue Bluff Marl). The Lisbon Formation also contains the McBean Limestone Member, a fossiliferous limestone layer. The formation has a thickness of approximately 63 ft, and the top of the formation is at approximately El. 137 feet msl. This formation separates the confined and unconfined aquifer systems beneath the VEGP site.

Recharge to the Tertiary aquifer is primarily by infiltration of rainfall in its outcrop area, which is a belt 20 to 60 miles wide extending northeastward across central Georgia and into portions of Alabama to the west and South Carolina to the east. Discharge from the Tertiary aquifer occurs from pumping, from natural springs in areas where topography is lower than the piezometric level of the aquifer, and from subaqueous outcrops that are presumed to occur offshore. Discharge also occurs to the Savannah River where the river has completely eroded the Blue Bluff Marl confining layer allowing discharge from the aquifer to the river.

Water Table Aquifer

The uppermost aquifer at the VEGP site is unconfined and consists of the Barnwell Group, including the discontinuous deposits of the Utley Limestone, as well as Quaternary deposits along adjacent stream channels. The saturated interval within the Barnwell Group is commonly referred to as the Water Table aquifer (also known as the Upper Three Runs aquifer) and is the first water-bearing zone encountered beneath the VEGP site. The descriptions of the Barnwell Group were determined from VEGP geotechnical and hydrogeological borings and are described as follows:

- The basal Utley Limestone Member of the Barnwell Group consists of sand, clay, and silt with carbonate-rich layers. The stratum is discontinuous across the VEGP site and was not encountered in several of the borings. When encountered, the thickness of the stratum ranges from approximately 22 to 104 ft, and the top of the formation ranges from approximately El. 151 to 199 ft msl. The Utley limestone was encountered at boring B-1003. The stratum is approximately 38 ft thick at this location with a top elevation of approximately El. 175 ft msl.
- Overlying the Utley Limestone are undifferentiated sands, clays, and silts. The thickness of the group is variable with a range of approximately 48 to 164 ft. The top of the group ranges from approximately El. 205 to 264 ft msl. At boring B-1003, the formation is approximately 48 ft thick with the top of the formation being at an elevation of approximately 223 ft msl.

Recharge to the Water Table aquifer is almost exclusively by infiltration of rainfall. The presence of porous surface sands and the moderate topographic relief in the VEGP site area suggest that a significant fraction of the precipitation either infiltrates the ground or is lost to the atmosphere by evapotranspiration. Discharge is to localized drainages and wells.

#### 2.3.1.2.3 Observation Well Data

Data from a combination of new wells installed for the ESP application and existing VEGP site wells were used to develop the groundwater elevation contour maps. The new wells, designated OW-1001 through OW-1015, were installed in May and June 2005. (One of the wells, OW-1001, had very little change in groundwater levels and is not included in the analysis. A replacement well, OW-1001A, was installed in October 2005.) Ten of the new wells are screened in the Water Table aquifer. The remaining five new wells are screened in the confined Tertiary aquifer system below the Blue Bluff Marl. No wells were installed into the deeper Cretaceous aquifer. Existing wells 142 and 179, remaining from the pre-construction monitoring network for VEGP Units 1 and 2, are screened in the Water Table aquifer. Existing wells with identifications beginning with the number 8 were installed between 1979 and 1985 to monitor construction dewatering of VEGP Units 1 and 2. These wells are screened in either the Water Table or Tertiary aquifers. Existing wells with an LT designation were installed in 1985 as part of post-construction monitoring activities and are associated with the Water Table aquifer. The locations of observation wells presently being monitored at the VEGP site area are shown in Figure 2.3.1-12. Table 2.3.1-18 lists the observation wells currently being used to monitor the Water Table aquifer, while Table 2.3.1-19 lists the observation wells currently being used to monitor the Tertiary aquifer.

Monthly water levels in the observation wells were measured to characterize seasonal trends in groundwater levels and flow directions for VEGP site. Monthly monitoring of these wells began in June 2005 and is continuing. A 12-month data set representing June 2005 to June 2006 is utilized for this application. In addition, longer-term data are available for some of the existing wells completed in the Water Table and Tertiary aquifers, which are used to characterize historical trends.

The following groundwater piezometric surface trend discussion is based on the information presented in Figures 2.3.1-13 through 2.3.1-27 and Tables 2.3.1-18 and 2.3.1-19.

Water Table Aquifer

Historical groundwater elevations for the 1971-1985 period for the Water Table aquifer are provided in Figure 2.3.1-13 for wells 142, 179, 803A, 804, and 805A. This monitoring occurred before construction, during construction dewatering, and after dewatering of VEGP Units 1 and 2. These data show the effect of construction dewatering and the recovery of groundwater levels after dewatering activities were completed. Historical groundwater elevation data for the 1995-2004 period are shown in Figure 2.3.1-14 for Water Table aquifer wells LT-1B, LT-7A, LT-12, LT-13, 802A, 805A, 806B, and 808. Groundwater elevations were relatively steady from 1995 to 1999; however, groundwater elevations decreased from 2000 through 2002, with 2002 having the lowest values. These decreases correlate to a drought that affected the region in the 1999-2002 period. Groundwater levels have partly recovered in the subsequent years.

Recent groundwater data from 2005 and 2006 for the Water Table aquifer are shown in Figure 2.3.1-15. These data exhibit little variability and do not show any significant seasonal influences during this monitoring period. Groundwater elevations range from approximately El. 132.5 to 165.5 ft msl across the area monitored.

The groundwater elevation data summarized in Table 2.3.1-18 were used to develop quarterly groundwater surface elevation contour maps for the Water Table aquifer. These maps are presented in Figures 2.3.1-16 through 2.3.1-20 for June 2005 through June 2006. Note that October 2005 data, as opposed to September 2005 data, were used to develop the contour map for the second quarter so that data from replacement well OW-1001A, installed in October 2005, could be incorporated. For each quarter, the spatial trend in the piezometric surface is similar, with elevations ranging from a high of approximately El. 165 ft msl in the vicinity of well OW-1013 to a low of less than El. 135 ft msl at well OW-1005. The groundwater surface contour maps indicate that horizontal groundwater flow across the VEGP site is in a north-northwest direction toward Mallard Pond (also known as Mathes Pond). This surface water feature is a local discharge point for the shallow groundwater flowing beneath the VEGP site. The horizontal hydraulic gradient across the site for the Water Table aquifer is relatively consistent between the five figures and is approximately 0.012 ft/ft.

Tertiary Aquifer

Historical groundwater elevations from 1971 through 1985 for Tertiary aquifer wells 27 and 29 are provided in Figure 2.3.1-21.

Recent groundwater elevation data from 2005 and 2006 for the Tertiary aquifer are shown in Figure 2.3.1-22. Elevations are relatively constant from June to August 2005. In most cases, the piezometric head of the aquifer declines from August 2005 through November 2005. The elevations begin to rebound in December 2006, continuing through February 2006. The lowering of the piezometric surface is likely in response to a decrease in precipitation. October and November are the months with the lowest precipitation during the year for this area. Well 27 shows a higher degree of variability than the others and is likely influenced by its proximity to the river.

The groundwater elevation data summarized in Table 2.3.1-19 were used to develop piezometric surface maps for the Tertiary aquifer. The Tertiary aquifer piezometric surface is presented in Figures 2.3.1-23 through 2.3.1-27 for June 2005 through June 2006. The piezometric surfaces for the Tertiary aquifer show a relatively consistent flow pattern. In general, the groundwater in this aquifer unit shows an east-to-northeast flow pattern, toward the Savannah River. Head elevations range from approximately El. 125 ft msl in the western portion of the VEGP site to less than El. 100 ft msl in the vicinity of the bluff next to the Savannah River flood plain. The elevation of the piezometric head at the bluff and that of the Savannah River flood plain suggest groundwater is discharging to the Savannah River. The piezometric elevations in the Tertiary aquifer decreased at least 1.5 ft across the VEGP site in December 2005, reflecting the seasonal decrease in precipitation.

The horizontal hydraulic gradient across the site for the Tertiary aquifer is relatively consistent among the five figures and is approximately 0.006 ft/ft. In the center of the VEGP site, there is a downward head difference of approximately 50 ft between the Water Table aquifer and the Tertiary aquifer, suggesting hydraulic separation of the two aquifers. The Blue Bluff Marl confining unit that separates the aquifer systems has an average thickness of about 70 ft at VEGP site.

Tertiary Aquifer

At the VEGP site, both the Cretaceous and the Tertiary aquifers are considered confined beneath the Blue Bluff Marl but are in apparent hydraulic connection with each other. At some distance downdip of the VEGP site, the Cretaceous aquifer becomes hydraulically separated from the Tertiary aquifer. This separation is believed to be due to facies changes in the intervening clays and silts of the Snapp and Black Mingo formations becoming relatively impermeable. The point at which this occurs is not well defined but it is believed to be a few miles downdip (south) of the site.

The regional direction of the groundwater flow in the Cretaceous (and the Tertiary) aquifer system is south-by-southeast at a hydraulic gradient of approximately 6 to 20 ft/mi (0.001 to 0.004 ft/ft) **(Siple 1967)**. From the vicinity of the Fall Line to a point expected to be a few miles south of the site, the Savannah River has downcut through the Blue Bluff Marl confining layer and into the underlying strata. This cut allows both the Cretaceous and the Tertiary aquifers to discharge to the riverbed, resulting in a localized hydraulic (groundwater) sink. The aquifer flow directions in the vicinity of the river cut are affected by the hydraulic sink and do not follow regional trends.

### 2.3.1.2.4 Hydrogeologic Properties

The 15 new groundwater observation wells installed in connection with the ESP application were slug tested to determine in situ hydraulic conductivity values for the Water Table and Tertiary aquifers. Table 2.3.1-20 summarizes the test results. Soil samples collected from selected geotechnical and hydrogeological borings were submitted for laboratory tests to determine grain size, moisture content, and specific gravity, results from which are included in Tables 2.3.1-21 through 2.3.1-23. Similar data are available for the adjacent VEGP Units 1 and 2 site. The hydrogeological properties of the Water Table aquifer, Lisbon Formation (Blue Bluff Marl) confining unit, Tertiary aquifer, and Cretaceous aquifer at the VEGP site are discussed below.

Water Table Aquifer

In the vicinity of the VEGP site, the basal unit of the Barnwell Group, the Utley limestone member, is capable of transmitting groundwater but is of limited areal and vertical extent. In addition, the horizontal and vertical hydraulic conductivity of the saturated clays, silts, and sands within the Barnwell Group varies considerably, due to variable clay content.

The hydraulic conductivity of the Water Table aquifer within the vicinity of the VEGP site was measured previously by both in situ and laboratory testing methods during site characterization investigations for VEGP Units 1 and 2. In situ hydraulic conductivity values for the Barnwell Group sands, silts, and clays were found to range between 60 and 340 ft/yr (0.16 to 0.93 ft/day), with a geometric mean of 0.55 ft/day. Laboratory values varied considerably beyond the range of the in situ tests. Well pumping tests conducted in the Utley Limestone resulted in hydraulic conductivities ranging from 1,530 to 125,400 ft/yr (4.2 to 340 ft/day), while falling and constant head tests suggested lower values, ranging from 96 to 5,800 ft/yr (0.26 to 16 ft/day). Laboratory porosity values for the Barnwell Group sands, silts, and clays were found to range from 34 to 61 percent, with a mean value of 44 percent.

Hydraulic conductivities were determined for the VEGP site as part of the ESP investigation. Slug test results for the Water Table aquifer range from 0.074 to 2.7 ft/day, with a geometric mean of 0.41 ft/day (Table 2.3.1-20). Table 2.3.1-21 summarizes the laboratory test results for geotechnical samples of the Barnwell Formation, which were at depths ranging from El. 108 to 248 ft msl. Sand and clay make up the majority of samples, with some gravel present. Measured moisture contents, by weight, range from 4 to 93 percent. Specific gravity analysis was performed only for the samples collected from the observation well borings. Values range between 2.61 to 2.90 and have a median value of 2.66. Using the median moisture content of 25 percent and a value of 2.66 for the specific gravity, the void ratio is estimated to be about 0.67. A total porosity of 40 percent is calculated from this void ratio, and an effective porosity of about 32 percent is estimated based on 80 percent of the total porosity **(de Marsily 1986)**. The specific yield for the Water Table aquifer was not determined; however, an estimate of this value taken from published literature for similar aquifer materials indicates that it may be in the range of 0.20 to 0.33 **(McWhorter and Sunada 1977)**.

The groundwater travel time in the Water Table aquifer was calculated from the ESP site to the projected discharge point (Mallard Pond). A horizontal hydraulic gradient of 0.012 ft/ft between observation wells OW-1010 and OW-1005, a hydraulic conductivity of 0.41 ft/day, and the effective porosity of 32 percent were selected to calculate an average horizontal groundwater velocity of 0.015 ft/day. Using a distance of approximately 2,200 ft from center of the power block area for the new AP1000 units to the closest point of Mallard Pond, the groundwater travel time from the power block area to Mallard Pond is estimated to be about 400 years.

Lisbon Formation (Blue Bluff Marl) Confining Unit

The hydraulic conductivity of the marl layer is very low, and it effectively confines the aquifer underlying it. It is considered a barrier to vertical groundwater movement. In situ permeability tests (packer tests) were performed in the marl during site characterization investigations for VEGP Units 1 and 2. In 90 percent of the intervals tested, no measurable water inflow occurred. Laboratory permeability tests were also conducted on core samples collected from the marl. Laboratory measurements ranged from 0.0052 to 8.8 ft/yr ($1.4 \times 10^{-5}$ to $2.4 \times 10^{-2}$ ft/day) with a geometric mean of $1.3 \times 10^{-3}$ ft/day, indicating the marl is nearly impermeable. Porosity values ranged from 24 to 62 percent, with a mean value of 48 percent.

Geotechnical laboratory results for the Lisbon Formation (Blue Bluff Marl) confining unit are summarized in Table 2.3.1-22 for the VEGP site. Soil samples were collected between El. 51 and 135 ft msl. The samples consist of gravel, sand, and clay. Moisture contents range from 13.5 to 67 percent, with porosities of 25 to 59 percent. Using the median moisture content of 29 percent from geotechnical laboratory results and an assumed specific gravity of 2.65, the void ratio of the confining unit is estimated to be 77 percent. Based on the void ratio value, total porosity is calculated to be 44 percent. Assuming effective porosity is 80 percent of total porosity, the effective porosity for the confining unit is 35 percent **(de Marsily 1986)**.

Tertiary Aquifer

Hydraulic conductivities determined from Tertiary aquifer slug tests range from 0.35 to 2.1 ft/day, with a geometric mean of 0.83 ft/day (Table 2.3.1-20). These results are consistent with those for the VEGP Units 1 and 2 site for which the geometric mean was determined to be 0.51 ft/day. The laboratory results from the selected geotechnical samples collected in the Tertiary aquifer are presented in Table 2.3.1-23. Sample elevations range from El. -273 ft msl to 69 ft msl, with the samples consisting mainly of sand and fine particles, with some gravel. Moisture content ranges from 18 to 40 percent, with specific gravity values varying from 2.62 to 2.69. Using the median moisture content of 24 percent and a value of 2.67 for the specific gravity, the void ratio of the Tertiary aquifer is estimated to be about 0.64. A total porosity of 39 percent is calculated from this void ratio, and an effective porosity of about 31 percent is estimated based on 80 percent of the total porosity **(de Marsily 1986)**. The storage coefficient for the Tertiary aquifer alone was not determined; however, previous tests of wells completed in the combined Cretaceous/Tertiary aquifers suggest that a value on the order of $10^{-4}$ would be a reasonable estimate (see below).

The horizontal hydraulic gradient of the Tertiary aquifer is approximately 0.0044 ft/ft, based on the average groundwater elevations between well OW-1011 and well 27. The average horizontal groundwater velocity was calculated at 0.012 ft/day using a hydraulic conductivity of 0.83 ft/day, a hydraulic gradient of 0.0044 ft/ft, and an effective porosity of 31 percent. Using a distance of 5,600 ft from center of the power block area for the new AP1000 units to the closest point of the Savannah River, the groundwater travel time from the power block area to the Savannah River in the Tertiary aquifer is estimated to be about 1300 years.

Cretaceous Aquifer

Two makeup water wells (designated as MU-1 and MU-2A) for VEGP Units 1 and 2 were reported to be capable of supplying water at 2,000 gal./min and 1,000 gal./min, respectively. The water is withdrawn from the combined Cretaceous/Tertiary aquifers. Pumping tests were conducted at these wells in 1977. Transmissivity values ranged between 110,400 to 130,900 gallons per day per foot (gpd/ft). A storage coefficient was calculated at $1.07 \times 10^{-4}$.

A pumping test was also conducted in a Cretaceous aquifer test well identified as TW-1 during site characterization activities for VEGP Units 1 and 2. A transmissivity value of 158,000 gpd/ft was calculated as an average value for the aquifer. The storage coefficient ranged between $3.3 \times 10^{-4}$ and $2.1 \times 10^{-4}$, indicating the aquifer is effectively under confined conditions.

Vertical hydraulic conductivities were estimated assuming that the anisotropy ratio between the vertical and horizontal directions is 1:3, based on measured horizontal and vertical hydraulic conductivities for sandstone deposits **(Freeze and Cherry 1979)**. The vertical hydraulic conductivities for the Water Table aquifer, Lisbon Formation confining unit, and Tertiary aquifer are estimated to be 0.14, 0.00045, and 0.28 ft/day, respectively.

2.3.1.2.5 Summary

The VEGP site lies within the Coastal Plain Physiographic Province. Geologic conditions beneath the VEGP site generally consist of about 1000 ft of Coastal Plain sediments with underlying Paleozoic sedimentary Triassic sediments and Paleozoic crystalline rock Groundwater at the site occurs in three aquifers that are part of the Southeastern Coastal Plain aquifer system. The lower (Cretaceous) aquifer is comprised of Cretaceous-age sediments, while the middle (Tertiary) aquifer is comprised of Tertiary-age sediments. Both are under confined conditions. The upper (Water Table) aquifer, comprised of Tertiary-age sediments, is unconfined. Recharge to the Cretaceous and Tertiary aquifers occurs in their outcrop areas north of the VEGP site. These aquifers discharge to the Savannah River and to subaqueous outcrops along the Continental Shelf. Recharge to the Water Table aquifer occurs by infiltration of precipitation. Discharge is to localized drainage and stream incisions.

Observation wells completed in the Water Table and Tertiary aquifers were used to develop piezometric contour maps and hydraulic gradients. Hydrogeologic properties of these aquifers were determined by laboratory testing of soil samples and by in situ testing. Piezometric contour maps for the Water Table aquifer indicate that groundwater flow across the VEGP site is northward towards Mallard Pond, which serves as a discharge area. The groundwater travel time from the center of the VEGP site to Mallard Pond is estimated to be about 400 years. Piezometric contour maps for the Tertiary aquifer show groundwater flow across the VEGP site to be in the east-to-northeast direction toward the Savannah River, which serves as a discharge area. The groundwater travel time in the Tertiary aquifer, from the center of the VEGP site to the Savannah River, is estimated to be about 1300 years. The Water Table and Tertiary aquifers are separated by a very low permeability stratum known as the Lisbon formation. Observation well data suggest that there is little to no hydraulic connectivity between the Water Table and Tertiary aquifers.

No sole-source aquifers have been designated within the VEGP site region.

## Table 2.3.1-1 Savannah River Sub-basins and Drainage Areas Above VEGP

| NWS Subbasin | | NWS Subbasin Name | Drainage Area, $mi^2$ | |
|---|---|---|---|---|
| No. | I.D. | | upstream of site (1) | downstream of site (2) |
| 1 | TIGG1 | Burton Dam, GA | 122.3 | 0.0 |
| 2 | JCSS1 | Jocassee Dam, SC | 157.7 | 0.0 |
| 3 | KEOS1 | Keowee Dam, SC | 288.0 | 0.0 |
| 4 | HRTG1 | Hartwell Dam, GA | 1544.7 | 0.0 |
| 5 | RBRS1 | R.B. Russell Dam | 738.2 | 0.0 |
| 6 | CARG1 | Carlton Bridge, GA | 760.6 | 0.0 |
| 7 | CHDS1UP | Clark Hill - Thurmon Dam (upstream) | 665.9 | 0.0 |
| 8 | CHDS1 | Clark Hill Dam | 1847.7 | 0.0 |
| 9 | MODS1 | Modoc, S.C. | 539.9 | 0.0 |
| 10 | AGTG1 | Steven Creek Dam, GA | 454.8 | 0.0 |
| 11 | AGSG1 | Augusta 5th Street | 77.1 | 0.0 |
| 12 | AUGG1 | Augusta/Butler Creek | 273.6 | 0.0 |
| 13 | JACS1 | Jackson, S.C. | 651.2 | 0.0 |
| 14 | BFYG1 | Burton's Ferry, GA | 182.5 | 293.4 |
| 15 | BRIG1 | Millhaven, GA | 0.0 | 646.2 |
| 16 | CLYG1 | Clyo, GA | 0.0 | 634.7 |
| **Estimated Savannah River drainage area at site** | | | **8304.2** | |

**1) Based on data from Southeast River Flood Forecasting Center, Atlanta, GA. (NWS 2005)**
**2) As estimated from HUC-12 shapefiles**

## Table 2.3.1-2 River Miles for Key Landmarks Along the Savannah River

| Land Mark | River Mile * |
|---|---|
| Confluence of White Water & Toxaway Rivers | 368.6 |
| Confluence of Tallulah & Chatooga (forming the Tugaloo) | 358.1 |
| Confluence of the Keowee & Twelve Mile Creek (forming Seneca River) | 338.5 |
| Confluence of the Senaca & Tugaloo Rivers (forming the Savannah) | 312.1 |
| Hartwell Dam (USGS gage 02187250) | 288.9 |
| Iva gage (USGS gage 02187500) | 280.4 |
| Confluence of Broad River | 269.6 |
| Calhoun Falls (USGS gage 02189000) | 263.6 |
| Richard B. Russell Dam (USGS gage 02189004) | 259.1 |
| Conflence of Little River | 223.4 |
| J. Strom Thurmond Dam (USGS gage 02194500) | 221.6 |
| Confluence of Stevens Creek | 208.1 |
| Augusta City Dam | 207.0 |
| Augusta, GA at Fifth Street gage site (02197000) | 199.6 |
| Horse Creek at mouth | 197.4 |
| New Savannah Bluff Lock and Dam | 187.7 |
| Shell Bluff Landing, Georgia | 161.9 |
| Jackson, SC gage (02197320) | 156.8 |
| Vogtle Electric Generating Plant | 150.9 |
| Burtons Ferry Gage (02197500) | 118.7 |
| Confluence of Brier Creek | 102.5 |
| Clyo gage (02198500) | 60.9 |
| Ebenezer Landing, Georgia | 48.1 |
| Houlihan Bridge (U.S. Highway 17) | 21.6 |
| City of Savannah, GA at Bull Street | 14.4 |
| Mouth of the Savannah River | 0.0 |

* River miles measured from the mouth of Savannah Harbor, as reported by USACE 1996.

Source: Adapted from USACE 1996

## Table 2.3.1-3 USGS Quadrangles for Savannah River Watershed

| Map ID | 7.5-minute Quadsheet Name | State | N. Latitude | W. Longitude |
|---|---|---|---|---|
| 1 | Tuckasegee | NC | 35 ° 15 ' 00 " | 83 ° 00 ' 00 " |
| 2 | Sam Knob | NC | 35 ° 15 ' 00 " | 82 ° 52 ' 30 " |
| 3 | Wayah Bald | NC | 35 ° 07 ' 30 " | 83 ° 30 ' 00 " |
| 4 | Glenville | NC | 35 ° 07 ' 30 " | 83 ° 07 ' 30 " |
| 5 | Big Ridge | NC | 35 ° 07 ' 30 " | 83 ° 00 ' 00 " |
| 6 | Lake Toxaway | NC | 35 ° 07 ' 30 " | 82 ° 52 ' 30 " |
| 7 | Rosman | NC | 35 ° 07 ' 30 " | 82 ° 45 ' 00 " |
| 8 | Rainbow Springs | NC | 35 ° 00 ' 00 " | 83 ° 30 ' 00 " |
| 9 | Prentiss | NC | 35 ° 00 ' 00 " | 83 ° 22 ' 30 " |
| 10 | Scaly Mountain | NC | 35 ° 00 ' 00 " | 83 ° 15 ' 00 " |
| 11 | Highlands | NC | 35 ° 00 ' 00 " | 83 ° 07 ' 30 " |
| 12 | Cashiers | NC | 35 ° 00 ' 00 " | 83 ° 00 ' 00 " |
| 13 | Reid | NC | 35 ° 00 ' 00 " | 82 ° 52 ' 30 " |
| 14 | Eastatoe Gap | NC | 35 ° 00 ' 00 " | 82 ° 45 ' 00 " |
| 15 | Table Rock | SC | 35 ° 00 ' 00 " | 82 ° 37 ' 30 " |
| 16 | Macedonia | GA | 34 ° 52 ' 30 " | 83 ° 37 ' 30 " |
| 17 | Hightower Bald | GA | 34 ° 52 ' 30 " | 83 ° 30 ' 00 " |
| 18 | Dillard | GA | 34 ° 52 ' 30 " | 83 ° 22 ' 30 " |
| 19 | Rabun Bald | GA | 34 ° 52 ' 30 " | 83 ° 15 ' 00 " |
| 20 | Satolah | GA | 34 ° 52 ' 30 " | 83 ° 07 ' 30 " |
| 21 | Tamassee | SC | 34 ° 52 ' 30 " | 83 ° 00 ' 00 " |
| 22 | Salem | SC | 34 ° 52 ' 30 " | 82 ° 52 ' 30 " |
| 23 | Sunset | SC | 34 ° 52 ' 30 " | 82 ° 45 ' 00 " |
| 24 | Pickens | SC | 34 ° 52 ' 30 " | 82 ° 37 ' 30 " |
| 25 | Dacusville | SC | 34 ° 52 ' 30 " | 82 ° 30 ' 00 " |
| 26 | Tray Mountain | GA | 34 ° 45 ' 00 " | 83 ° 37 ' 30 " |
| 27 | Lake Burton | GA | 34 ° 45 ' 00 " | 83 ° 30 ' 00 " |
| 28 | Tiger | GA | 34 ° 45 ' 00 " | 83 ° 22 ' 30 " |
| 29 | Rainy Mountain | GA | 34 ° 45 ' 00 " | 83 ° 15 ' 00 " |
| 30 | Whetstone | SC | 34 ° 45 ' 00 " | 83 ° 07 ' 30 " |
| 31 | Walhalla | SC | 34 ° 45 ' 00 " | 83 ° 00 ' 00 " |
| 32 | Old Pickens | SC | 34 ° 45 ' 00 " | 82 ° 52 ' 30 " |
| 33 | Six Mile | SC | 34 ° 45 ' 00 " | 82 ° 45 ' 00 " |
| 34 | Liberty | SC | 34 ° 45 ' 00 " | 82 ° 37 ' 30 " |
| 35 | Easley | SC | 34 ° 45 ' 00 " | 82 ° 30 ' 00 " |
| 36 | Greenville | SC | 34 ° 45 ' 00 " | 82 ° 22 ' 30 " |
| 37 | Clarkesville NE | GA | 34 ° 37 ' 30 " | 83 ° 30 ' 00 " |
| 38 | Tallulah Falls | GA | 34 ° 37 ' 30 " | 83 ° 22 ' 30 " |
| 39 | Tugaloo Lake | GA | 34 ° 37 ' 30 " | 83 ° 15 ' 00 " |
| 40 | Holly Springs | SC | 34 ° 37 ' 30 " | 83 ° 07 ' 30 " |
| 41 | Westminster | SC | 34 ° 37 ' 30 " | 83 ° 00 ' 00 " |
| 42 | Seneca | SC | 34 ° 37 ' 30 " | 82 ° 52 ' 30 " |
| 43 | Clemson | SC | 34 ° 37 ' 30 " | 82 ° 45 ' 00 " |
| 44 | Five Forks | SC | 34 ° 37 ' 30 " | 82 ° 37 ' 30 " |
| 45 | Piercetown | SC | 34 ° 37 ' 30 " | 82 ° 30 ' 00 " |
| 46 | Pelzer | SC | 34 ° 37 ' 30 " | 82 ° 22 ' 30 " |
| 47 | Clarkesville | GA | 34 ° 30 ' 00 " | 83 ° 30 ' 00 " |
| 48 | Ayersville | GA | 34 ° 30 ' 00 " | 83 ° 22 ' 30 " |
| 49 | Toccoa | GA | 34 ° 30 ' 00 " | 83 ° 15 ' 00 " |
| 50 | Avalon | GA | 34 ° 30 ' 00 " | 83 ° 07 ' 30 " |
| 51 | Oakway | SC | 34 ° 30 ' 00 " | 83 ° 00 ' 00 " |
| 52 | Fair Play | SC | 34 ° 30 ' 00 " | 82 ° 52 ' 30 " |
| 53 | La France | SC | 34 ° 30 ' 00 " | 82 ° 45 ' 00 " |
| 54 | Anderson North | SC | 34 ° 30 ' 00 " | 82 ° 37 ' 30 " |
| 55 | Belton West | SC | 34 ° 30 ' 00 " | 82 ° 30 ' 00 " |
| 56 | Belton East | SC | 34 ° 30 ' 00 " | 82 ° 22 ' 30 " |
| 57 | Lula | GA | 34 ° 22 ' 30 " | 83 ° 37 ' 30 " |
| 58 | Baldwin | GA | 34 ° 22 ' 30 " | 83 ° 30 ' 00 " |
| 59 | Lake Russell | GA | 34 ° 22 ' 30 " | 83 ° 22 ' 30 " |
| 60 | Red Hill | GA | 34 ° 22 ' 30 " | 83 ° 15 ' 00 " |

## Table 2.3.1-3 (cont.) USGS Quadrangles for Savannah River Watershed

| Map ID | 7.5-minute Quadsheet Name | State | N. Latitude | W. Longitude |
|---|---|---|---|---|
| 61 | Martin | GA | 34 ° 22 ' 30 " | 83 ° 07 ' 30 " |
| 62 | Lavonia | GA | 34 ° 22 ' 30 " | 83 ° 00 ' 00 " |
| 63 | Reed Creek | GA | 34 ° 22 ' 30 " | 82 ° 52 ' 30 " |
| 64 | Hartwell NE | SC | 34 ° 22 ' 30 " | 82 ° 45 ' 00 " |
| 65 | Anderson South | SC | 34 ° 22 ' 30 " | 82 ° 37 ' 30 " |
| 66 | Saylors Crossroads | SC | 34 ° 22 ' 30 " | 82 ° 30 ' 00 " |
| 67 | Honea Path | SC | 34 ° 22 ' 30 " | 82 ° 22 ' 30 " |
| 68 | Ware Shoals West | SC | 34 ° 22 ' 30 " | 82 ° 15 ' 00 " |
| 69 | Gillsville | GA | 34 ° 15 ' 00 " | 83 ° 37 ' 30 " |
| 70 | Maysville | GA | 34 ° 15 ' 00 " | 83 ° 30 ' 00 " |
| 71 | Homer | GA | 34 ° 15 ' 00 " | 83 ° 22 ' 30 " |
| 72 | Ashland | GA | 34 ° 15 ' 00 " | 83 ° 15 ' 00 " |
| 73 | Carnesville | GA | 34 ° 15 ' 00 " | 83 ° 07 ' 30 " |
| 74 | Royston | GA | 34 ° 15 ' 00 " | 83 ° 00 ' 00 " |
| 75 | Hartwell | GA | 34 ° 15 ' 00 " | 82 ° 52 ' 30 " |
| 76 | Hartwell Dam | GA | 34 ° 15 ' 00 " | 82 ° 45 ' 00 " |
| 77 | Iva | SC | 34 ° 15 ' 00 " | 82 ° 37 ' 30 " |
| 78 | Antreville | SC | 34 ° 15 ' 00 " | 82 ° 30 ' 00 " |
| 79 | Due West | SC | 34 ° 15 ' 00 " | 82 ° 22 ' 30 " |
| 80 | Shoals Junction | SC | 34 ° 15 ' 00 " | 82 ° 15 ' 00 " |
| 81 | Cokesbury | SC | 34 ° 15 ' 00 " | 82 ° 07 ' 30 " |
| 82 | Waterloo | SC | 34 ° 15 ' 00 " | 82 ° 00 ' 00 " |
| 83 | Apple Valley | GA | 34 ° 07 ' 30 " | 83 ° 30 ' 00 " |
| 84 | Commerce | GA | 34 ° 07 ' 30 " | 83 ° 22 ' 30 " |
| 85 | Ila | GA | 34 ° 07 ' 30 " | 83 ° 15 ' 00 " |
| 86 | Danielsville North | GA | 34 ° 07 ' 30 " | 83 ° 07 ' 30 " |
| 87 | Bowman | GA | 34 ° 07 ' 30 " | 83 ° 00 ' 00 " |
| 88 | Dewy Rose | GA | 34 ° 07 ' 30 " | 82 ° 52 ' 30 " |
| 89 | Rock Branch | GA | 34 ° 07 ' 30 " | 82 ° 45 ' 00 " |
| 90 | Lowndesville | SC | 34 ° 07 ' 30 " | 82 ° 37 ' 30 " |
| 91 | Latimer | SC | 34 ° 07 ' 30 " | 82 ° 30 ' 00 " |
| 92 | Abbeville West | SC | 34 ° 07 ' 30 " | 82 ° 22 ' 30 " |
| 93 | Abbeville East | SC | 34 ° 07 ' 30 " | 82 ° 15 ' 00 " |
| 94 | Greenwood | SC | 34 ° 07 ' 30 " | 82 ° 07 ' 30 " |
| 95 | Ninety Six | SC | 34 ° 07 ' 30 " | 82 ° 00 ' 00 " |
| 96 | Dyson | SC | 34 ° 07 ' 30 " | 81 ° 52 ' 30 " |
| 97 | Nicholson | GA | 34 ° 00 ' 00 " | 83 ° 22 ' 30 " |
| 98 | Hull | GA | 34 ° 00 ' 00 " | 83 ° 15 ' 00 " |
| 99 | Danielsville South | GA | 34 ° 00 ' 00 " | 83 ° 07 ' 30 " |
| 100 | Carlton | GA | 34 ° 00 ' 00 " | 83 ° 00 ' 00 " |
| 101 | Elberton West | GA | 34 ° 00 ' 00 " | 82 ° 52 ' 30 " |
| 102 | Elberton East | GA | 34 ° 00 ' 00 " | 82 ° 45 ' 00 " |
| 103 | Heardmont | GA | 34 ° 00 ' 00 " | 82 ° 37 ' 30 " |
| 104 | Calhoun Falls | SC | 34 ° 00 ' 00 " | 82 ° 30 ' 00 " |
| 105 | Calhoun Creek | SC | 34 ° 00 ' 00 " | 82 ° 22 ' 30 " |
| 106 | Verdery | SC | 34 ° 00 ' 00 " | 82 ° 15 ' 00 " |
| 107 | Bradley | SC | 34 ° 00 ' 00 " | 82 ° 07 ' 30 " |
| 108 | Kirksey | SC | 34 ° 00 ' 00 " | 82 ° 00 ' 00 " |
| 109 | Good Hope | SC | 34 ° 00 ' 00 " | 81 ° 52 ' 30 " |
| 110 | Saluda North | SC | 34 ° 00 ' 00 " | 81 ° 45 ' 00 " |
| 111 | Athens East | GA | 33 ° 52 ' 30 " | 83 ° 15 ' 00 " |
| 112 | Crawford | GA | 33 ° 52 ' 30 " | 83 ° 07 ' 30 " |
| 113 | Sandy Cross | GA | 33 ° 52 ' 30 " | 83 ° 00 ' 00 " |
| 114 | Vesta | GA | 33 ° 52 ' 30 " | 82 ° 52 ' 30 " |
| 115 | Jacksons Crossroads | GA | 33 ° 52 ' 30 " | 82 ° 45 ' 00 " |
| 116 | Broad | GA | 33 ° 52 ' 30 " | 82 ° 37 ' 30 " |
| 117 | Chennault | GA | 33 ° 52 ' 30 " | 82 ° 30 ' 00 " |
| 118 | Willington | SC | 33 ° 52 ' 30 " | 82 ° 22 ' 30 " |
| 119 | McCormick | SC | 33 ° 52 ' 30 " | 82 ° 15 ' 00 " |
| 120 | Winterseat | SC | 33 ° 52 ' 30 " | 82 ° 07 ' 30 " |

## Table 2.3.1-3 (cont.) USGS Quadrangles for Savannah River Watershed

| Map ID | 7.5-minute Quadsheet Name | State | N. Latitude | W. Longitude |
|---|---|---|---|---|
| 121 | Limestone | SC | 33 ° 52 ' 30 " | 82 ° 00 ' 00 " |
| 122 | Owdoms | SC | 33 ° 52 ' 30 " | 81 ° 52 ' 30 " |
| 123 | Saluda South | SC | 33 ° 52 ' 30 " | 81 ° 45 ' 00 " |
| 124 | Maxeys | GA | 33 ° 45 ' 00 " | 83 ° 07 ' 30 " |
| 125 | Lexington | GA | 33 ° 45 ' 00 " | 83 ° 00 ' 00 " |
| 126 | Rayle | GA | 33 ° 45 ' 00 " | 82 ° 52 ' 30 " |
| 127 | Celeste | GA | 33 ° 45 ' 00 " | 82 ° 45 ' 00 " |
| 128 | Tignall | GA | 33 ° 45 ' 00 " | 82 ° 37 ' 30 " |
| 129 | Metasville | GA | 33 ° 45 ' 00 " | 82 ° 30 ' 00 " |
| 130 | Lincolnton | GA | 33 ° 45 ' 00 " | 82 ° 22 ' 30 " |
| 131 | Plum Branch | SC | 33 ° 45 ' 00 " | 82 ° 15 ' 00 " |
| 132 | Parksville | SC | 33 ° 45 ' 00 " | 82 ° 07 ' 30 " |
| 133 | Red Hill | SC | 33 ° 45 ' 00 " | 82 ° 00 ' 00 " |
| 134 | Edgefield | SC | 33 ° 45 ' 00 " | 81 ° 52 ' 30 " |
| 135 | Johnston | SC | 33 ° 45 ' 00 " | 81 ° 45 ' 00 " |
| 136 | Penfield | GA | 33 ° 37 ' 30 " | 83 ° 07 ' 30 " |
| 137 | Woodville | GA | 33 ° 37 ' 30 " | 83 ° 00 ' 00 " |
| 138 | Philomath | GA | 33 ° 37 ' 30 " | 82 ° 52 ' 30 " |
| 139 | Washington West | GA | 33 ° 37 ' 30 " | 82 ° 45 ' 00 " |
| 140 | Washington East | GA | 33 ° 37 ' 30 " | 82 ° 37 ' 30 " |
| 141 | Aonia | GA | 33 ° 37 ' 30 " | 82 ° 30 ' 00 " |
| 142 | Woodlawn | GA | 33 ° 37 ' 30 " | 82 ° 22 ' 30 " |
| 143 | Leah | GA | 33 ° 37 ' 30 " | 82 ° 15 ' 00 " |
| 144 | Clarks Hill | SC | 33 ° 37 ' 30 " | 82 ° 07 ' 30 " |
| 145 | Colliers | SC | 33 ° 37 ' 30 " | 82 ° 00 ' 00 " |
| 146 | Ropers Crossroads | SC | 33 ° 37 ' 30 " | 81 ° 52 ' 30 " |
| 147 | Trenton | SC | 33 ° 37 ' 30 " | 81 ° 45 ' 00 " |
| 148 | Aiken NW | SC | 33 ° 37 ' 30 " | 81 ° 37 ' 30 " |
| 149 | Union Point | GA | 33 ° 30 ' 00 " | 83 ° 00 ' 00 " |
| 150 | Crawfordville | GA | 33 ° 30 ' 00 " | 82 ° 52 ' 30 " |
| 151 | Sharon | GA | 33 ° 30 ' 00 " | 82 ° 45 ' 00 " |
| 152 | Cadley | GA | 33 ° 30 ' 00 " | 82 ° 37 ' 30 " |
| 153 | Wrightsboro | GA | 33 ° 30 ' 00 " | 82 ° 30 ' 00 " |
| 154 | Winfield | GA | 33 ° 30 ' 00 " | 82 ° 22 ' 30 " |
| 155 | Appling | GA | 33 ° 30 ' 00 " | 82 ° 15 ' 00 " |
| 156 | Evans | GA | 33 ° 30 ' 00 " | 82 ° 07 ' 30 " |
| 157 | Martinez | GA | 33 ° 30 ' 00 " | 82 ° 00 ' 00 " |
| 158 | North Augusta | SC | 33 ° 30 ' 00 " | 81 ° 52 ' 30 " |
| 159 | Graniteville | SC | 33 ° 30 ' 00 " | 81 ° 45 ' 00 " |
| 160 | Aiken | SC | 33 ° 30 ' 00 " | 81 ° 37 ' 30 " |
| 161 | Oakwood | SC | 33 ° 30 ' 00 " | 81 ° 30 ' 00 " |
| 162 | Sparta NE | GA | 33 ° 22 ' 30 " | 82 ° 45 ' 00 " |
| 163 | Warrenton | GA | 33 ° 22 ' 30 " | 82 ° 37 ' 30 " |
| 164 | Thomson West | GA | 33 ° 22 ' 30 " | 82 ° 30 ' 00 " |
| 165 | Thomson East | GA | 33 ° 22 ' 30 " | 82 ° 22 ' 30 " |
| 166 | Harlem | GA | 33 ° 22 ' 30 " | 82 ° 15 ' 00 " |
| 167 | Grovetown | GA | 33 ° 22 ' 30 " | 82 ° 07 ' 30 " |
| 168 | Augusta West | GA | 33 ° 22 ' 30 " | 82 ° 00 ' 00 " |
| 169 | Augusta East | GA | 33 ° 22 ' 30 " | 81 ° 52 ' 30 " |
| 170 | Hollow Creek | SC | 33 ° 22 ' 30 " | 81 ° 45 ' 00 " |
| 171 | New Ellenton | SC | 33 ° 22 ' 30 " | 81 ° 37 ' 30 " |
| 172 | Windsor | SC | 33 ° 22 ' 30 " | 81 ° 30 ' 00 " |
| 173 | Williston | SC | 33 ° 22 ' 30 " | 81 ° 22 ' 30 " |
| 174 | Bastonville | GA | 33 ° 15 ' 00 " | 82 ° 30 ' 00 " |
| 175 | Bowdens Pond | GA | 33 ° 15 ' 00 " | 82 ° 22 ' 30 " |
| 176 | Avondale | GA | 33 ° 15 ' 00 " | 82 ° 15 ' 00 " |
| 177 | Blythe | GA | 33 ° 15 ' 00 " | 82 ° 07 ' 30 " |
| 178 | Hephzibah | GA | 33 ° 15 ' 00 " | 82 ° 00 ' 00 " |
| 179 | Mechanic Hill | GA | 33 ° 15 ' 00 " | 81 ° 52 ' 30 " |
| 180 | Jackson | SC | 33 ° 15 ' 00 " | 81 ° 45 ' 00 " |

## Table 2.3.1-3 (cont.) USGS Quadrangles for Savannah River Watershed

| Map ID | 7.5-minute Quadsheet Name | State | N. Latitude | W. Longitude |
|---|---|---|---|---|
| 181 | New Ellenton SW | SC | 33 ° 15 ' 00 " | 81 ° 37 ' 30 " |
| 182 | New Ellenton SE | SC | 33 ° 15 ' 00 " | 81 ° 30 ' 00 " |
| 183 | Long Branch | SC | 33 ° 15 ' 00 " | 81 ° 22 ' 30 " |
| 184 | Wrens | GA | 33 ° 07 ' 30 " | 82 ° 22 ' 30 " |
| 185 | Matthews | GA | 33 ° 07 ' 30 " | 82 ° 15 ' 00 " |
| 186 | Keysville | GA | 33 ° 07 ' 30 " | 82 ° 07 ' 30 " |
| 187 | Storys Millpond | GA | 33 ° 07 ' 30 " | 82 ° 00 ' 00 " |
| 188 | McBean | GA | 33 ° 07 ' 30 " | 81 ° 52 ' 30 " |
| 189 | Shell Bluff Landing | GA | 33 ° 07 ' 30 " | 81 ° 45 ' 00 " |
| 190 | Girard NW | SC | 33 ° 07 ' 30 " | 81 ° 37 ' 30 " |
| 191 | Girard NE | SC | 33 ° 07 ' 30 " | 81 ° 30 ' 00 " |
| 192 | Snelling | SC | 33 ° 07 ' 30 " | 81 ° 22 ' 30 " |
| 193 | Barnwell | SC | 33 ° 07 ' 30 " | 81 ° 15 ' 00 " |
| 194 | Kellys Pond | GA | 33 ° 00 ' 00 " | 82 ° 15 ' 00 " |
| 195 | Gough | GA | 33 ° 00 ' 00 " | 82 ° 07 ' 30 " |
| 196 | Waynesboro | GA | 33 ° 00 ' 00 " | 82 ° 00 ' 00 " |
| 197 | Idlewood | GA | 33 ° 00 ' 00 " | 81 ° 52 ' 30 " |
| 198 | Alexander | GA | 33 ° 00 ' 00 " | 81 ° 45 ' 00 " |
| 199 | Girard | GA | 33 ° 00 ' 00 " | 81 ° 37 ' 30 " |
| 200 | Millett | SC | 33 ° 00 ' 00 " | 81 ° 30 ' 00 " |
| 201 | Martin | SC | 33 ° 00 ' 00 " | 81 ° 22 ' 30 " |
| 202 | Allendale | SC | 33 ° 00 ' 00 " | 81 ° 15 ' 00 " |
| 203 | Bellevue | GA | 32 ° 52 ' 30 " | 82 ° 00 ' 00 " |
| 204 | Perkins | GA | 32 ° 52 ' 30 " | 81 ° 52 ' 30 " |
| 205 | Sardis | GA | 32 ° 52 ' 30 " | 81 ° 45 ' 00 " |
| 206 | Hilltonia | GA | 32 ° 52 ' 30 " | 81 ° 37 ' 30 " |
| 207 | Burtons Ferry Landing | GA | 32 ° 52 ' 30 " | 81 ° 30 ' 00 " |
| 208 | Bull Pond | SC | 32 ° 52 ' 30 " | 81 ° 22 ' 30 " |
| 209 | Barton | SC | 32 ° 52 ' 30 " | 81 ° 15 ' 00 " |
| 210 | Bay Branch | GA | 32 ° 45 ' 00 " | 81 ° 45 ' 00 " |
| 211 | Sylvania North | GA | 32 ° 45 ' 00 " | 81 ° 37 ' 30 " |
| 212 | Jacksonboro Bridge | GA | 32 ° 45 ' 00 " | 81 ° 30 ' 00 " |
| 213 | Brier Creek Landing | GA | 32 ° 45 ' 00 " | 81 ° 22 ' 30 " |
| 214 | Solomons Crossroads | SC | 32 ° 45 ' 00 " | 81 ° 15 ' 00 " |
| 215 | Sylvania South | GA | 32 ° 37 ' 30 " | 81 ° 37 ' 30 " |
| 216 | Hunters | GA | 32 ° 37 ' 30 " | 81 ° 30 ' 00 " |
| 217 | Blue Springs Landing | GA | 32 ° 37 ' 30 " | 81 ° 22 ' 30 " |
| 218 | Shirley | SC | 32 ° 37 ' 30 " | 81 ° 15 ' 00 " |
| 219 | Furman | SC | 32 ° 37 ' 30 " | 81 ° 07 ' 30 " |
| 220 | Oliver | GA | 32 ° 30 ' 00 " | 81 ° 30 ' 00 " |
| 221 | Kildare | GA | 32 ° 30 ' 00 " | 81 ° 22 ' 30 " |
| 222 | Brighton | SC | 32 ° 30 ' 00 " | 81 ° 15 ' 00 " |
| 223 | Pineland | SC | 32 ° 30 ' 00 " | 81 ° 07 ' 30 " |
| 224 | Springfield North | GA | 32 ° 22 ' 30 " | 81 ° 15 ' 00 " |
| 225 | Hardeeville NW | SC | 32 ° 22 ' 30 " | 81 ° 07 ' 30 " |

Source: Compiled from Data, ESRI 2004

## Table 2.3.1-4 Approximate Lengths and Slopes of Local Streams

| Map ID | Stream Identification | Approximate length, ft * | Upstream Elevation | Outfall Elevation | Approximate Slope |
|---|---|---|---|---|---|
| 1 | Unnamed creek at Hancock Landing to the Savannah River | 7,000 | 163 | 85 | 0.0111 |
| 2 | Unnamed tributary to Daniels Branch to Daniels Branch | 6,000 | 190 | 105 | 0.0142 |
| 3 | Red Branch to Daniels Branch | 10,500 | 235 | 115 | 0.0114 |
| 4 | Daniels Branch D/S of embankment dam to confluence with Red Br. | 5,500 | 140 | 115 | 0.0045 |
| 5 | Unnamed tributary to Beaverdam Creek | 8,500 | 235 | 87 | 0.0174 |
| 6 | Beaverdam Creek to Telfair Pond | 13,500 | 100 | 85 | 0.0011 |
| 7 | Beaverdam Creek, D/S of Telfair Pond to Savannah River | 21,000 | 190 | 105 | 0.0040 |

* from outfall to end of longest tributary

## Table 2.3.1-5 USGS Gage Data for the Savannah River

| USGS Gage ID | Location on Savannah River | River Mile * | Coordinates | | Altitude, feet MSL ** | Area drained, $mi^2$ | Average daily flow series | | | Annual Peak flow series | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Start | End | No. | Qp start | Qp end | No. |
| 2187252 | below Hartwell Lake nr Hartwell, GA | 288.9 | 34°21'15" N, | 82°48'55" W | 470.00 | 2,090 | 10/1/1984 | 9/30/1999 | 4,502 | 1/21/1985 | 8/24/1999 | 15 |
| 2187500 | near Iva, SC | 280.4 | 34°15'20" N, | 82°44'42" W | 432.26 | 2,231 | 10/1/1950 | 9/30/1981 | 11,323 | 10/8/1949 | 7/24/1981 | 32 |
| 2189000 | near Calhoun Falls, SC | 263.6 | 34°04'15" N, | 82°38'30" W | 363.53 | 2,876 | 10/1/1896 | 9/30/1979 | 17,044 | 4/5/1897 | 3/28/1980 | 82 |
| 2195000 | near Clarks Hill, SC | NR | 33°38'40" N, | 82°12'05" W | 182.69 | 6,150 | 5/14/1940 | 6/30/1954 | 5,161 | -- | -- | 0 |
| 2196484 | near North Augusta, SC | 207.0 | 33°33'06" N, | 82°02'19" W | 150.00 | 7,150 | 10/1/1988 | 9/30/2002 | 5,113 | 9/21/1989 | 3/4/2002 | 13 |
| 2197000 | at Augusta, GA | 199.6 | 33°22'25" N, | 81°56'35" W | 96.58 | 7,508 | 10/1/1883 | 9/30/2003 | 35,793 | 1/17/1796 | 6/14/2004 | 133 |
| 2197320 | near Jackson, SC | 156.8 | 33°13'01" N, | 81°46'04" W | 77.00 | 8,110 | 10/1/1971 | 9/30/2002 | 10,733 | 1/21/1972 | 3/5/2002 | 30 |
| 21973269 | at Waynesboro, GA | 150.9 | 33°08'59" N, | 81°45'18" W | n/a | 8,300 | 1/22/2005 | 9/30/2005 | 251 | n/a | n/a | n/a |
| 2197500 | at Burtons Ferry Bridge nr Millhaven, GA | 118.7 | 32°56'20" N, | 81°30'10" W | 52.42 | 8,650 | 10/1/1939 | 9/30/2003 | 18,993 | 10/1/1929 | 3/21/2003 | 53 |
| 2198500 | near Clyo, GA | 60.9 | 32°31'41" N, | 81°16'08" W | 13.39 | 9,850 | 10/1/1929 | 9/30/2003 | 25,567 | 1/24/1925 | 3/3/2004 | 80 |

* River miles measured from the mouth of Savannah Harbor, as reported by USACE 1996.
** NGVD 1929

Source: Adapted from USGS 2006a

## Table 2.3.1-6 Mean Daily Flows on the Savannah River at Augusta, Georgia

| Day of month | Mean of daily mean values for this day for 98 years of record[1], in ft³/s | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | 10790 | 11320 | 17390 | 16289 | 10680 | 8129 | 7708 | 8359 | 8281 | 7717 | 5987 | 8172 |
| 2 | 11380 | 11860 | 15900 | 16230 | 10950 | 8078 | 8381 | 8139 | 8205 | 10460 | 6316 | 7694 |
| 3 | 11360 | 11960 | 14110 | 17210 | 10570 | 8107 | 7871 | 8541 | 7546 | 10080 | 6574 | 7651 |
| 4 | 12460 | 12860 | 13420 | 15820 | 10130 | 7917 | 7126 | 8446 | 7586 | 8478 | 6847 | 8232 |
| 5 | 13170 | 13380 | 14440 | 14099 | 9711 | 7943 | 7085 | 7901 | 7451 | 7249 | 6990 | 8680 |
| 6 | 12130 | 13339 | 14920 | 15170 | 9621 | 8233 | 7356 | 8065 | 7634 | 7143 | 6782 | 8617 |
| 7 | 11860 | 13850 | 15029 | 15920 | 9875 | 8760 | 7357 | 8125 | 7709 | 6793 | 6303 | 8444 |
| 8 | 12600 | 15250 | 15910 | 15740 | 10160 | 8985 | 7993 | 7921 | 7986 | 6526 | 6310 | 8281 |
| 9 | 12650 | 15590 | 16410 | 15490 | 10140 | 8532 | 8653 | 8440 | 7689 | 6696 | 6763 | 8289 |
| 10 | 12080 | 15459 | 16070 | 15120 | 10110 | 8316 | 8541 | 8329 | 8819 | 7243 | 6846 | 8670 |
| 11 | 11550 | 15330 | 14549 | 14560 | 9318 | 8103 | 7732 | 7352 | 9687 | 7243 | 6650 | 8512 |
| 12 | 11790 | 15190 | 13940 | 13650 | 8830 | 8026 | 7387 | 7287 | 7867 | 7047 | 6635 | 8372 |
| 13 | 12240 | 14620 | 14520 | 12780 | 8648 | 8111 | 7342 | 7680 | 6671 | 7058 | 6901 | 8580 |
| 14 | 11610 | 14330 | 14940 | 12730 | 8600 | 8570 | 7788 | 8807 | 6223 | 6582 | 7357 | 8793 |
| 15 | 11200 | 14090 | 14690 | 13110 | 8388 | 8829 | 7669 | 9442 | 6372 | 6121 | 7344 | 9559 |
| 16 | 10860 | 13469 | 15490 | 13619 | 8393 | 9036 | 7872 | 9381 | 6331 | 5916 | 7227 | 10260 |
| 17 | 11570 | 13880 | 15880 | 13450 | 8369 | 8825 | 7699 | 9570 | 6543 | 6188 | 7475 | 9995 |
| 18 | 12350 | 15020 | 14779 | 12270 | 7988 | 8540 | 7635 | 9034 | 7583 | 6975 | 7398 | 9486 |
| 19 | 13900 | 15020 | 13869 | 11650 | 7629 | 8056 | 7612 | 8447 | 7598 | 6931 | 7311 | 9025 |
| 20 | 15450 | 14170 | 14490 | 11670 | 8318 | 7589 | 7735 | 8776 | 6913 | 6854 | 7297 | 8854 |
| 21 | 14820 | 14130 | 15780 | 11620 | 9137 | 7369 | 7393 | 8078 | 6540 | 7215 | 6879 | 9797 |
| 22 | 12730 | 15110 | 16450 | 11370 | 9283 | 7657 | 7171 | 7790 | 6591 | 7233 | 6834 | 9845 |
| 23 | 11580 | 14790 | 16189 | 10830 | 9216 | 7228 | 6961 | 7473 | 6438 | 7373 | 6792 | 9854 |
| 24 | 11800 | 14010 | 16550 | 10380 | 8788 | 7318 | 6879 | 7321 | 6270 | 7584 | 7131 | 9289 |
| 25 | 11990 | 13780 | 15960 | 10060 | 8499 | 8373 | 7196 | 7213 | 6418 | 7035 | 7296 | 9232 |
| 26 | 12190 | 13880 | 15079 | 10500 | 7805 | 8399 | 7623 | 7367 | 6989 | 6491 | 7352 | 9595 |
| 27 | 11760 | 14160 | 15370 | 10500 | 7795 | 7699 | 7499 | 7301 | 8905 | 6709 | 7551 | 10100 |
| 28 | 11260 | 16089 | 15380 | 10190 | 7904 | 7406 | 7428 | 7615 | 8902 | 6778 | 7584 | 10090 |
| 29 | 11310 | 11980 | 15300 | 9767 | 7866 | 7209 | 7655 | 8207 | 7516 | 6342 | 7950 | 10160 |
| 30 | 11450 | | 16800 | 10480 | 7794 | 7598 | 8445 | 8447 | 7140 | 6319 | 8448 | 11020 |
| 31 | 11250 | | 16920 | | 7823 | | 8962 | 8352 | | 6173 | | 11100 |
| 1 -- Available period of record may be less than value shown for certain days of the year | | | | | | | | | | | | |

Source: USGS 2006c

# Table 2.3.1-7 Mean Daily Flows on the Savannah River near Jackson, South Carolina

| Day of month | Mean of daily mean values for this day for 31 years of record[1], in $ft^3/s$ | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | 8843 | 10990 | 10650 | 11520 | 9351 | 8778 | 8337 | 7511 | 7725 | 7052 | 7188 | 8115 |
| 2 | 9091 | 11140 | 11050 | 10540 | 8757 | 8383 | 7974 | 7581 | 7334 | 7079 | 7167 | 8850 |
| 3 | 9807 | 11920 | 11320 | 10560 | 8860 | 7941 | 7691 | 7778 | 7141 | 7541 | 7088 | 8730 |
| 4 | 9931 | 11990 | 11470 | 10660 | 8858 | 8393 | 7922 | 7877 | 7433 | 7708 | 7193 | 8524 |
| 5 | 9759 | 11430 | 12559 | 10900 | 9146 | 8316 | 7743 | 7420 | 7791 | 7885 | 7261 | 8674 |
| 6 | 9677 | 11560 | 12140 | 11150 | 8650 | 8323 | 8097 | 7441 | 7891 | 7779 | 7233 | 8840 |
| 7 | 9407 | 11650 | 12040 | 10630 | 8578 | 8328 | 8102 | 7409 | 7778 | 7589 | 7218 | 8908 |
| 8 | 9032 | 11730 | 12160 | 10290 | 7630 | 8169 | 7924 | 7463 | 7395 | 7581 | 7141 | 9053 |
| 9 | 9086 | 11620 | 12240 | 10180 | 7377 | 8247 | 7316 | 7566 | 7322 | 7791 | 7225 | 9121 |
| 10 | 9402 | 11830 | 12020 | 10470 | 8088 | 7944 | 7700 | 7752 | 7428 | 7937 | 7354 | 8978 |
| 11 | 9922 | 11430 | 11100 | 10920 | 7937 | 8374 | 7524 | 7465 | 7247 | 7994 | 7435 | 9219 |
| 12 | 10540 | 11980 | 11480 | 10510 | 8381 | 8175 | 7107 | 7766 | 7042 | 7991 | 7510 | 9271 |
| 13 | 10800 | 12060 | 11790 | 10360 | 8695 | 8682 | 7079 | 7695 | 7059 | 7850 | 7542 | 9356 |
| 14 | 10870 | 11850 | 11920 | 9937 | 8551 | 8554 | 7042 | 7798 | 7047 | 7693 | 7745 | 9084 |
| 15 | 10640 | 11930 | 11740 | 9614 | 8096 | 8441 | 7183 | 7859 | 7299 | 7367 | 8222 | 9007 |
| 16 | 10430 | 11840 | 11510 | 10490 | 8221 | 8061 | 7270 | 7835 | 7208 | 7330 | 8354 | 9235 |
| 17 | 10510 | 10920 | 11570 | 10510 | 8368 | 7730 | 7478 | 7945 | 7015 | 7739 | 7940 | 9326 |
| 18 | 10770 | 10540 | 11340 | 10150 | 8784 | 7774 | 7583 | 8110 | 6855 | 7308 | 7681 | 9248 |
| 19 | 11290 | 11110 | 10750 | 9529 | 9375 | 7715 | 7551 | 8038 | 6841 | 7717 | 7734 | 9064 |
| 20 | 11480 | 10840 | 10560 | 9320 | 8814 | 7670 | 7688 | 7437 | 6826 | 7695 | 7644 | 9841 |
| 21 | 11260 | 10200 | 10800 | 9484 | 8461 | 8276 | 7558 | 7482 | 6702 | 7905 | 7584 | 9628 |
| 22 | 11430 | 10260 | 10990 | 9388 | 8173 | 8800 | 7393 | 7431 | 7010 | 7758 | 7739 | 9536 |
| 23 | 11580 | 10760 | 10220 | 9379 | 8739 | 8878 | 7469 | 7361 | 7161 | 7848 | 8381 | 9469 |
| 24 | 11300 | 11080 | 9758 | 9780 | 9255 | 8404 | 7360 | 7312 | 7366 | 8257 | 8387 | 9350 |
| 25 | 11240 | 11250 | 10010 | 9456 | 9503 | 8230 | 7209 | 7335 | 7141 | 8340 | 8529 | 9362 |
| 26 | 10980 | 11090 | 11160 | 9380 | 9236 | 8154 | 7234 | 7284 | 7216 | 8108 | 8117 | 9653 |
| 27 | 10900 | 11380 | 11150 | 9780 | 9021 | 8113 | 7057 | 7332 | 7115 | 7974 | 7992 | 9524 |
| 28 | 11230 | 10990 | 10860 | 9542 | 8956 | 8240 | 6866 | 7430 | 6977 | 8022 | 7863 | 9155 |
| 29 | 10720 | 10540 | 11550 | 9237 | 9177 | 8481 | 6835 | 8035 | 7106 | 7759 | 8077 | 8781 |
| 30 | 10850 | | 11950 | 9728 | 9396 | 8469 | 7195 | 7984 | 7017 | 7360 | 8527 | 8777 |
| 31 | 10870 | | 11900 | | 9236 | | 7465 | 7957 | | 7160 | | 8816 |

1 -- Available period of record may be less than value shown for certain days of the year.

Source: USGS 2006d

## Table 2.3.1-8 Mean Daily Flows on the Savannah River at Burton's Ferry

| Day of month | Mean of daily mean values for this day for 52 years of record[1], in ft$^3$/s | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | 11640 | 11900 | 14530 | 16120 | 11670 | 8270 | 7836 | 7533 | 8094 | 6845 | 7130 | 8937 |
| 2 | 11370 | 12130 | 14499 | 16080 | 11890 | 8214 | 7980 | 7644 | 8149 | 6871 | 7009 | 9615 |
| 3 | 11430 | 12170 | 14549 | 15980 | 11930 | 8037 | 8060 | 7695 | 8228 | 6858 | 7056 | 9981 |
| 4 | 11910 | 12180 | 14720 | 15720 | 12160 | 7935 | 8041 | 7682 | 8357 | 6918 | 7115 | 9803 |
| 5 | 11980 | 12120 | 14829 | 15609 | 12410 | 7801 | 8040 | 7712 | 8495 | 6889 | 7252 | 9366 |
| 6 | 11760 | 11810 | 14840 | 15400 | 12360 | 7713 | 7950 | 7830 | 8406 | 6957 | 7376 | 9141 |
| 7 | 11410 | 11680 | 14850 | 15070 | 12120 | 7718 | 8050 | 7961 | 8309 | 6954 | 7402 | 8978 |
| 8 | 11230 | 11920 | 15160 | 14779 | 11940 | 7653 | 8087 | 8053 | 8129 | 6974 | 7470 | 8855 |
| 9 | 11120 | 12310 | 15659 | 14430 | 11780 | 7742 | 8060 | 8098 | 7913 | 7054 | 7448 | 8950 |
| 10 | 11510 | 12609 | 15920 | 14140 | 11660 | 7946 | 8133 | 8123 | 7887 | 7166 | 7363 | 9013 |
| 11 | 12070 | 12860 | 16480 | 14090 | 11650 | 8173 | 8250 | 8114 | 7852 | 7272 | 7351 | 9081 |
| 12 | 12220 | 13239 | 17170 | 14560 | 11620 | 8339 | 8346 | 7986 | 7718 | 7372 | 7425 | 9075 |
| 13 | 11970 | 13650 | 17390 | 15040 | 11490 | 8564 | 8400 | 7962 | 7743 | 7492 | 7330 | 9058 |
| 14 | 11700 | 14110 | 17120 | 15230 | 11300 | 8704 | 8333 | 7931 | 7677 | 7566 | 7299 | 9178 |
| 15 | 11650 | 14480 | 16650 | 15129 | 11110 | 8718 | 8310 | 7944 | 7562 | 7597 | 7443 | 9410 |
| 16 | 11760 | 14530 | 16310 | 14729 | 10880 | 8806 | 8327 | 8556 | 7498 | 7674 | 7685 | 9572 |
| 17 | 11740 | 14440 | 16120 | 14490 | 10610 | 8694 | 8304 | 9731 | 7277 | 7613 | 7674 | 9626 |
| 18 | 11730 | 14249 | 16050 | 14430 | 10290 | 8511 | 8376 | 10130 | 7150 | 7411 | 7548 | 9686 |
| 19 | 11840 | 14120 | 15900 | 14420 | 10050 | 8397 | 8615 | 9983 | 7060 | 7316 | 7639 | 9708 |
| 20 | 12220 | 14060 | 15790 | 14260 | 9678 | 8231 | 8642 | 9682 | 7006 | 7304 | 7758 | 9599 |
| 21 | 12680 | 14099 | 15960 | 14120 | 9302 | 8082 | 8769 | 9205 | 6937 | 7412 | 7778 | 9540 |
| 22 | 13339 | 14640 | 16260 | 13710 | 9030 | 8146 | 8665 | 8847 | 6899 | 7499 | 7781 | 9636 |
| 23 | 14080 | 15359 | 16460 | 13280 | 8872 | 8375 | 8532 | 8534 | 7032 | 7498 | 7776 | 9637 |
| 24 | 14240 | 15750 | 17200 | 13100 | 8857 | 8257 | 8510 | 8351 | 7109 | 7566 | 7873 | 9662 |
| 25 | 13940 | 15480 | 18060 | 12920 | 9013 | 7987 | 8231 | 8309 | 7194 | 7657 | 8028 | 9821 |
| 26 | 13410 | 15070 | 18340 | 12420 | 8956 | 8036 | 8057 | 8310 | 7155 | 7856 | 8088 | 10070 |
| 27 | 12910 | 14810 | 18150 | 12020 | 8702 | 8025 | 7911 | 8290 | 7161 | 8068 | 8070 | 10410 |
| 28 | 12400 | 14690 | 17620 | 11750 | 8601 | 7838 | 7647 | 8208 | 6929 | 8098 | 8036 | 10550 |
| 29 | 11770 | 15150 | 16870 | 11520 | 8470 | 7682 | 7516 | 8102 | 6723 | 8005 | 8162 | 10850 |
| 30 | 11450 | | 16350 | 11510 | 8421 | 7723 | 7498 | 8116 | 6761 | 7699 | 8371 | 11320 |
| 31 | 11560 | | 16180 | | 8327 | | 7573 | 8088 | | 7339 | | 11660 |
| 1 -- Available period of record may be less than value shown for certain days of the year | | | | | | | | | | | | |

Source: USGS 2006g

## Table 2.3.1-9 Annual Mean Daily Flows on the Savannah River at Augusta, Georgia, and at Burtons Ferry Near Millhaven, Georgia

| Year | Annual mean streamflow, in ft$^3$/s | | Year | Annual mean streamflow, in ft$^3$/s | | Year | Annual mean streamflow, in ft$^3$/s | | Year | Annual mean streamflow, in ft$^3$/s | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Augusta | Burtons F. | | Augusta | Burtons F. | | Augusta | Burtons F. | | Augusta | Burtons F. |
| **1884** | 10,630 | -- | **1931** | 6,806 | -- | **1955** | 5,367 | 5,974 | **1979** | 11,710 | -- |
| **1885** | 9,642 | -- | **1932** | 11,990 | -- | **1956** | 5,550 | 6,309 | **1980** | 11,670 | -- |
| **1886** | 12,620 | -- | **1933** | 7,461 | -- | **1957** | 7,645 | 8,312 | **1981** | 5,921 | -- |
| **1887** | 9,718 | -- | **1934** | 8,112 | -- | **1958** | 10,300 | 11,040 | **1982** | 7,409 | -- |
| **1888** | 16,780 | -- | **1935** | 7,492 | -- | **1959** | 8,569 | 9,748 | **1983** | 10,990 | -- |
| **1889** | 12,700 | -- | **1936** | 17,100 | -- | **1960** | 11,110 | 13,110 | **1984** | 11,220 | 12,760 |
| **1890** | 8,665 | -- | **1937** | 12,800 | -- | **1961** | 9,349 | 10,910 | **1985** | 6,556 | 7,167 |
| **1891** | 14,050 | -- | **1938** | 7,671 | -- | **1962** | 8,746 | 10,580 | **1986** | 5,803 | 6,175 |
| **1896** | 7,802 | -- | **1939** | 9,298 | -- | **1963** | 10,020 | 11,140 | **1987** | 8,203 | 8,955 |
| **1897** | 9,730 | -- | **1940** | 8,898 | 9,607 | **1964** | 18,530 | 20,500 | **1988** | 4,888 | 5,367 |
| **1898** | 9,894 | -- | **1941** | 6,765 | 7,546 | **1965** | 10,800 | 12,780 | **1989** | 7,153 | 7,966 |
| **1899** | 11,270 | -- | **1942** | 8,982 | 10,010 | **1966** | 9,398 | 11,180 | **1990** | 10,630 | 11,860 |
| **1900** | 12,310 | -- | **1943** | 10,820 | 12,490 | **1967** | 9,152 | 10,570 | **1991** | 10,010 | 11,670 |
| **1901** | 16,430 | -- | **1944** | 10,360 | 11,750 | **1968** | 8,281 | 9,624 | **1992** | 10,510 | 11,860 |
| **1902** | 12,290 | -- | **1945** | 7,930 | 8,301 | **1969** | 9,821 | 10,950 | **1993** | 12,160 | 14,449 |
| **1903** | 13,530 | -- | **1946** | 11,070 | 12,470 | **1970** | 6,967 | 12,350 | **1994** | 10,220 | 11,800 |
| **1904** | 5,528 | -- | **1947** | 10,360 | 11,770 | **1971** | 9,479 | -- | **1995** | 11,340 | 12,770 |
| **1905** | 8,676 | -- | **1948** | 14,099 | 15,640 | **1972** | 9,957 | -- | **1996** | 10,120 | 11,440 |
| **1906** | 15,840 | -- | **1949** | 13,890 | 15,459 | **1973** | 12,740 | -- | **1997** | 9,270 | 10,440 |
| **1925** | 7,892 | -- | **1950** | 7,691 | 8,764 | **1974** | 9,840 | -- | **1998** | 13,669 | 16,020 |
| **1926** | 7,743 | -- | **1951** | 6,222 | 7,010 | **1975** | 13,590 | -- | **1999** | 5,409 | 6,320 |
| **1927** | 6,219 | -- | **1952** | 8,221 | 9,328 | **1976** | 12,290 | -- | **2000** | 4,729 | 5,451 |
| **1928** | 11,210 | -- | **1953** | 7,372 | 8,622 | **1977** | 10,320 | -- | **2001** | 4,827 | 5,772 |
| **1929** | 21,130 | -- | **1954** | 6,944 | 7,382 | **1978** | 9,336 | -- | **2002** | 4,419 | 5,168 |

Source: USGS 2006c; USGS 2006g

## Table 2.3.1-10 Mean Monthly Stream Flow on the Savannah River near Jackson, South Carolina

| YEAR | Monthly mean streamflow, in ft$^3$/s | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1971 | * | * | * | * | * | * | * | * | * | 6,973 | 7,280 | 13,969 |
| 1972 | * | 16,350 | 8,499 | 7,641 | 9,220 | 9,777 | 9,149 | 7,106 | 6,868 | 6,682 | 6,765 | 11,710 |
| 1973 | 14,810 | 18,670 | | * | 11,180 | | 9,275 | 8,005 | 6,852 | 6,695 | 6,692 | 8,437 |
| 1974 | 16,960 | * | 9,538 | * | 8,120 | 7,244 | 7,295 | 8,364 | 7,554 | 7,206 | 7,250 | 7,406 |
| 1975 | 12,839 | * | * | * | 13,930 | 9,854 | 8,653 | 7,502 | 8,194 | 11,750 | 14,570 | 13,590 |
| 1976 | 13,230 | 11,640 | * | * | * | * | * | 7,396 | 7,692 | 9,382 | 9,967 | * |
| 1977 | 14,870 | 9,364 | 13,760 | * | 8,704 | 7,573 | 7,368 | 7,276 | 7,133 | 7,249 | 12,910 | 13,020 |
| 1978 | * | * | 11,110 | 8,677 | 13,289 | 9,101 | 6,879 | 6,830 | 6,524 | 6,180 | 6,461 | 6,387 |
| 1979 | 6,737 | * | * | * | * | 16,820 | 8,685 | 8,529 | 7,794 | 8,745 | 11,460 | 12,550 |
| 1980 | * | * | * | * | 11,090 | 13,030 | 7,822 | 7,242 | 7,073 | 6,927 | 7,208 | 6,655 |
| 1981 | 6,803 | 7,836 | 6,898 | 6,641 | 5,679 | 6,710 | 5,465 | 5,689 | 5,656 | 5,071 | 4,563 | 5,734 |
| 1982 | 10,120 | 11,570 | 8,308 | 8,070 | 6,393 | 5,926 | 5,900 | 5,959 | 6,669 | 6,714 | 6,016 | 8,753 |
| 1983 | 14,779 | * | * | | 9,075 | 10,500 | 6,951 | 6,627 | 6,701 | 6,136 | 5,798 | 9,127 |
| 1984 | 12,950 | 14,240 | * | 14,560 | * | 8,859 | 8,265 | * | 7,655 | 6,500 | 6,451 | 6,084 |
| 1985 | 6,482 | 13,260 | 7,478 | 6,283 | 5,568 | 5,351 | 5,820 | 5,725 | 5,486 | 6,521 | 6,876 | 6,694 |
| 1986 | 7,601 | 7,170 | 6,904 | 5,750 | 5,403 | 5,739 | 5,869 | 6,354 | 5,555 | 4,859 | 4,582 | 5,986 |
| 1987 | 9,399 | 11,590 | * | 11,010 | 5,896 | 5,434 | 6,221 | 8,941 | 9,859 | 7,552 | 6,455 | 5,816 |
| 1988 | 6,160 | 6,193 | 5,728 | 5,461 | 4,720 | 4,560 | 4,530 | 4,628 | 5,423 | 5,487 | 4,958 | 4,750 |
| 1989 | 5,162 | 5,833 | 6,983 | 6,701 | 5,123 | 5,334 | 6,739 | 5,978 | 8,670 | 14,280 | 6,924 | 16,880 |
| 1990 | 11,380 | * | * | 9,043 | 11,950 | 6,817 | 6,401 | 8,358 | 7,180 | * | 7,105 | 7,033 |
| 1991 | 8,097 | 10,170 | * | 13,160 | * | 9,750 | 11,430 | 16,510 | 7,645 | 6,621 | 7,560 | 7,410 |
| 1992 | 8,793 | 8,283 | 12,910 | 10,080 | 5,990 | 8,673 | 7,509 | 8,723 | 7,806 | 12,630 | * | * |
| 1993 | * | * | * | * | 9,660 | 8,632 | 7,620 | 7,573 | 6,437 | 6,147 | 6,498 | 6,624 |
| 1994 | 8,413 | 8,672 | 10,990 | 10,070 | 6,594 | 7,270 | * | * | 11,270 | * | 12,860 | 15,430 |
| 1995 | 15,210 | * | * | 8,012 | 6,330 | 6,937 | 7,422 | 9,027 | 10,630 | 11,290 | * | 14,140 |
| 1996 | 9,469 | * | * | 11,820 | 9,943 | 10,710 | 7,407 | 8,096 | 8,050 | 8,769 | 5,634 | 7,684 |
| 1997 | 11,790 | 14,850 | * | 11,160 | 11,490 | 9,784 | 8,263 | 9,418 | 6,090 | 7,312 | 7,570 | 12,210 |
| 1998 | * | * | * | * | * | 8,659 | 7,476 | 7,018 | 8,901 | 7,826 | 7,416 | 6,787 |
| 1999 | 7,096 | 9,446 | 7,075 | 6,901 | 5,789 | 5,672 | 6,427 | 6,761 | 6,528 | 5,088 | 4,600 | 4,583 |
| 2000 | 6,505 | 5,637 | 5,746 | 4,883 | 4,680 | 4,990 | 4,901 | 5,659 | 6,342 | 5,041 | 4,956 | 5,128 |
| 2001 | 5,531 | 5,637 | 8,030 | 5,830 | 4,837 | 5,968 | 5,169 | 5,094 | 4,763 | 4,659 | 4,744 | 5,000 |
| 2002 | 5,110 | 5,306 | 5,355 | 5,185 | 4,575 | 4,388 | 4,441 | 4,462 | 4,711 | * | * | * |
| Mean of monthly stream flows | 9,858 | 10,090 | 8,457 | 8,426 | 7,893 | 7,933 | 7,080 | 7,409 | 7,216 | 7,458 | 7,315 | 8,813 |

* inidcates a month for which no value is reported by the USGS due to insufficient number of daily readings for meaningful average

Source: USGS 2006d

# Table 2.3.1-11 Mean Monthly Stream Flow on the Savannah River at Augusta, Georgia

| YEAR | Monthly mean streamflow, in $ft^3/s$ | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1883 | | | | | | | | | | 2,611 | 3,901 | 4,263 |
| 1884 | 10,570 | 13,300 | 33,180 | 18,100 | 6,536 | 14,979 | 8,337 | 4,618 | 2,698 | 2,370 | 2,903 | 9,979 |
| 1885 | 21,820 | 15,800 | 8,516 | 5,878 | 7,036 | 6,463 | 3,888 | 3,929 | 7,793 | 11,730 | 11,970 | 11,270 |
| 1886 | 23,720 | 9,367 | 13,100 | 21,560 | 19,570 | 16,580 | 19,230 | 7,259 | 5,363 | 3,283 | 5,261 | 6,784 |
| 1887 | 6,128 | 13,080 | 9,900 | 5,387 | 4,645 | 6,398 | 12,450 | 35,030 | 4,957 | 5,570 | 4,305 | 8,510 |
| 1888 | 16,940 | 19,880 | 24,650 | 14,740 | 13,790 | 8,493 | 5,256 | 6,097 | 47,850 | 12,250 | 19,510 | 12,850 |
| 1889 | 26,570 | 30,840 | 15,830 | 10,650 | 6,219 | 7,451 | 10,750 | 15,509 | 9,469 | 4,975 | 10,060 | 5,443 |
| 1890 | 5,137 | 9,023 | 12,340 | 7,661 | 9,608 | 5,491 | 8,192 | 6,002 | 8,249 | 19,540 | 5,429 | 7,080 |
| 1891 | 14,660 | 34,300 | 43,060 | 17,650 | 8,755 | 8,647 | 6,534 | 13,669 | 5,622 | 3,520 | 5,951 | 7,591 |
| 1896 | 11,260 | 16,820 | 7,005 | 5,298 | 4,907 | 3,951 | 16,800 | 3,431 | 3,403 | 2,792 | 7,904 | 10,290 |
| 1897 | 9,167 | 24,470 | 20,200 | 18,630 | 7,516 | 5,538 | 7,301 | 8,177 | 4,100 | 3,741 | 3,857 | 5,265 |
| 1898 | 6,519 | 4,929 | 6,298 | 11,710 | 4,415 | 3,574 | 11,160 | 13,440 | 21,490 | 14,520 | 10,130 | 10,300 |
| 1899 | 16,020 | 34,870 | 24,790 | 14,380 | 7,638 | 6,090 | 5,145 | 5,128 | 5,554 | 5,608 | 4,808 | 7,045 |
| 1900 | 7,262 | 26,240 | 18,330 | 20,090 | 9,265 | 22,700 | 9,589 | 5,775 | 6,197 | 6,681 | 7,432 | 9,705 |
| 1901 | 14,280 | 16,560 | 15,140 | 25,380 | 15,340 | 19,570 | 8,979 | 26,260 | 20,570 | 9,170 | 7,547 | 18,570 |
| 1902 | 11,690 | 27,600 | 36,000 | 13,460 | 8,394 | 7,487 | 5,525 | 5,843 | 7,460 | 6,423 | 5,850 | 12,700 |
| 1903 | 10,590 | 39,560 | 32,930 | 19,900 | 10,040 | 17,280 | 7,275 | 8,195 | 5,316 | 4,179 | 4,979 | 4,405 |
| 1904 | 5,585 | 9,206 | 8,579 | 5,512 | 4,292 | 4,088 | 3,769 | 11,700 | 3,795 | 2,079 | 3,015 | 4,772 |
| 1905 | 7,073 | 18,780 | 7,274 | 5,416 | 9,759 | 4,704 | 12,609 | 7,745 | 4,218 | 3,916 | 3,789 | 19,270 |
| 1906 | 28,670 | 10,650 | 23,290 | 10,760 | 8,022 | 16,100 | 19,480 | 16,180 | 19,620 | 18,140 | 8,824 | 9,576 |
| 1925 | 40,410 | 10,240 | 8,892 | 7,369 | 5,211 | 3,258 | 3,001 | 1,706 | 1,453 | 2,656 | 5,757 | 4,540 |
| 1926 | 12,960 | 16,330 | 11,920 | 11,930 | 3,985 | 3,434 | 4,958 | 6,858 | 3,992 | 3,118 | 5,437 | 8,611 |
| 1927 | 5,840 | 10,400 | 10,340 | 5,845 | 3,427 | 5,613 | 9,276 | 3,569 | 2,727 | 2,625 | 3,121 | 12,010 |
| 1928 | 6,566 | 9,379 | 9,545 | 13,289 | 13,339 | 8,328 | 10,060 | 29,970 | 14,470 | 7,495 | 6,317 | 5,538 |
| 1929 | 8,176 | 22,690 | 52,440 | 14,870 | 20,670 | 10,350 | 8,318 | 5,870 | 35,850 | 42,170 | 16,990 | 15,110 |
| 1930 | 13,400 | 12,010 | 12,010 | 8,906 | 7,296 | 5,588 | 4,806 | 3,645 | 4,511 | 3,348 | 7,627 | 8,795 |
| 1931 | 9,933 | 6,967 | 8,287 | 10,780 | 9,360 | 3,794 | 4,720 | 4,304 | 2,501 | 2,399 | 2,614 | 15,790 |
| 1932 | 20,430 | 17,890 | 12,260 | 9,640 | 7,203 | 10,600 | 4,157 | 9,261 | 3,409 | 11,020 | 10,510 | 27,389 |
| 1933 | 14,860 | 19,910 | 9,088 | 8,305 | 6,966 | 5,020 | 5,124 | 4,611 | 5,284 | 3,385 | 3,580 | 4,355 |
| 1934 | 5,286 | 6,111 | 15,430 | 7,816 | 8,017 | 15,900 | 6,368 | 5,920 | 4,748 | 10,580 | 4,387 | 6,586 |
| 1935 | 11,620 | 8,819 | 12,130 | 10,510 | 6,963 | 4,361 | 6,805 | 6,899 | 6,247 | 2,923 | 7,043 | 5,656 |
| 1936 | 40,960 | 23,470 | 16,640 | 58,700 | 7,889 | 5,766 | 4,322 | 6,857 | 4,024 | 18,750 | 5,770 | 12,620 |
| 1937 | 31,619 | 23,180 | 13,610 | 18,320 | 13,710 | 7,244 | 5,518 | 8,195 | 6,793 | 13,270 | 6,245 | 6,427 |
| 1938 | 6,468 | 4,812 | 8,597 | 19,680 | 6,218 | 8,517 | 13,919 | 7,191 | 3,978 | 3,010 | 4,387 | 5,190 |
| 1939 | 6,503 | 25,090 | 22,400 | 10,740 | 8,399 | 6,032 | 5,860 | 11,830 | 4,927 | 3,412 | 3,192 | 4,304 |
| 1940 | 8,433 | 13,890 | 10,150 | 8,762 | 4,497 | 4,436 | 4,571 | 27,130 | 8,205 | 2,682 | 6,602 | 7,500 |
| 1941 | 8,308 | 5,188 | 10,730 | 7,052 | 3,615 | 6,138 | 15,870 | 5,322 | 2,735 | 2,325 | 2,673 | 10,800 |
| 1942 | 7,382 | 13,650 | 26,590 | 8,490 | 8,897 | 5,832 | 5,784 | 7,266 | 5,046 | 4,072 | 4,472 | 10,360 |
| 1943 | 26,329 | 14,670 | 19,380 | 14,610 | 8,975 | 6,725 | 13,619 | 6,219 | 4,932 | 3,662 | 4,528 | 6,157 |
| 1944 | 10,460 | 18,720 | 33,670 | 20,620 | 9,586 | 5,936 | 4,745 | 4,493 | 3,701 | 3,953 | 4,066 | 4,671 |
| 1945 | 5,802 | 13,400 | 9,961 | 12,720 | 6,855 | 4,507 | 5,182 | 5,008 | 7,770 | 3,897 | 4,527 | 15,989 |
| 1946 | 26,179 | 21,370 | 16,560 | 15,740 | 13,080 | 7,316 | 5,522 | 5,368 | 3,906 | 7,506 | 5,844 | 5,093 |
| 1947 | 21,560 | 8,909 | 16,070 | 14,610 | 6,030 | 5,870 | 4,366 | 4,336 | 3,248 | 4,887 | 20,450 | 13,969 |
| 1948 | 11,310 | 29,049 | 24,120 | 17,220 | 8,419 | 6,631 | 10,330 | 8,349 | 6,834 | 4,791 | 21,250 | 21,670 |
| 1949 | 17,920 | 25,140 | 12,860 | 14,549 | 18,670 | 11,900 | 14,190 | 11,800 | 13,080 | 9,557 | 9,393 | 8,433 |
| 1950 | 9,481 | 8,759 | 11,570 | 7,607 | 5,907 | 7,448 | 6,916 | 4,358 | 8,250 | 8,541 | 5,165 | 8,319 |
| 1951 | 6,581 | 7,451 | 9,764 | 11,440 | 6,580 | 5,963 | 4,570 | 3,464 | 3,389 | 2,728 | 4,196 | 8,662 |
| 1952 | 8,654 | 5,842 | 29,080 | 21,820 | 6,782 | 4,342 | 3,627 | 3,889 | 3,332 | 3,385 | 4,017 | 3,751 |
| 1953 | 4,084 | 5,889 | 11,390 | 6,460 | 15,150 | 5,778 | 5,750 | 5,696 | 7,231 | 7,171 | 6,498 | 7,115 |
| 1954 | 7,247 | 7,269 | 9,420 | 11,460 | 7,306 | 6,575 | 6,230 | 5,677 | 5,584 | 5,818 | 5,846 | 4,982 |
| 1955 | 4,600 | 5,278 | 5,767 | 7,119 | 5,804 | 5,227 | 5,205 | 5,225 | 4,995 | 4,976 | 5,076 | 5,150 |
| 1956 | 4,418 | 4,861 | 5,668 | 6,171 | 6,031 | 5,425 | 5,266 | 5,547 | 6,189 | 5,437 | 5,622 | 5,961 |
| 1957 | 6,105 | 5,988 | 6,772 | 8,225 | 9,802 | 6,138 | 6,143 | 6,171 | 6,452 | 7,347 | 9,310 | 13,130 |
| 1958 | 12,780 | 14,030 | 15,120 | 23,520 | 12,260 | 6,609 | 8,796 | 7,835 | 5,879 | 5,722 | 5,675 | 5,763 |
| 1959 | 6,026 | 7,395 | 7,322 | 6,721 | 5,780 | 13,060 | 6,613 | 7,070 | 8,559 | 12,680 | 12,400 | 9,298 |
| 1960 | 15,070 | 28,480 | 18,660 | 18,020 | 9,029 | 6,267 | 6,414 | 7,344 | 6,538 | 6,514 | 5,867 | 5,943 |
| 1961 | 6,198 | 9,951 | 11,980 | 21,770 | 7,425 | 6,783 | 8,840 | 7,700 | 7,835 | 5,679 | 5,537 | 12,700 |
| 1962 | 14,960 | 9,978 | 13,180 | 15,420 | 7,963 | 8,189 | 5,676 | 5,992 | 6,050 | 5,960 | 5,852 | 5,865 |

# Table 2.3.1-11 (cont.) Mean Monthly Stream Flow on the Savannah River at Augusta, Georgia

| YEAR | Monthly mean streamflow, in ft$^3$/s | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1963 | 9,178 | 9,885 | 18,450 | 7,675 | 14,900 | 10,090 | 11,220 | 7,875 | 7,488 | 6,559 | 6,826 | 9,818 |
| 1964 | 16,360 | 16,720 | 27,510 | 43,850 | 27,050 | 7,143 | 10,970 | 11,900 | 14,480 | 17,740 | 10,950 | 17,670 |
| 1965 | 17,610 | 10,120 | 17,450 | 16,370 | 9,574 | 12,760 | 7,652 | 9,027 | 7,959 | 7,057 | 6,958 | 7,060 |
| 1966 | 8,783 | 13,610 | 23,610 | 7,201 | 10,480 | 9,031 | 6,830 | 6,731 | 6,896 | 6,478 | 6,478 | 6,795 |
| 1967 | 8,718 | 8,439 | 9,228 | 6,870 | 7,036 | 14,440 | 8,713 | 8,625 | 8,740 | 6,286 | 7,593 | 15,100 |
| 1968 | 18,440 | 7,175 | 7,199 | 7,554 | 7,620 | 9,607 | 7,366 | 7,500 | 6,808 | 6,649 | 6,834 | 6,469 |
| 1969 | 10,210 | 13,590 | 11,350 | 20,800 | 13,680 | 7,370 | 6,942 | 7,128 | 7,177 | 6,602 | 6,586 | 6,867 |
| 1970 | 6,945 | 7,093 | 8,552 | 8,093 | 6,582 | 6,548 | 7,059 | 6,889 | 6,562 | 6,460 | 6,283 | 6,536 |
| 1971 | 7,151 | 7,314 | 21,580 | 8,658 | 9,374 | 7,339 | 7,248 | 8,471 | 7,306 | 7,198 | 7,504 | 14,160 |
| 1972 | 19,250 | 16,160 | 8,569 | 7,737 | 9,347 | 10,390 | 8,429 | 7,129 | 7,078 | 6,581 | 6,385 | 12,550 |
| 1973 | 15,260 | 19,080 | 18,180 | 25,620 | 11,030 | 22,830 | 7,906 | 7,469 | 6,344 | 6,076 | 6,153 | 7,845 |
| 1974 | 16,160 | 22,350 | 8,762 | 13,900 | 7,865 | 7,093 | 7,302 | 8,181 | 7,238 | 6,451 | 6,814 | 7,044 |
| 1975 | 12,170 | 18,140 | 28,490 | 21,380 | 13,430 | 9,235 | 8,231 | 7,546 | 7,882 | 11,100 | 13,139 | 12,680 |
| 1976 | 12,250 | 10,410 | 16,750 | 12,600 | 11,120 | 16,940 | 13,200 | 7,379 | 7,612 | 8,880 | 9,583 | 20,530 |
| 1977 | 13,210 | 8,924 | 13,020 | 20,180 | 8,396 | 7,745 | 7,612 | 7,235 | 6,909 | 7,045 | 11,940 | 11,610 |
| 1978 | 16,300 | 17,990 | 9,746 | 8,012 | 12,070 | 8,532 | 7,082 | 6,833 | 6,694 | 6,470 | 6,435 | 6,452 |
| 1979 | 6,821 | 11,040 | 18,690 | 24,720 | 11,800 | 14,449 | 7,629 | 7,778 | 7,317 | 8,491 | 10,800 | 11,300 |
| 1980 | 13,160 | 12,520 | 23,610 | 26,750 | 10,610 | 11,590 | 7,720 | 7,196 | 7,094 | 6,535 | 6,916 | 6,560 |
| 1981 | 6,670 | 7,211 | 6,390 | 6,179 | 5,691 | 6,203 | 5,587 | 5,667 | 5,840 | 5,294 | 4,624 | 5,794 |
| 1982 | 9,346 | 11,620 | 7,779 | 8,098 | 6,104 | 5,985 | 5,931 | 5,988 | 6,855 | 6,697 | 5,975 | 8,855 |
| 1983 | 13,780 | 17,210 | 17,230 | 26,210 | 8,244 | 9,724 | 6,489 | 6,573 | 6,467 | 6,067 | 5,534 | 9,062 |
| 1984 | 12,780 | 14,160 | 19,060 | 14,190 | 17,040 | 8,252 | 8,120 | 15,570 | 7,367 | 6,239 | 6,014 | 5,789 |
| 1985 | 6,252 | 12,360 | 7,050 | 6,133 | 5,515 | 5,256 | 5,715 | 5,678 | 5,575 | 6,581 | 6,636 | 6,402 |
| 1986 | 7,461 | 6,609 | 6,534 | 5,557 | 5,479 | 5,834 | 5,954 | 6,092 | 5,516 | 4,514 | 4,561 | 5,546 |
| 1987 | 8,365 | 10,660 | 15,290 | 9,937 | 5,639 | 5,353 | 6,136 | 8,671 | 9,440 | 7,036 | 6,284 | 5,804 |
| 1988 | 5,998 | 6,082 | 5,637 | 5,172 | 4,476 | 4,271 | 4,219 | 4,320 | 4,847 | 4,939 | 4,442 | 4,305 |
| 1989 | 4,734 | 5,290 | 6,149 | 5,794 | 4,672 | 4,810 | 6,001 | 5,541 | 7,814 | 13,150 | 5,977 | 15,590 |
| 1990 | 10,120 | 21,640 | 25,100 | 7,892 | 11,580 | 6,450 | 6,546 | 8,340 | 6,825 | 10,580 | 6,433 | 6,596 |
| 1991 | 7,422 | 9,371 | 12,310 | 11,570 | 16,830 | 9,222 | 10,900 | 14,810 | 6,983 | 6,353 | 7,201 | 6,881 |
| 1992 | 7,825 | 7,483 | 12,030 | 8,722 | 5,664 | 8,098 | 6,524 | 8,050 | 7,050 | 11,240 | 15,880 | 27,270 |
| 1993 | 30,240 | 22,920 | 22,910 | 19,040 | 8,241 | 7,644 | 6,938 | 6,885 | 5,553 | 5,223 | 5,363 | 5,657 |
| 1994 | 7,362 | 7,544 | 9,658 | 8,775 | 5,779 | 7,576 | 12,050 | 15,820 | 9,531 | 13,460 | 11,280 | 13,450 |
| 1995 | 13,930 | 19,020 | 18,980 | 7,388 | 5,897 | 6,127 | 6,843 | 8,000 | 9,342 | 9,907 | 18,610 | 12,630 |
| 1996 | 9,627 | 24,210 | 23,460 | 9,290 | 7,935 | 8,307 | 5,220 | 6,047 | 6,986 | 8,204 | 5,455 | 7,270 |
| 1997 | 10,640 | 13,860 | 14,960 | 9,127 | 9,117 | 8,644 | 7,325 | 8,489 | 5,306 | 6,430 | 6,491 | 11,050 |
| 1998 | 21,530 | 30,600 | 24,960 | 22,460 | 19,020 | 7,571 | 6,768 | 6,522 | 7,651 | 6,566 | 6,183 | 5,535 |
| 1999 | 5,669 | 7,711 | 5,704 | 5,620 | 4,735 | 4,878 | 5,499 | 6,173 | 5,812 | 4,764 | 4,288 | 4,239 |
| 2000 | 5,921 | 4,882 | 5,014 | 4,371 | 4,089 | 4,269 | 4,359 | 5,180 | 5,661 | 4,387 | 4,196 | 4,416 |
| 2001 | 4,853 | 4,908 | 7,038 | 4,764 | 4,037 | 5,160 | 4,564 | 4,589 | 4,284 | 4,436 | 4,527 | 4,749 |
| 2002 | 4,690 | 4,774 | 4,687 | 4,641 | 4,250 | 4,139 | 4,246 | 4,204 | 4,318 | 3,973 | 4,304 | 4,824 |
| 2003 | 4,126 | 5,548 | 17,820 | 13,660 | 19,060 | 14,199 | 16,850 | 10,420 | 5,514 | | | |
| Mean of monthly stream flows | 12,100 | 14,120 | 15,370 | 13,080 | 8,979 | 8,098 | 7,669 | 8,168 | 7,413 | 7,115 | 7,038 | 9,170 |
| Mean from 1984 to 2003 | 9,477 | 11,982 | 13,218 | 9,205 | 8,453 | 6,803 | 7,039 | 7,970 | 6,569 | 7,262 | 7,059 | 8,316 |

Source; USGS 2006c

## Table 2.3.1-12 Mean Monthly Stream Flow on the Savannah River at Burtons Ferry Near Millhaven, Georgia

| YEAR | Monthly mean streamflow, in $ft^3/s$ | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1939 | | | | | | | | | | 4,182 | 3,807 | 4,792 |
| 1940 | 9,086 | 14,790 | 10,680 | 9,345 | 5,114 | 5,071 | 5,078 | 28,040 | 9,677 | 3,573 | 6,783 | 8,139 |
| 1941 | 9,548 | 6,139 | 9,687 | 9,919 | 4,192 | 5,262 | 19,400 | 6,375 | 3,597 | 2,984 | 3,284 | 9,764 |
| 1942 | 11,030 | 14,670 | 28,120 | 11,900 | 9,450 | 7,007 | 6,498 | 7,473 | 5,739 | 4,945 | 5,249 | 8,129 |
| 1943 | 27,530 | 21,820 | 21,240 | 16,320 | 10,740 | 7,371 | 15,380 | 7,433 | 5,931 | 4,566 | 5,540 | 6,401 |
| 1944 | 12,630 | 18,780 | 33,880 | 25,430 | 13,270 | 6,894 | 5,651 | 5,308 | 4,576 | 4,602 | 4,332 | 5,919 |
| 1945 | 6,787 | 12,290 | 11,690 | 10,270 | 11,840 | 5,172 | 5,405 | 6,006 | 8,201 | 4,877 | 5,024 | 12,300 |
| 1946 | 33,190 | 22,330 | 16,690 | 19,180 | 14,099 | 8,167 | 6,172 | 5,966 | 4,574 | 8,020 | 6,210 | 5,573 |
| 1947 | 21,510 | 10,480 | 17,680 | 16,660 | 7,625 | 7,618 | 5,541 | 5,497 | 4,479 | 5,954 | 22,070 | 16,130 |
| 1948 | 12,860 | 30,440 | 26,710 | 21,570 | 9,045 | 8,674 | 10,430 | 9,177 | 7,979 | 6,818 | 12,150 | 32,410 |
| 1949 | 21,650 | 26,870 | 14,970 | 15,759 | 20,630 | 13,050 | 15,050 | 12,100 | 16,100 | 10,510 | 10,470 | 9,305 |
| 1950 | 11,070 | 10,450 | 12,580 | 9,574 | 6,944 | 8,663 | 7,730 | 5,608 | 8,917 | 8,696 | 6,109 | 8,939 |
| 1951 | 7,864 | 8,425 | 10,550 | 12,730 | 7,483 | 6,615 | 5,233 | 4,147 | 3,861 | 3,598 | 5,094 | 8,658 |
| 1952 | 9,916 | 7,315 | 28,710 | 26,620 | 8,169 | 4,705 | 4,178 | 4,628 | 4,091 | 4,074 | 4,813 | 4,677 |
| 1953 | 5,649 | 7,137 | 13,350 | 8,969 | 16,640 | 6,878 | 6,571 | 6,314 | 8,058 | 7,910 | 7,320 | 8,412 |
| 1954 | 8,609 | 8,011 | 9,425 | 12,670 | 7,786 | 6,591 | 6,422 | 5,844 | 5,742 | 5,880 | 6,198 | 5,524 |
| 1955 | 5,594 | 6,256 | 6,401 | 8,094 | 6,331 | 5,648 | 5,604 | 5,629 | 5,523 | 5,233 | 5,578 | 5,859 |
| 1956 | 5,067 | 6,192 | 7,342 | 7,745 | 7,098 | 5,941 | 5,531 | 5,890 | 6,665 | 5,842 | 5,887 | 6,528 |
| 1957 | 6,522 | 6,820 | 7,753 | 8,958 | 10,450 | 7,000 | 6,497 | 6,433 | 7,137 | 8,660 | 8,769 | 14,560 |
| 1958 | 13,660 | 15,270 | 16,660 | 24,310 | 13,980 | 7,559 | 9,066 | 8,178 | 5,881 | 5,810 | 6,080 | 6,394 |
| 1959 | 6,972 | 9,057 | 8,823 | 7,846 | 6,365 | 13,990 | 7,128 | 7,198 | 9,130 | 14,240 | 15,650 | 10,760 |
| 1960 | 15,609 | 32,429 | 24,520 | 23,490 | 11,250 | 7,593 | 7,534 | 8,249 | 7,261 | 7,252 | 6,478 | 6,685 |
| 1961 | 7,255 | 9,672 | 16,130 | 24,200 | 10,900 | 7,413 | 10,650 | 8,817 | 9,717 | 6,181 | 6,540 | 13,440 |
| 1962 | 18,760 | 11,860 | 17,820 | 18,270 | 9,399 | 9,320 | 6,808 | 6,866 | 6,834 | 6,812 | 7,032 | 7,275 |
| 1963 | 10,640 | 11,920 | 17,980 | 10,670 | 15,480 | 10,130 | 13,260 | 8,787 | 8,462 | 7,695 | 7,566 | 10,890 |
| 1964 | 17,850 | 20,040 | 27,080 | 46,240 | 29,980 | 8,418 | 11,140 | 13,310 | 20,010 | 20,150 | 14,240 | 17,700 |
| 1965 | 21,180 | 12,770 | 19,010 | 21,870 | 11,770 | 13,640 | 9,797 | 10,580 | 8,836 | 8,121 | 7,934 | 7,940 |
| 1966 | 10,130 | 13,289 | 30,180 | 9,741 | 12,850 | 11,030 | 8,041 | 7,988 | 7,776 | 7,530 | 7,543 | 7,920 |
| 1967 | 10,460 | 9,752 | 11,230 | 8,155 | 8,282 | 15,960 | 10,530 | 9,677 | 10,580 | 7,252 | 8,632 | 16,320 |
| 1968 | 22,200 | 10,070 | 8,643 | 8,535 | 8,479 | 10,500 | 8,075 | 8,093 | 7,524 | 7,459 | 7,937 | 7,870 |
| 1969 | 10,500 | 17,050 | 12,709 | 18,970 | 17,910 | 8,366 | 7,751 | 7,910 | 8,092 | 7,342 | 7,433 | 7,864 |
| 1970 | 7,954 | 8,308 | 9,695 | 10,070 | 7,660 | 7,457 | 7,685 | 7,794 | 7,268 | | | |
| 1982 | | | | | | | | | | 7,158 | 6,356 | 8,959 |
| 1983 | 15,609 | 19,670 | 20,720 | 29,540 | 9,621 | 10,460 | 7,268 | 6,929 | 7,027 | 6,408 | 6,150 | 9,597 |
| 1984 | 13,780 | 14,950 | 23,540 | 15,580 | 21,300 | 9,361 | 8,470 | 17,810 | 7,924 | 6,848 | 6,770 | 6,551 |
| 1985 | 6,987 | 13,719 | 7,813 | 6,530 | 5,873 | 5,779 | 6,156 | 6,098 | 5,658 | 6,413 | 7,681 | 7,830 |
| 1986 | 8,158 | 8,178 | 7,887 | 5,915 | 5,481 | 5,953 | 5,649 | 6,153 | 5,558 | 4,657 | 4,529 | 6,087 |
| 1987 | 9,893 | 11,700 | 17,780 | 11,650 | 6,246 | 5,639 | 6,298 | 8,660 | 9,573 | 7,495 | 6,596 | 6,117 |
| 1988 | 6,502 | 6,516 | 6,089 | 5,886 | 4,994 | 4,856 | 4,510 | 4,484 | 5,469 | 5,336 | 4,981 | 4,839 |
| 1989 | 5,419 | 5,785 | 7,108 | 6,855 | 5,053 | 5,296 | 6,717 | 5,694 | 8,867 | 14,800 | 6,450 | 17,200 |
| 1990 | 11,560 | 20,770 | 30,240 | 10,620 | 12,310 | 7,526 | 6,788 | 8,535 | 7,623 | 12,690 | 7,136 | 6,860 |
| 1991 | 8,217 | 10,760 | 14,929 | 14,560 | 19,830 | 10,210 | 11,810 | 19,220 | 8,322 | 6,619 | 7,845 | 7,503 |
| 1992 | 9,016 | 8,560 | 13,230 | 11,120 | 6,385 | 9,812 | 8,122 | 9,026 | 7,731 | 13,210 | 14,380 | 31,390 |
| 1993 | 35,290 | 28,220 | 27,389 | 26,000 | 9,788 | 8,379 | 7,016 | 6,858 | 6,259 | 5,993 | 6,632 | 6,627 |
| 1994 | 8,378 | 9,021 | 11,290 | 10,420 | 6,387 | 6,717 | 15,709 | 16,010 | 12,420 | 15,509 | 13,010 | 16,260 |
| 1995 | 16,550 | 19,080 | 24,640 | 8,388 | 6,253 | 7,288 | 7,138 | 8,834 | 10,290 | 10,780 | 18,210 | 16,150 |
| 1996 | 9,575 | 26,379 | 25,450 | 13,630 | 9,622 | 10,380 | 6,764 | 7,482 | 7,518 | 8,511 | 5,336 | 7,262 |
| 1997 | 11,510 | 14,610 | 19,350 | 10,360 | 11,250 | 9,212 | 7,737 | 8,795 | 5,654 | 6,932 | 7,497 | 12,500 |
| 1998 | 24,510 | 33,880 | 31,310 | 27,200 | 24,420 | 8,671 | 7,436 | 6,903 | 8,613 | 7,375 | 6,929 | 6,350 |
| 1999 | 6,745 | 9,690 | 6,946 | 6,653 | 5,536 | 5,325 | 6,420 | 6,431 | 6,418 | 5,685 | 5,119 | 5,148 |
| 2000 | 7,143 | 6,080 | 6,029 | 4,849 | 4,514 | 4,786 | 4,718 | 5,268 | 6,258 | 5,096 | 5,205 | 5,480 |
| 2001 | 5,961 | 5,806 | 7,900 | 6,501 | 5,319 | 6,313 | 5,645 | 5,445 | 5,256 | 4,935 | 4,984 | 5,204 |
| 2002 | 5,517 | 5,870 | 5,687 | 5,734 | 4,881 | 4,700 | 4,746 | 4,718 | 4,573 | 4,577 | 5,197 | 5,868 |
| 2003 | 5,224 | 6,419 | 18,730 | 16,410 | 19,140 | 19,110 | 19,510 | 13,320 | 7,211 | | | |
| Mean monthly flow | 12,131 | 13,584 | 16,192 | 14,202 | 10,489 | 8,144 | 8,163 | 8,346 | 7,547 | 7,381 | 7,591 | 9,670 |
| Mean from 1984 to 2003 | 10,797 | 13,300 | 15,667 | 11,243 | 9,729 | 7,766 | 7,868 | 8,787 | 7,360 | 8,077 | 7,605 | 9,538 |

Source: USGS 2006g

**Table 2.3.1-13 Average Daily Flows by Month for Three Gages on the Savannah River for Entire Record Length and Common Period of Complete Regulation**

| | Augusta 1884-2003 | Augusta 1984-2002 | Jackson 1971-2002 | Jackson 1984-2002 | Burtons Ferry 1939-2003 | Burtons Ferry 1984-2002 |
|---|---|---|---|---|---|---|
| Jan | 12,101 | 9,759 | 9,858 | 8,538 | 12,131 | 10,304 |
| Feb | 14,122 | 12,320 | 10,086 | 9,021 | 13,584 | 14,202 |
| Mar | 15,370 | 12,975 | 8,457 | 7,720 | 16,192 | 16,227 |
| Apr | 13,077 | 8,971 | 8,426 | 8,583 | 14,202 | 11,081 |
| May | 8,979 | 7,894 | 7,893 | 6,784 | 10,489 | 10,104 |
| Jun | 8,098 | 6,414 | 7,933 | 7,028 | 8,144 | 8,421 |
| Jul | 7,669 | 6,522 | 7,081 | 6,773 | 8,163 | 7,790 |
| Aug | 8,168 | 7,841 | 7,409 | 7,549 | 8,346 | 7,466 |
| Sep | 7,413 | 6,624 | 7,216 | 7,316 | 7,547 | 6,866 |
| Oct | 7,115 | 7,262 | 7,458 | 7,536 | 7,381 | 6,736 |
| Nov | 7,038 | 7,059 | 7,315 | 6,574 | 7,591 | 7,310 |
| Dec | 9,170 | 8,316 | 8,813 | 8,132 | 9,670 | 7,995 |

## Table 2.3.1-14 N-Day Low Flow Values for the Savannah River at Augusta, Georgia

| Year | N-day Low Flow Values from SWSTAT for USGS Gage 02197000 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 3-day | 7-day | 10-day | 30-day | 60-day | 90-day | 183-day | 365-day |
| **1885** | 2060. 11 | 2160. 9 | 2230. 9 | 2330. 6 | 2430. 4 | 2620. 4 | 4780. 17 | 9670. 51 |
| **1886** | 2510. 22 | 2710. 21 | 2890. 22 | 3710. 26 | 3810. 23 | 4140. 21 | 5820. 38 | 9700. 53 |
| **1887** | 3050. 32 | 3080. 28 | 3150. 27 | 3230. 19 | 3520. 15 | 4420. 27 | 5580. 34 | 11100. 68 |
| **1888** | 2890. 27 | 3050. 27 | 3160. 28 | 3840. 30 | 4720. 41 | 4780. 32 | 8550. 83 | 12200. 80 |
| **1889** | 3530. 36 | 4070. 45 | 4460. 52 | 5100. 53 | 5430. 49 | 6180. 68 | 14900. 94 | 17700. 94 |
| **1890** | 3960. 50 | 4010. 43 | 4120. 44 | 4780. 48 | 5200. 45 | 5960. 58 | 7100. 67 | 8910. 43 |
| **1891** | 2890. 28 | 3110. 29 | 3550. 33 | 4300. 42 | 6210. 74 | 6370. 70 | 7540. 77 | 14000. 87 |
| **1897** | 2070. 13 | 2210. 10 | 2300. 10 | 2580. 7 | 3100. 9 | 3130. 7 | 5540. 31 | 9310. 47 |
| **1898** | 2350. 20 | 2440. 14 | 2560. 16 | 3330. 21 | 3550. 17 | 3740. 17 | 4720. 15 | 6830. 19 |
| **1899** | 2340. 19 | 2420. 13 | 2510. 13 | 3150. 17 | 3620. 18 | 5210. 41 | 10800. 91 | 14600. 89 |
| **1900** | 2800. 24 | 3000. 25 | 3140. 26 | 3770. 29 | 4570. 37 | 4880. 37 | 5300. 24 | 9320. 48 |
| **1901** | 4040. 52 | 4110. 47 | 4370. 50 | 4810. 49 | 5590. 54 | 6070. 62 | 7500. 75 | 11900. 76 |
| **1902** | 5750. 80 | 6400. 89 | 7210. 93 | 7530. 95 | 7700. 94 | 9280. 94 | 14000. 93 | 18800. 95 |
| **1903** | 3920. 48 | 4280. 52 | 4450. 51 | 4870. 50 | 5650. 56 | 5790. 52 | 6330. 49 | 12800. 85 |
| **1904** | 3630. 38 | 3640. 35 | 3660. 35 | 4150. 37 | 4380. 34 | 4440. 28 | 5190. 23 | 8600. 35 |
| **1905** | 1740. 6 | 1880. 3 | 1850. 3 | 2060. 2 | 2420. 3 | 2780. 6 | 4670. 14 | 6270. 12 |
| **1906** | 2860. 26 | 3020. 26 | 3090. 24 | 3550. 22 | 3740. 22 | 3880. 18 | 6170. 44 | 11200. 69 |
| **1926** | 1140. 1 | 1170. 1 | 1180. 1 | 1300. 1 | 1510. 1 | 1640. 1 | 2850. 1 | 6290. 13 |
| **1927** | 1720. 5 | 1960. 5 | 1900. 4 | 2680. 10 | 2940. 7 | 3430. 9 | 4240. 6 | 6550. 15 |
| **1928** | 1220. 2 | 1360. 2 | 1420. 2 | 2100. 3 | 2440. 5 | 2620. 5 | 4420. 9 | 6130. 9 |
| **1929** | 4160. 53 | 5060. 64 | 4950. 61 | 5470. 63 | 5790. 63 | 6410. 71 | 9380. 88 | 16000. 91 |
| **1930** | 3980. 51 | 4210. 50 | 4220. 47 | 5110. 55 | 6140. 73 | 7470. 89 | 15900. 95 | 17300. 93 |
| **1931** | 2120. 14 | 2540. 17 | 2530. 15 | 2900. 13 | 3730. 21 | 3650. 13 | 4630. 12 | 6640. 17 |
| **1932** | 1420. 3 | 1920. 4 | 2010. 6 | 2170. 4 | 2360. 2 | 2500. 2 | 3370. 2 | 8880. 42 |
| **1933** | 2040. 10 | 2360. 11 | 2340. 11 | 3150. 16 | 3990. 24 | 5530. 45 | 6730. 59 | 11400. 70 |
| **1934** | 2230. 16 | 2640. 18 | 2610. 17 | 2980. 14 | 3330. 13 | 3500. 12 | 4380. 8 | 6130. 8 |
| **1935** | 2840. 25 | 3620. 34 | 3460. 32 | 4220. 40 | 4940. 42 | 5660. 47 | 6330. 50 | 8580. 34 |
| **1936** | 1930. 8 | 2500. 16 | 2470. 12 | 2840. 11 | 3640. 19 | 4790. 34 | 5480. 29 | 11500. 71 |
| **1937** | 2920. 29 | 3150. 30 | 3280. 30 | 4020. 33 | 5020. 43 | 5100. 40 | 7610. 80 | 16000. 90 |
| **1938** | 3610. 37 | 3770. 38 | 3820. 38 | 4690. 47 | 5130. 44 | 5780. 51 | 7020. 64 | 8820. 41 |
| **1939** | 2180. 15 | 2680. 19 | 2630. 18 | 2890. 12 | 3280. 11 | 3690. 15 | 5020. 20 | 10400. 59 |
| **1940** | 2270. 17 | 2860. 23 | 2860. 20 | 3080. 15 | 3150. 10 | 3480. 11 | 5500. 30 | 7500. 22 |
| **1941** | 1980. 9 | 2110. 8 | 2200. 8 | 2670. 9 | 3290. 12 | 4150. 22 | 5850. 39 | 8260. 29 |
| **1942** | 1690. 4 | 2010. 6 | 1980. 5 | 2300. 5 | 2470. 6 | 2540. 3 | 5160. 22 | 8680. 37 |
| **1943** | 2930. 30 | 3000. 24 | 3090. 25 | 3730. 27 | 4080. 28 | 4440. 29 | 5400. 28 | 10100. 56 |
| **1944** | 3130. 34 | 3340. 32 | 3350. 31 | 3560. 23 | 4060. 26 | 4020. 19 | 5810. 37 | 10900. 66 |
| **1945** | 2960. 31 | 3260. 31 | 3270. 29 | 3560. 24 | 3680. 20 | 3700. 16 | 4280. 7 | 7520. 23 |
| **1946** | 2540. 23 | 2850. 22 | 3070. 23 | 3770. 28 | 4120. 30 | 4650. 30 | 5110. 21 | 10800. 63 |
| **1947** | 2060. 12 | 2490. 15 | 2880. 21 | 3630. 25 | 4010. 25 | 4670. 31 | 5550. 32 | 9680. 52 |
| **1948** | 2280. 18 | 2400. 12 | 2510. 14 | 3190. 18 | 3530. 16 | 3670. 14 | 4750. 16 | 11800. 72 |
| **1949** | 3630. 39 | 4090. 46 | 4340. 49 | 4650. 46 | 5740. 61 | 6120. 66 | 7510. 76 | 13400. 86 |
| **1950** | 6030. 85 | 6380. 88 | 6340. 87 | 7150. 92 | 8110. 95 | 8630. 93 | 9240. 86 | 11800. 74 |
| **1951** | 3200. 35 | 3470. 33 | 3590. 34 | 4250. 41 | 5620. 55 | 5930. 55 | 6280. 48 | 7190. 21 |
| **1952** | 1830. 7 | 2090. 7 | 2100. 7 | 2620. 8 | 2970. 8 | 3150. 8 | 4030. 4 | 7850. 26 |
| **1953** | 2420. 21 | 2680. 20 | 2740. 19 | 3270. 20 | 3330. 14 | 3440. 10 | 3660. 3 | 6340. 14 |
| **1954** | 4350. 57 | 5240. 66 | 5530. 71 | 5680. 69 | 5700. 59 | 5740. 50 | 6350. 51 | 7580. 24 |
| **1955** | 4210. 54 | 4240. 51 | 4300. 48 | 4440. 45 | 4680. 40 | 4920. 38 | 5340. 25 | 6260. 11 |
| **1956** | 3730. 41 | 4180. 49 | 4180. 46 | 4350. 44 | 4590. 38 | 4780. 33 | 4900. 19 | 5310. 5 |
| **1957** | 4800. 63 | 4830. 59 | 4840. 56 | 5260. 58 | 5320. 48 | 5390. 43 | 5570. 33 | 5880. 7 |
| **1958** | 5170. 69 | 5690. 75 | 5670. 74 | 6010. 76 | 6080. 70 | 6120. 65 | 6520. 52 | 9540. 50 |
| **1959** | 5390. 75 | 5550. 73 | 5580. 73 | 5650. 67 | 5680. 57 | 5690. 49 | 6050. 42 | 8560. 33 |
| **1960** | 5360. 74 | 5400. 71 | 5420. 69 | 5690. 70 | 6120. 71 | 6890. 83 | 7940. 82 | 11900. 77 |

## Table 2.3.1-14 (cont.) N-Day Low Flow Values for the Savannah River at Augusta, Georgia

| Year | N-day Low Flow Values from SWSTAT for USGS Gage 02197000 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 3-day | 7-day | 10-day | 30-day | 60-day | 90-day | 183-day | 365-day |
| 1961 | 5260. 72 | 5660. 74 | 5690. 75 | 5850. 74 | 5880. 65 | 5990. 61 | 6240. 47 | 8320. 30 |
| 1962 | 4860. 64 | 5110. 65 | 5140. 64 | 5370. 61 | 5520. 51 | 5630. 46 | 7020. 65 | 10200. 58 |
| 1963 | 5240. 71 | 5380. 70 | 5410. 68 | 5640. 66 | 5780. 62 | 5830. 54 | 5890. 40 | 8700. 38 |
| 1964 | 5530. 77 | 5810. 78 | 5810. 77 | 6440. 85 | 6650. 86 | 6850. 82 | 7860. 81 | 11800. 75 |
| 1965 | 6710. 93 | 6840. 93 | 6930. 92 | 7020. 91 | 7480. 92 | 9330. 95 | 12100. 92 | 17300. 92 |
| 1966 | 6350. 91 | 6610. 90 | 6600. 88 | 6840. 87 | 6920. 87 | 6960. 84 | 7580. 78 | 10800. 64 |
| 1967 | 6180. 88 | 6250. 85 | 6300. 86 | 6450. 86 | 6470. 80 | 6530. 74 | 6690. 57 | 7770. 25 |
| 1968 | 5880. 83 | 6020. 80 | 6020. 79 | 6270. 79 | 6330. 77 | 7320. 88 | 8730. 84 | 9710. 54 |
| 1969 | 5850. 82 | 6010. 79 | 6110. 80 | 6390. 82 | 6510. 84 | 6550. 75 | 6790. 60 | 8430. 32 |
| 1970 | 6070. 87 | 6170. 82 | 6260. 84 | 6420. 84 | 6500. 82 | 6650. 78 | 6840. 61 | 8810. 40 |
| 1971 | 5450. 76 | 5760. 77 | 5760. 76 | 5840. 73 | 6250. 76 | 6290. 69 | 6580. 54 | 8110. 28 |
| 1972 | 5980. 84 | 6340. 87 | 6750. 91 | 7000. 90 | 7140. 89 | 7230. 87 | 7490. 74 | 10100. 57 |
| 1973 | 5800. 81 | 6030. 81 | 6130. 81 | 6250. 78 | 6360. 78 | 6520. 73 | 7590. 79 | 10600. 61 |
| 1974 | 5600. 78 | 5750. 76 | 5920. 78 | 6000. 75 | 6050. 69 | 6160. 67 | 6930. 62 | 12300. 81 |
| 1975 | 6040. 86 | 6240. 84 | 6190. 83 | 6370. 81 | 6510. 83 | 6620. 76 | 7140. 71 | 10900. 65 |
| 1976 | 6910. 95 | 7330. 95 | 7390. 95 | 7470. 94 | 7670. 93 | 7810. 91 | 9350. 87 | 11900. 78 |
| 1977 | 6740. 94 | 7240. 94 | 7230. 94 | 7300. 93 | 7470. 91 | 7950. 92 | 9990. 90 | 11900. 79 |
| 1978 | 6620. 92 | 6770. 92 | 6750. 90 | 6870. 88 | 6930. 88 | 6990. 85 | 7370. 72 | 11000. 67 |
| 1979 | 6200. 89 | 6300. 86 | 6290. 85 | 6390. 83 | 6430. 79 | 6440. 72 | 6600. 55 | 8760. 39 |
| 1980 | 6310. 90 | 6740. 91 | 6710. 89 | 6980. 89 | 7470. 90 | 7560. 90 | 8890. 85 | 12700. 84 |
| 1981 | 5680. 79 | 6180. 83 | 6180. 82 | 6300. 80 | 6570. 85 | 6630. 77 | 6710. 58 | 9250. 46 |
| 1982 | 3060. 33 | 3750. 36 | 3740. 36 | 4200. 39 | 4670. 39 | 5010. 39 | 5360. 26 | 6600. 16 |
| 1983 | 5070. 68 | 5470. 72 | 5540. 72 | 5840. 72 | 5900. 67 | 5940. 56 | 6240. 46 | 9020. 45 |
| 1984 | 4860. 65 | 5030. 62 | 5130. 63 | 5370. 60 | 5730. 60 | 5970. 60 | 6640. 56 | 10800. 62 |
| 1985 | 5330. 73 | 5380. 69 | 5450. 70 | 5720. 71 | 5870. 64 | 5950. 57 | 7080. 66 | 9500. 49 |
| 1986 | 4870. 66 | 5030. 63 | 5060. 62 | 5160. 56 | 5310. 47 | 5460. 44 | 5640. 35 | 6170. 10 |
| 1987 | 3830. 45 | 3940. 41 | 4000. 41 | 4140. 35 | 4480. 35 | 4820. 35 | 5360. 27 | 6930. 20 |
| 1988 | 4610. 62 | 4760. 58 | 4820. 55 | 5080. 52 | 5480. 50 | 5660. 48 | 6140. 43 | 6810. 18 |
| 1989 | 3880. 47 | 3940. 42 | 4000. 42 | 4150. 36 | 4220. 32 | 4270. 24 | 4500. 11 | 4760. 2 |
| 1990 | 3870. 46 | 4140. 48 | 4140. 45 | 4320. 43 | 4520. 36 | 4850. 36 | 5760. 36 | 10500. 60 |
| 1991 | 4470. 60 | 4880. 60 | 4930. 59 | 5420. 62 | 6250. 75 | 6690. 80 | 7480. 73 | 8370. 31 |
| 1992 | 4220. 55 | 4530. 54 | 4950. 60 | 6170. 77 | 6480. 81 | 6660. 79 | 7120. 69 | 9850. 55 |
| 1993 | 4950. 67 | 5300. 67 | 5340. 66 | 5660. 68 | 6130. 72 | 6730. 81 | 7120. 68 | 14500. 88 |
| 1994 | 4410. 59 | 4600. 56 | 4590. 53 | 4940. 51 | 5220. 46 | 5300. 42 | 5920. 41 | 7910. 27 |
| 1995 | 4560. 61 | 5020. 61 | 5220. 65 | 5580. 64 | 5880. 66 | 7050. 86 | 9830. 89 | 12500. 83 |
| 1996 | 5210. 70 | 5310. 68 | 5370. 67 | 5630. 65 | 5920. 68 | 5970. 59 | 7130. 70 | 11800. 73 |
| 1997 | 3810. 43 | 4480. 53 | 4700. 54 | 5100. 54 | 5560. 53 | 6070. 63 | 6530. 53 | 8650. 36 |
| 1998 | 4340. 56 | 4540. 55 | 4880. 58 | 5310. 59 | 5690. 58 | 6090. 64 | 6970. 63 | 12300. 82 |
| 1999 | 4400. 58 | 4750. 57 | 4860. 57 | 5260. 57 | 5550. 52 | 5790. 53 | 6210. 45 | 8930. 44 |
| 2000 | 3950. 49 | 4060. 44 | 4090. 43 | 4180. 38 | 4260. 33 | 4390. 25 | 4820. 18 | 5150. 4 |
| 2001 | 3680. 40 | 3750. 37 | 3800. 37 | 4040. 34 | 4080. 27 | 4200. 23 | 4640. 13 | 4810. 3 |
| 2002 | 3740. 42 | 3780. 39 | 3870. 39 | 3960. 32 | 4130. 31 | 4390. 26 | 4480. 10 | 4600. 1 |
| 2003 | 3820. 44 | 3840. 40 | 3870. 40 | 3920. 31 | 4120. 29 | 4130. 20 | 4170. 5 | 5550. 6 |

**Table 2.3.1-15 SWSTAT Output for Log Pearson Frequency Analysis of 7-Day Low Flows on the Savannah River at Augusta, Georgia**

```
               Log-Pearson Type III Statistics
                          SWSTAT 4.1
                 (based on USGS Program A193)

 Notice -- Use of Log-Pearson Type III or Pearson-Type III
           distributions are for preliminary computations.
           User is responsible for assessment and
           interpretation.


              SAVANNAH RIVER AT AUGUSTA, GA
                  April  1 - start of season
                  March 31 - end of season
               1986 - 2003 - time period
                 7-day low - parameter
                        18 - non-zero values
                         0 - zero values
                         0 - negative values (ignored)

       5025.714    3935.714    4758.571    3940.000    4138.571
       4884.286    4531.429    5304.286    4600.000    5020.000
       5307.143    4477.143    4540.000    4752.857    4057.143
       3745.714    3775.714    3844.286


 The following 7 statistics are based on non-zero values:

 Mean (logs)                                       3.648
 Variance (logs)                                   0.003
 Standard Deviation (logs)                         0.051
 Skewness (logs)                                  -0.075
 Standard Error of Skewness (logs)                 0.536
 Serial Correlation Coefficient (logs)             0.339
 Coefficient of Variation (logs)                   0.014


      Non-exceedance      Recurrence        Parameter
       Probability         Interval           Value
       -----------        ----------        ---------
            0.0100           100.00          3369.406
            0.0200            50.00          3484.674
            0.0500            20.00          3663.468
            0.1000            10.00          3828.398
            0.2000             5.00          4035.955
            0.3333             3.00          4235.952
            0.5000             2.00          4457.744
            0.8000             1.25          4913.406
            0.9000             1.11          5165.582
            0.9600             1.04          5445.413
            0.9800             1.02          5632.292
```

## Table 2.3.1-16 Annual Peak Discharges on the Savannah River at Augusta, Georgia

| Water Year | Date | Gage Height (feet) | Peak discharge (cfs) | Water Year | Date | Gage Height (feet) | Peak discharge (cfs) |
|---|---|---|---|---|---|---|---|
| 1796 | Jan. 17, 1796 | 38 | 280,000 (2) | 1937 | Jan. 04, 1937 | 30.1 | 91,400 |
| 1840 | May 28, 1840 | 37.5 | 260,000 (2) | 1938 | Oct. 21, 1937 | 30.1 | 91,400 |
| 1852 | Aug. 29, 1852 | 36.8 | 230,000 (2) | 1939 | Mar. 02, 1939 | 24.1 | 90,900 |
| 1864 | Jan. 01, 1864 | 34 | 160,000 (2) | 1940 | Aug. 15, 1940 | 29.4 | 239,000 |
| 1865 | Jan. 11, 1865 | 36.4 | 220,000 (2) | 1941 | Jul. 08, 1941 | 22.89 | 53,300 |
| 1876 | Dec. 30, 1875 | 28.6 | 86,400 | 1942 | Mar. 23, 1942 | 24.56 | 105,000 |
| 1877 | Apr. 14, 1877 | 31.4 | 119,000 | 1943 | Jan. 20, 1943 | 25.1 | 117,000 |
| 1878 | Nov. 23, 1877 | 23.5 | 51,500 | 1944 | Mar. 22, 1944 | 25.53 | 128,000 |
| 1879 | Aug. 03, 1879 | 22 | 44,000 | 1945 | Apr. 27, 1945 | 23.16 | 64,000 |
| 1880 | Dec. 16, 1879 | 30.1 | 102,000 | 1946 | Jan. 09, 1946 | 24.43 | 97,200 |
| 1881 | Mar. 18, 1881 | 32.2 | 130,000 | 1947 | Jan. 22, 1947 | 23.97 | 86,000 |
| 1882 | Sep. 12, 1882 | 29.3 | 93,300 | 1948 | Feb. 10, 1948 | 23.9 | 83,200 |
| 1883 | Jan. 22, 1883 | 30.8 | 111,000 | 1949 | Nov. 30, 1948 | 26.61 | 154,000 |
| 1884 | Apr. 16, 1884 | 28 | 81,000 | 1950 | Oct. 09, 1949 | 20.1 | 32,500 |
| 1885 | Jan. 26, 1885 | 27.5 | 77,000 | 1951 | Oct. 22, 1950 | 22.32 | 46,300 |
| 1886 | May 21, 1886 | 32.5 | 135,000 | 1952 | Mar. 06, 1952 | 21.53 | 39,300 (5) |
| 1887 | Jul. 31, 1887 | 34.5 | 173,000 | 1953 | May 8, 1953 | 20.8 | 35,200 (6) |
| 1888 | Sep. 11, 1888 | 38.7 | 303,000 | 1954 | Mar. 30, 1954 | 17.39 | 25,500 (6) |
| 1889 | Feb. 19, 1889 | 33.3 | 149,000 | 1955 | Apr. 15, 1955 | 16.77 | 23,900 (6) |
| 1890 | Feb. 27, 1890 | 22.9 | 48,500 | 1956 | Apr. 12, 1956 | 14.7 | 18,600 (6) |
| 1891 | Mar. 10, 1891 | 35.5 | 197,000 | 1957 | May 7, 1957 | 14.08 | 18,000 (6) |
| 1892 | Jan. 20, 1892 | 32.8 | 140,000 | 1958 | Apr. 18, 1958 | 22.91 | 66,300 (6) |
| 1893 | Feb. 14, 1893 | 25 | 60,000 | 1959 | Jun. 08, 1959 | 18.65 | 28,500 (6) |
| 1894 | Aug. 07, 1894 | 24 | 54,000 | 1960 | Feb. 14, 1960 | 20.58 | 34,900 (6) |
| 1895 | Jan. 11, 1895 | 30.4 | 106,000 | 1961 | Apr. 02, 1961 | 20.56 | 34,800 (6) |
| 1896 | Jul. 10, 1896 | 30.5 | 107,000 | 1962 | Jan. 09, 1962 | 20.09 | 32,500 (6) |
| 1897 | Apr. 06, 1897 | 29.3 | 93,300 | 1963 | Mar. 23, 1963 | 19.52 | 31,300 (6) |
| 1898 | Sep. 02, 1898 | 31.3 | 117,000 | 1964 | Apr. 09, 1964 | 24.16 | 87,100 (6) |
| 1899 | Feb. 08, 1899 | 31 | 113,000 | 1965 | Dec. 27, 1964 | 20.62 | 34,600 (6) |
| 1900 | Feb. 15, 1900 | 32.7 | 138,000 | 1966 | Mar. 06, 1966 | 21.5 | 39,300 (6) |
| 1901 | Apr. 04, 1901 | 31.8 | 124,000 | 1967 | Aug. 25, 1967 | 18.1 | 26,500 (6) |
| 1902 | Mar. 01, 1902 | 34.6 | 175,000 | 1968 | Jan. 12, 1968 | 20.94 | 35,900 (6) |
| 1903 | Feb. 09, 1903 | 33.2 | 147,000 | 1969 | Apr. 21, 1969 | 22.24 | 45,600 (6) |
| 1904 | Aug. 10, 1904 | 25.5 | 63,000 | 1970 | Apr. 01, 1970 | 17.68 | 25,200 (6) |
| 1905 | Feb. 14, 1905 | 25.8 | 64,800 | 1971 | Mar. 05, 1971 | 23.3 | 63,900 (6) |
| 1906 | Jan. 05, 1906 | 29.6 | 96,600 | 1972 | Jan. 20, 1972 | 20.36 | 33,700 (6) |
| 1907 | Oct. 05, 1906 | 23.6 | 52,000 | 1973 | Apr. 08, 1973 | 21.63 | 40,200 (6) |
| 1908 | Aug. 27, 1908 | 38.8 | 307,000 | 1974 | Feb. 23, 1974 | 20.13 | 32,900 (6) |
| 1909 | Jun. 05, 1909 | 28.7 | 87,300 | 1975 | Mar. 25, 1975 | 22.24 | 45,600 (6) |
| 1910 | Mar. 02, 1910 | 26.4 | 69,800 | 1976 | Jun. 05, 1976 | 20.27 | 33,300 (6) |
| 1911 | Apr. 14, 1911 | 19.1 | 32,800 | 1977 | Apr. 07, 1977 | 20.5 | 34,200 (6) |
| 1912 | Mar. 17, 1912 | 36.8 | 234,000 | 1978 | Jan. 26, 1978 | 21.98 | 43,100 (6) |
| 1913 | Mar. 16, 1913 | 35.1 | 156,000 | 1979 | Feb. 27, 1979 | 21.13 | 37,300 (6) |
| 1914 | Dec. 31, 1913 | 24.3 | 48,000 | 1980 | Mar. 31, 1980 | 22.33 | 47,200 (6) |
| 1915 | Jan. 20, 1915 | 28.2 | 61,000 | 1981 | Feb. 12, 1981 | 14.7 | 17,700 (6) |
| 1916 | Feb. 03, 1916 | 31 | 82,400 | 1982 | Jan. 02, 1982 | 19.39 | 30,700 (6) |
| 1917 | Mar. 06, 1917 | 29.2 | 68,000 | 1983 | Apr. 10, 1983 | 23.21 | 66,100 (6) |
| 1918 | Jan. 30, 1918 | 25.5 | 45,500 | 1984 | 5-May-84 | 20.35 | 34,000 (6) |
| 1919 | Dec. 24, 1918 | 35 | 128,000 | 1985 | Feb. 07, 1985 | 17.89 | 25,700 (6) |
| 1920 | Dec. 11, 1919 | 35.4 | 133,000 | 1986 | Oct. 03, 1985 | 15.74 | 21,000 (6) |
| 1921 | Feb. 11, 1921 | 35.1 | 129,000 | 1987 | Mar. 06, 1987 | 18.98 | 29,200 (6) |
| 1922 | Feb. 16, 1922 | 32 | 92,000 | 1988 | Feb. 05, 1988 | 10.61 | 13,600 (6) |
| 1923 | Feb. 28, 1923 | 28 | 59,700 | 1989 | Sep. 22, 1989 | 15.33 | 20,200 (6) |

## Table 2.3.1-16 (cont.) Annual Peak Discharges on the Savannah River at Augusta, Georgia

| Water Year | Date | Gage Height (feet) | Peak discharge (cfs) | Water Year | Date | Gage Height (feet) | Peak discharge (cfs) |
|---|---|---|---|---|---|---|---|
| 1924 | Sep. 22, 1924 | 28 | 59,700 | 1990 | Feb. 27, 1990 | 20.69 | 35,300 (6) |
| 1925 | Jan. 20, 1925 | 36.5 | 150,000 | 1991 | Oct. 13, 1990 | 22.8 | 59,200 (6) |
| 1926 | Jan. 20, 1926 | 27.3 | 55,300 | 1992 | Mar. 27, 1992 | 16.29 | 22,100 (6) |
| 1927 | Dec. 30, 1926 | 24 | 39,000 | 1993 | Jan. 14, 1993 | 21.81 | 45,100 (6) |
| 1928 | Aug. 17, 1928 | 40.4 | 226,000 | 1994 | Jul. 01, 1994 | 21.4 | 40,700 (6) |
| 1929 | Sep. 27, 1929 | 46.3 | 343,000 | 1995 | Feb. 19, 1995 | 20.28 | 33,600 (6) |
| 1930 | Oct. 02, 1929 | 45.1 | 350,000 | 1996 | Feb. 05, 1996 | 20.48 | 34,400 (6) |
| 1931 | Nov. 17, 1930 | 19.9 | 26,100 | 1997 | Mar. 10, 1997 | 18.11 | 26,300 (6) |
| 1932 | Jan. 09, 1932 | 30.4 | 93,800 | 1998 | Feb. 07, 1998 | 21.63 | 43,000 (6) |
| 1933 | Oct. 18, 1932 | 30.3 | 92,600 | 1999 | Feb. 02, 1999 | 14.72 | 19,000 (6) |
| 1934 | Mar. 05, 1934 | 28.5 | 73,200 | 2000 | Jan. 25, 2000 | 13.25 | 16,800 (6) |
| 1935 | Mar. 14, 1935 | 27.4 | 63,700 | 2002 | Mar. 04, 2002 | 7.14 | 8,510 (6) |
| 1936 | Apr. 08, 1936 | 41.2 | 258,000 | 2003 | 24-May-03 | 20.42 | 31,600 (6) |
| | | | | 2004 | Jun. 14, 2004 | 13.82 | 17,600 (6) |

2 -- Discharge is an Estimate
5 -- Discharge affected to unknown degree by Regulation or Diversion
6 -- Discharge affected by Regulation or Diversion

Source: USGS 2006c

## Table 2.3.1-17 Inventory of Savannah River Watershed Water Control Structures

| Name of Dam or Reservoir | Owner or Operator | Stream | Savannah River Mile | Distance U/S of Vogtle Site | Drainage Area above dam (sq. mi.) | Storage, in thousands of acre-feet | Normal Pool Elev, ft MSL | Spillway Crest Elevation, ft. MSL | Top of Dam Elevation, ft. MSL | Generator Capacity, MW |
|---|---|---|---|---|---|---|---|---|---|---|
| New Savannah Bluff Lock & Dam | USACE | Savannah River | 187.7 | 36.8 | 7,508 | RoR | 115.0 | n/a | n/a | n/a |
| Stevens Creek | SC Electric & Gas | Savannah River | 208.1 | 57.2 | 7,173 | 11 | n/a | n/a | n/a | 19.2 |
| J. Strom Thurmond Lake & Dam | USACE | Savannah River | 221.6 | 70.7 | 6,144 | 2,510 | 335.0 | 300 | 351 | 280 |
| Richard B. Russell Lake & Dam | USACE | Savannah River | 259.1 | 108.2 | 2,900 | 1,020 | 475.0 | 436 | 495 | 300 |
| Hartwell Lake & Dam | USACE | Savannah River | 288.9 | 138.0 | 2,088 | 2,550 | 660.0 | 630 | 679 | 330 |
| Yonah Dam | GA Power Company | Tugaloo-Chatooga | 340.0 | 189.1 | 470 | 10.2 | 744.2 | 742 | 757 | 22.5 |
| Keowee Lake & Dam | Duke Power Company | Senaca-Keowee | 341.0 | 190.1 | 439 | 940 | 800.0 | 765 | 815 | 157.5 |
| Tugaloo Lake & Dam | GA Power Company | Tugaloo | 343.1 | 192.2 | 464 | 43.2 | 891.5 | 885 | 905 | 45 |
| Tallulah Falls Dam | GA Power Company | Tallulah River | 346.7 | 195.8 | 186 | 2.46 | 1,500.0 | 1493 | 1514 | 72 |
| Mathis Lake & Dam | GA Power Company | Tallulah River | 353.4 | 202.5 | 151 | 31.4 | 1,689.6 | 1681 | 1704 | 16 |
| Jocassee Lake & Dam | Duke Power Company | Senaca-Keowee | 357.0 | 206.1 | 148 | 1,100 | 1,110.0 | 1077 | 1125 | 612 |
| Nacoochee Dam | GA Power Company | Tallulah River | 362.1 | 211.2 | 136 | 8.2 | 1,752.5 | 1753 | 1765 | 4.8 |
| Little River Lake & Dam | Duke Power Company | Senaca-Keowee | 366.0 | 215.1 | 439 | 940 | 800.0 | 765 | 815 | |
| Burton Lake & Dam | GA Power Company | Tallulah River | 366.4 | 215.5 | 118 | 108 | 1,866.6 | 1860 | 1873 | 6.1 |

Source: Compiled from USACE 1996

## Table 2.3.1-18 Monthly Groundwater Level Elevations in the Water Table Aquifer

| Well No. | Well Depth (ft) | Groundwater Level Elevations (ft msl) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jun 2005 | Jul 2005 | Aug 2005 | Sep 2005 | Oct 2005 | Nov 2005 | Dec 2005 | Jan 2006 | Feb 2006 | Mar 2006 | Apr 2006 | May 2006 | Jun 2006 |
| 142 | 97 | 154.37 | 154.38 | 154.49 | 154.64 | 154.75 | 154.69 | 154.60 | 154.71 | 154.77 | 154.71 | 154.63 | 154.55 | 154.48 |
| 179 | 133 | 147.42 | 148.40 | 148.42 | 148.72 | 148.69 | 148.75 | 148.52 | 148.61 | 148.64 | 148.72 | 148.66 | 148.76 | 148.78 |
| 802A | 91 | 157.90 | 157.86 | 158.07 | 158.23 | 158.29 | 158.34 | 158.28 | 158.28 | 158.39 | 158.23 | 158.17 | 158.09 | 157.99 |
| 803A | 90 | 159.98 | 159.91 | 160.15 | 160.32 | 160.39 | 160.48 | 160.39 | 160.37 | 160.48 | 160.45 | 160.30 | 160.20 | 160.12 |
| 804 | 95 | 163.73 | 163.62 | 163.92 | 164.10 | 164.21 | 164.23 | 164.05 | 164.08 | 164.23 | 164.30 | 164.11 | 163.99 | 163.88 |
| 805A | 129 | 158.53 | 158.57 | 158.84 | 158.98 | 159.09 | 159.09 | 159.05 | 158.94 | 158.92 | 158.98 | 158.82 | 158.82 | 158.63 |
| 806B | 69 | 155.62 | 155.15 | 155.78 | 155.90 | 155.96 | 155.98 | 155.88 | 155.97 | 155.98 | 156.03 | 155.85 | 155.78 | 155.73 |
| 808 | 75 | 158.88 | 159.14 | 159.42 | 159.55 | 159.49 | 159.37 | 159.15 | 159.04 | 159.19 | 159.15 | 158.99 | 158.53 | 158.80 |
| 809 | 94 | 152.78 | 152.70 | 152.75 | 152.89 | 152.98 | 152.97 | 152.98 | 153.10 | 153.22 | 153.18 | 153.01 | 153.02 | 153.00 |
| LT-1B | 94 | 154.92 | 154.82 | 155.01 | 155.16 | 155.18 | 155.22 | 155.06 | 155.18 | 152.52 | 155.28 | 155.18 | 155.15 | 154.95 |
| LT-7A | 89 | 154.39 | 154.15 | 154.33 | 154.46 | 154.48 | 154.46 | 154.31 | 154.57 | 154.83 | 154.59 | 154.57 | 154.50 | 154.41 |
| LT-12 | 88 | 158.21 | 157.90 | 158.07 | 158.22 | 158.31 | 158.28 | 158.21 | 158.53 | 158.66 | 158.48 | 158.54 | 158.48 | 158.23 |
| LT-13 | 91 | 156.10 | 155.92 | 156.13 | 156.30 | 156.32 | 156.37 | 156.23 | 156.36 | 156.66 | 156.35 | 156.32 | 156.32 | 156.23 |
| OW-1001 | 133 | 113.35 | 118.03 | 118.36 | 117.95 | 117.69 | 116.54 | 116.56 | 116.93 | 117.22 | 117.34 | 117.56 | 117.13 | 116.63 |
| OW-1001A | 93 | | | | | 135.95 | 135.91 | 135.97 | 135.98 | 135.99 | 135.96 | 135.97 | 135.96 | 135.96 |
| OW-1003 | 91 | 155.94 | 155.89 | 156.06 | 156.29 | 156.24 | 156.36 | 156.26 | 156.34 | 156.37 | 156.43 | 156.32 | 157.24 | 156.16 |
| OW-1005 | 177 | 132.95 | 132.73 | 132.88 | 133.01 | 132.67 | 132.65 | 132.53 | 132.74 | 133.04 | 133.12 | 133.14 | 133.20 | 133.12 |
| OW-1006 | 135 | 147.66 | 147.48 | 147.57 | 147.60 | 147.49 | 147.20 | 147.18 | 147.41 | 147.40 | 147.37 | 147.35 | 147.21 | 147.05 |
| OW-1007 | 120 | 151.82 | 151.72 | 151.78 | 151.63 | 151.45 | 151.15 | 151.05 | 151.41 | 151.49 | 151.45 | 151.22 | 151.11 | 150.99 |
| OW-1009 | 98 | 162.38 | 162.40 | 162.71 | 162.90 | 163.01 | 163.03 | 162.87 | 162.93 | 163.01 | 163.01 | 162.89 | 162.79 | 162.65 |
| OW-1010 | 95 | 163.10 | 163.26 | 163.59 | 163.77 | 163.81 | 163.78 | 163.62 | 163.60 | 163.63 | 163.57 | 163.44 | 163.29 | 163.09 |
| OW-1012 | 94 | 161.83 | 161.93 | 162.07 | 162.06 | 161.98 | 161.80 | 161.71 | 161.82 | 161.86 | 161.80 | 161.68 | 161.53 | 161.37 |
| OW-1013 | 104 | 164.95 | 165.00 | 165.29 | 165.47 | 165.48 | 165.42 | 165.21 | 165.29 | 165.46 | 165.31 | 165.23 | 165.11 | 164.96 |
| OW-1015 | 120 | 159.63 | 159.58 | 159.78 | 159.90 | 159.96 | 159.96 | 159.82 | 159.81 | 159.79 | 159.89 | 159.75 | 159.66 | 159.58 |

Notes: Blank entries indicate data not available (OW-1001 had very little change in groundwater levels; a replacement well, OW-1001A, was installed in October 2005).
142- and 179-wells installed in 1971 for support of Units 1 and 2 pre-construction groundwater monitoring program.
800-series wells installed between 1979 and 1985 for support of Units 1 and 2 construction groundwater monitoring program.
LT-series wells installed in 1985 for support of the Units 1 and 2 post-construction groundwater monitoring program.
OW-wells installed in 2005 as part of the ESP subsurface investigation program (Part 2 – SSAR Appendix 2.4A).
Well depths are below ground surface at time of installation.

## Table 2.3.1-19 Monthly Groundwater Level Elevations in the Tertiary Aquifer

| Well No. | Well Depth (ft) | Groundwater Level Elevations (ft msl) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jun 2005 | Jul 2005 | Aug 2005 | Sep 2005 | Oct 2005 | Nov 2005 | Dec 2005 | Jan 2006 | Feb 2006 | Mar 2006 | Apr 2006 | May 2006 | Jun 2006 |
| 27 | 190 | 91.50 | 89.96 | 91.63 | 83.96 | 82.13 | 88.24 | 82.57 | 84.62 | 85.77 | 84.49 | 83.42 | 83.08 | 83.03 |
| 29 | 212 | 98.88 | 97.80 | 98.33 | 93.17 | 91.86 | 91.89 | 92.59 | 93.97 | 94.19 | 93.63 | 93.05 | 92.16 | 91.76 |
| 850A | 194 | 105.27 | 104.68 | 104.76 | 101.04 | 100.03 | 99.91 | 100.70 | 101.86 | 101.69 | 101.48 | 101.14 | 100.07 | 99.63 |
| 851A | 285 | 114.54 | 114.40 | 114.02 | 111.59 | 111.38 | 110.60 | 112.34 | 112.32 | 112.43 | 112.42 | 112.23 | 111.08 | 110.36 |
| 852 | 223 | 114.71 | 114.49 | 114.00 | 111.88 | 111.09 | 111.21 | 111.88 | 113.06 | 113.51 | 113.14 | 112.82 | 111.74 | 110.38 |
| 853 | 221 | 108.60 | 108.17 | 107.98 | 104.53 | 103.64 | 103.45 | 104.18 | 105.32 | 105.14 | 104.97 | 104.65 | 103.58 | 103.15 |
| 854 | 222 | 107.06 | 106.88 | 106.65 | 103.37 | 102.38 | 102.23 | 103.03 | 104.13 | 103.85 | 103.73 | 103.45 | 102.31 | 101.86 |
| 855 | 225 | 102.63 | 101.74 | 102.00 | 97.22 | 96.08 | 96.21 | 96.85 | 98.43 | 98.49 | 98.15 | 97.53 | 96.75 | 95.93 |
| 856 | 182 | 114.07 | 113.94 | 113.49 | 111.37 | 110.57 | 110.63 | 111.31 | 112.52 | 112.46 | 112.39 | 112.07 | 111.21 | 109.94 |
| OW-1002 | 237 | 120.13 | 120.61 | 120.04 | 118.65 | 117.81 | 117.71 | 118.44 | 119.36 | 119.63 | 119.64 | 119.43 | 118.37 | 117.65 |
| OW-1004 | 187 | 108.27 | 108.14 | 108.01 | 105.06 | 104.05 | 103.75 | 104.51 | 105.56 | 105.83 | 105.28 | 105.12 | 103.88 | 103.54 |
| OW-1008 | 247 | 126.06 | 127.99 | 125.09 | 124.24 | 123.49 | 123.51 | 124.19 | 125.10 | 125.46 | 125.54 | 125.21 | 124.33 | 123.42 |
| OW-1011 | 218 | 122.50 | 122.38 | 121.49 | 120.37 | 119.59 | 119.73 | 120.46 | 121.41 | 121.64 | 121.70 | 121.48 | 120.47 | 119.37 |
| OW-1014 | 197 | 111.18 | 111.00 | 110.74 | 108.34 | 107.34 | 107.11 | 107.81 | 108.87 | 108.73 | 108.75 | 108.66 | 107.41 | 106.94 |

Notes: Blank entries indicate data not available.
27- and 29-wells installed in 1971 for support of Units 1 and 2 pre-construction groundwater monitoring program.
800-series wells installed between 1979 and 1985 for support of Units 1 and 2 construction groundwater monitoring program.
LT-series wells installed in 1985 for support of the Units 1 and 2 post-construction groundwater monitoring program.
OW-wells installed in 2005 as part of the ESP subsurface investigation program (Part 2 – SSAR Appendix 2.4A).
Well depths are below ground surface at time of installation.

## Table 2.3.1-20 Hydraulic Conductivity Values

| Well No. | Depth Interval Tested (ft) | Elevation (ft msl) | Aquifer | Material | Hydraulic Conductivity | |
|---|---|---|---|---|---|---|
| | | | | | (cm/sec) | (ft/day) |
| OW-1001A | 77 - 93 | 149.4 to 133.4 | Water Table | Sandy Clay | 2.6E-05 | 0.074 |
| OW-1003 | 72 - 91 | 151.0 to 132.0 | Water Table | Clayey Shell to Clayey Sand | 4.4E-05 | 0.12 |
| OW-1005 | 143 - 169 | 121.4 to 95.4 | Water Table | Silty Sand | 1.1E-04 | 0.32 |
| OW-1006 | 113 - 134 | 114.1 to 93.1 | Water Table | Fine Sand and Coarse Sand | 4.8E-04 | 1.4 |
| OW-1007 | 99 - 120 | 117.9 to 96.9 | Water Table | Silty Sand | 9.3E-04 | 2.7 |
| OW-1009 | 81 - 98 | 139.9 to 122.9 | Water Table | Silty Sand | 4.0E-04 | 1.1 |
| OW-1010 | 70 - 92 | 146.9 to 124.9 | Water Table | Sand and Clayey Silty Sand | 6.4E-05 | 0.18 |
| OW-1012 | 71 - 94 | 134.4 to 111.4 | Water Table | Sand and Silt | 1.4E-04 | 0.39 |
| OW-1013 | 81 - 104 | 135.9 to 112.9 | Water Table | Sand | 1.3E-04 | 0.38 |
| OW-1015 | 90 - 120 | 130.4 to 100.4 | Water Table | Clayey Sand and Sand | 1.5E-04 | 0.44 |
| OW-1002 | 216 - 237 | 11.4 to -9.6 | Tertiary | Silty Sand and Fine to Medium Sand | 3.2E-04 | 0.90 |
| OW-1004 | 150 - 187 | 72.92 to 53.92 | Tertiary | Sand to Silty Sand | 1.3E-04 | 0.35 |
| OW-1008 | 226 - 247 | -9.4 to -28.4 | Tertiary | Sand | 7.5E-04 | 2.1 |
| OW-1011 | 197 - 218 | 8.8 to -12.2 | Tertiary | Silty Sand and Coarse Sand | 3.8E-04 | 1.1 |
| OW-1014 | 179 - 197 | 41.9 to 23.9 | Tertiary | Silty Sand | 1.9E-04 | 0.54 |
| | | | | Geometric Mean Water Table Aquifer | 1.4E-04 | 0.41 |
| | | | | Geometric Mean Tertiary Aquifer | 3.0E-04 | 0.83 |

Source: Part 2 – SSAR Appendix 2.5A

## Table 2.3.1-21 Summary of Laboratory Test Results on Grain Size, Moisture Content, and Specific Gravity for the Barnwell Formation

| Borehole / Well No. | Sample Elevation (ft msl) | Grain Size Distribution | | | Moisture Content (%) | Specific Gravity |
|---|---|---|---|---|---|---|
| | | Gravel (%) | Sand (%) | Clay/Silt (%) | | |
| OW-1003 | 144.5 | 0.0 | 65.1 | 34.9 | ND | 2.69 |
| OW-1003 | 139.5 | 31.1 | 50.0 | 18.4 | ND | 2.68 |
| OW-1005 | 115.9 | 8.9 | 57.0 | 34.1 | ND | 2.63 |
| OW-1005 | 110.9 | 18.2 | 47.6 | 34.3 | ND | 2.61 |
| OW-1006 | 113.6 | 7.0 | 61.1 | 31.9 | ND | 2.67 |
| OW-1006 | 108.6 | 3.6 | 74.4 | 22.0 | ND | 2.90 |
| OW-1007 | 113.4 | 0.0 | 85.0 | 15.0 | ND | 2.65 |
| OW-1007 | 108.4 | 0.0 | 85.0 | 18.1 | ND | 2.66 |
| OW-1009 | 135.9 | 2.7 | 74.6 | 22.7 | ND | 2.61 |
| OW-1009 | 130.9 | 34.7 | 45.9 | 19.2 | ND | 2.75 |
| OW-1010 | 143.4 | 0.0 | 89.3 | 10.7 | ND | 2.67 |
| OW-1010 | 138.4 | 0.0 | 63.5 | 36.5 | ND | 2.63 |
| OW-1012 | 131.9 | 0.0 | 76.1 | 23.9 | ND | 2.66 |
| OW-1012 | 126.9 | 0.0 | 14.1 | 85.9 | ND | 2.66 |
| OW-1013 | 132.9 | 0.0 | 91.1 | 8.9 | ND | 2.65 |
| OW-1013 | 122.9 | 0.0 | 91.1 | 8.9 | ND | 2.65 |
| OW-1015 | 126.9 | 0.0 | 97.7 | 2.8 | ND | 2.63 |
| OW-1015 | 125.4 | 0.0 | 93.2 | 6.8 | ND | 2.67 |
| B-1002 | 214.3 | 6.2 | 79.1 | 14.7 | 6.2 | ND |
| B-1002 | 203.5 | 0.0 | 50.5 | 49.7 | 24.4 | ND |
| B-1002 | 193.5 | 0.0 | 57.0 | 43.0 | 31.8 | ND |
| B-1002 | 188.5 | 0.0 | 43.1 | 56.9 | 58.8 | ND |
| B-1002 | 168.5 | 0.0 | 62.7 | 37.3 | 42.9 | ND |
| B-1002 | 158.5 | 0.0 | 71.8 | 28.2 | 29.3 | ND |
| B-1002 | 148.5 | 0.3 | 72.0 | 27.7 | 24.5 | ND |
| B-1002 | 138.5 | 0.0 | 73.6 | 26.4 | 27.6 | ND |
| B-1003 | 208.2 | 0.0 | 79.1 | 20.9 | 13.4 | ND |
| B-1003 | 185.2 | 0.0 | 70.2 | 29.8 | 42.1 | ND |
| B-1003 | 168.2 | 0.0 | 34.4 | 13.4 | 17.5 | ND |
| B-1003 | 148.2 | 0.0 | 91.8 | 8.2 | 32.3 | ND |
| B-1004 | 240.8 | 0.0 | 66.4 | 33.6 | 13.8 | ND |
| B-1004 | 237.8 | 0.6 | 66.6 | 32.8 | 14.5 | ND |
| B-1004 | 226.3 | 0.2 | 71.6 | 28.2 | 18.5 | ND |
| B-1004 | 206.3 | 0.0 | 27.4 | 72.6 | 46.2 | ND |
| B-1004 | 196.3 | 0.0 | 36.2 | 63.8 | 62.9 | ND |
| B-1004 | 181.3 | 8.5 | 56.1 | 35.4 | 24.1 | ND |
| B-1004 | 166.3 | 0.0 | 68.7 | 31.3 | 28.8 | ND |
| B-1004 | 126.3 | 40.6 | 27.0 | 32.4 | 19.7 | ND |
| B-1006 | 248.5 | 0.0 | 89.4 | 10.6 | 3.8 | ND |
| B-1006 | 222.5 | 0.1 | 61.6 | 38.3 | 19.7 | ND |
| B-1006 | 197.5 | 0.0 | 21.6 | 78.4 | 92.8 | ND |
| B-1006 | 187.5 | 0.1 | 77.2 | 22.7 | 25.4 | ND |
| B-1006 | 167.5 | 0.0 | 55.5 | 44.5 | 51.9 | ND |

**Table 2.3.1-21 (cont.) Summary of Laboratory Test Results on Grain Size, Moisture Content, and Specific Gravity for the Barnwell Formation**

| Borehole / Well No. | Sample Elevation (ft msl) | Grain Size Distribution | | | Moisture Content (%) | Specific Gravity |
|---|---|---|---|---|---|---|
| | | Gravel (%) | Sand (%) | Clay/Silt (%) | | |
| B-1006 | 147.5 | 25.2 | 39.2 | 35.6 | 22.0 | ND |
| B-1010 | 211.1 | 0.0 | 87.2 | 12.8 | 5.7 | ND |
| B-1010 | 185.1 | 0.0 | 69.8 | 30.2 | 18.9 | ND |
| B-1010 | 160.1 | 0.0 | 68.1 | 31.9 | 27.3 | ND |
| | | | | Median | 25.0 | 2.66 |

Notes: ND - Not Determined.
OW-series data are provided in Part 2 – SSAR Appendix 2.4A.
B-series data are provided in Part 2 – SSAR Appendix 2.5A.
Moisture content is by weight percent.

## Table 2.3.1-22 Summary of Laboratory Test Results on Grain Size, Moisture Content, and Porosity for the Lisbon Formation

| Borehole / Well No. | Sample Elevation (ft msl) | Grain Size Distribution | | | Moisture Content (%) | Porosity |
|---|---|---|---|---|---|---|
| | | Gravel (%) | Sand (%) | Clay/Silt (%) | | |
| B-1002 | 123.0 | 49.4 | 21.7 | 28.9 | 52.1 | 0.59 |
| B-1002 | 118.5 | 14.6 | 26.4 | 59.0 | 56.5 | 0.56 |
| B-1002 | 108.5 | 12.8 | 53.4 | 33.8 | 25.5 | 0.36 |
| B-1002 | 98.5 | 53.7 | 21.8 | 24.5 | 13.5 | 0.25 |
| B-1002 | 88.5 | 26.3 | 49.4 | 27.3 | 28.6 | 0.45 |
| B-1003 | 135.2 | 16.5 | 50.1 | 33.4 | 67.4 | ND |
| B-1003 | 130.2 | 1.6 | 57.8 | 40.6 | 30.6 | 0.46 |
| B-1003 | 118.5 | 1.2 | 67.1 | 31.7 | 40.6 | 0.52 |
| B-1003 | 101.5 | 11.7 | 45.8 | 42.5 | 28.0 | 0.42 |
| B-1003 | 81.5 | 7.3 | 58.5 | 34.2 | 25.9 | 0.39 |
| B-1004 | 105.9 | 1.0 | 52.7 | 46.3 | 44.6 | 0.56 |
| B-1004 | 96.3 | 0.7 | 57.6 | 41.7 | 30.1 | 0.45 |
| B-1004 | 86.3 | 38.0 | 29.8 | 32.2 | 25.1 | 0.43 |
| B-1004 | 72.8 | 20.9 | 37.4 | 41.7 | 20.8 | 0.38 |
| B-1004 | 61.3 | 34.9 | 41.3 | 23.8 | 29.0 | 0.44 |
| B-1004 | 51.3 | 5.2 | 60.3 | 34.5 | 26.2 | 0.39 |
| B-1004 | 132.5 | 0.0 | 23.4 | 76.6 | 53.7 | ND |
| | | | | Median | 29.0 | 0.44 |

Notes: ND - Not Determined.
B-series data are provided in Part 2 – SSAR Appendix 2.5A.
Moisture content is by weight percent.
Porosity calculated assuming a specific gravity of 2.65.

**Table 2.3.1-23 Summary of Laboratory Test Results on Grain Size, Moisture Content, and Specific Gravity for the Still Branch And Congaree Formations**

| Borehole / Well No. | Sample Elevation (ft msl) | Grain Size Distribution | | | Moisture Content (%) | Specific Gravity |
|---|---|---|---|---|---|---|
| | | Gravel (%) | Sand (%) | Clay/Silt (%) | | |
| OW-1002 | 8.9 | 0.2 | 79.6 | 20.2 | ND | 2.65 |
| OW-1002 | -9.6 | 0.0 | 1.4 | 90.6 | ND | 2.62 |
| OW-1004 | 69.4 | 0.1 | 89.7 | 10.2 | ND | 2.69 |
| OW-1004 | 64.4 | 0.0 | 93.4 | 6.6 | ND | 2.67 |
| OW-1008 | -11.9 | 0.0 | 83.2 | 16.8 | ND | 2.69 |
| OW-1008 | -21.9 | 2.2 | 67.9 | 20.3 | ND | 2.68 |
| OW-1011 | 12.3 | 0.0 | 88.9 | 10.8 | ND | 2.67 |
| OW-1011 | -2.7 | 4.5 | 89.6 | 5.9 | ND | 2.66 |
| OW-1014 | 37.4 | 0.0 | 87.8 | 12.2 | ND | 2.69 |
| OW-1014 | 32.4 | 0.0 | 89.6 | 10.4 | ND | 2.66 |
| B-1002 | 68.5 | 16.2 | 32.9 | 50.9 | 23.3 | ND |
| B-1002 | 33.5 | 0.0 | 66.4 | 33.6 | 40.7 | ND |
| B-1002 | 16.5 | 2.6 | 71.4 | 26.0 | 18.5 | ND |
| B-1003 | 57.5 | 0.0 | 94.6 | 5.4 | 23.6 | ND |
| B-1003 | 37.5 | 0.9 | 82.7 | 16.4 | 32.3 | ND |
| B-1003 | 17.5 | 1.4 | 77.2 | 21.4 | 39.3 | ND |
| B-1003 | -17.5 | 0.0 | 89.1 | 10.9 | 23.2 | ND |
| B-1003 | -57.5 | 0.3 | 85.5 | 14.2 | 23.2 | ND |
| B-1003 | -92.5 | 70.7 | 26.0 | 3.3 | 32.7 | ND |
| B-1003 | -127.5 | 0.0 | 21.5 | 78.5 | 21.3 | ND |
| B-1003 | -177.5 | 0.3 | 83.9 | 15.8 | 18.9 | ND |
| B-1003 | -227.5 | 0.0 | 84.1 | 15.9 | 28.6 | ND |
| B-1003 | -273.5 | 0.0 | 86.8 | 13.2 | 26.4 | ND |
| | | | | Median | 24.0 | 2.67 |

Notes: ND - Not Determined.
OW-series data are provided in Part 2 – SSAR Appendix 2.4A.
B-series data are provided in Part 2 – SSAR Appendix 2.5A.
Moisture content is by weight percent.

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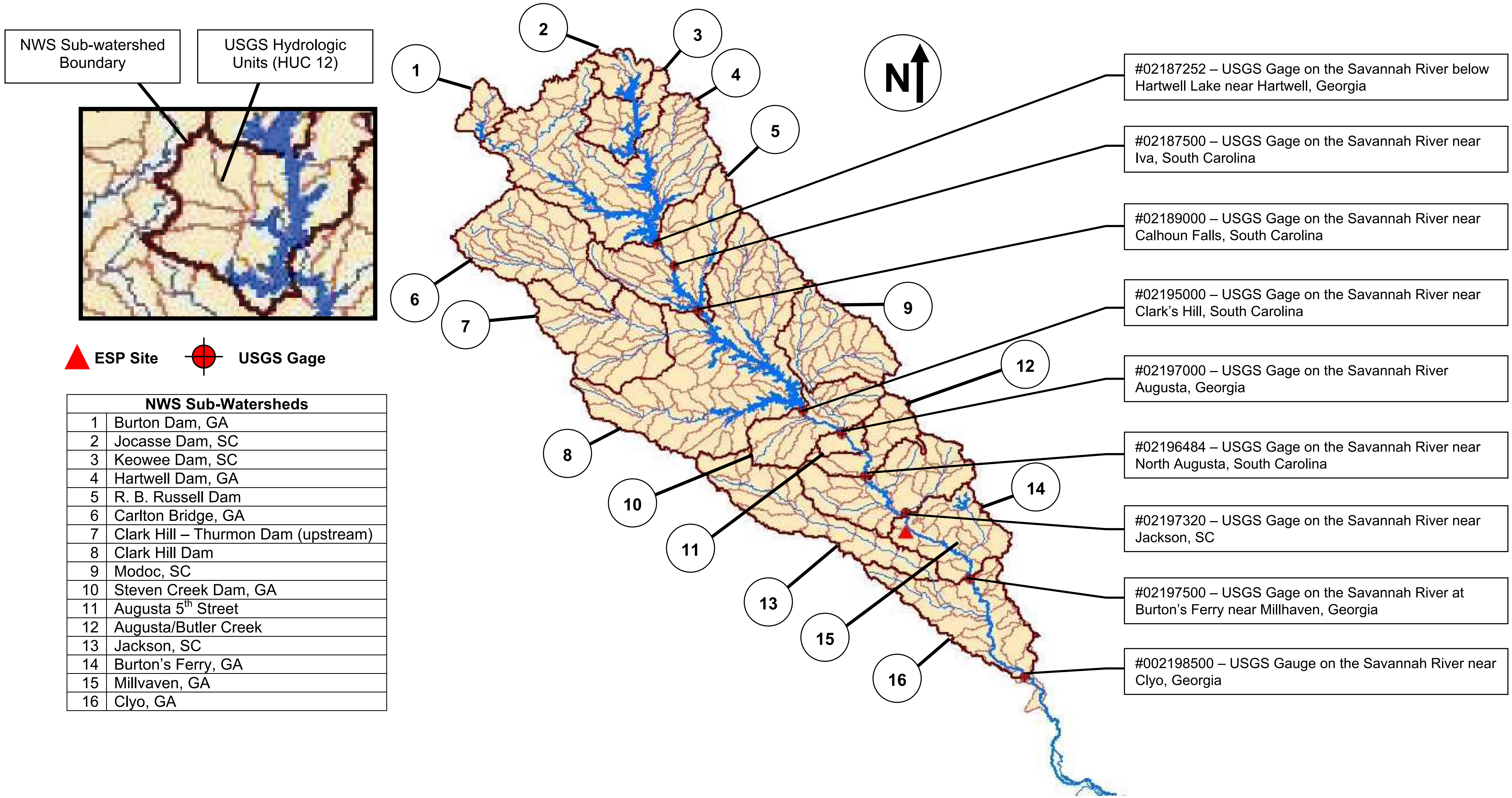


| NWS Sub-Watersheds | |
|---|---|
| 1 | Burton Dam, GA |
| 2 | Jocasse Dam, SC |
| 3 | Keowee Dam, SC |
| 4 | Hartwell Dam, GA |
| 5 | R. B. Russell Dam |
| 6 | Carlton Bridge, GA |
| 7 | Clark Hill – Thurmon Dam (upstream) |
| 8 | Clark Hill Dam |
| 9 | Modoc, SC |
| 10 | Steven Creek Dam, GA |
| 11 | Augusta 5th Street |
| 12 | Augusta/Butler Creek |
| 13 | Jackson, SC |
| 14 | Burton's Ferry, GA |
| 15 | Millvaven, GA |
| 16 | Clyo, GA |

**Figure 2.3.1-1 Savannah River Watershed and HUCs (No Scale)**

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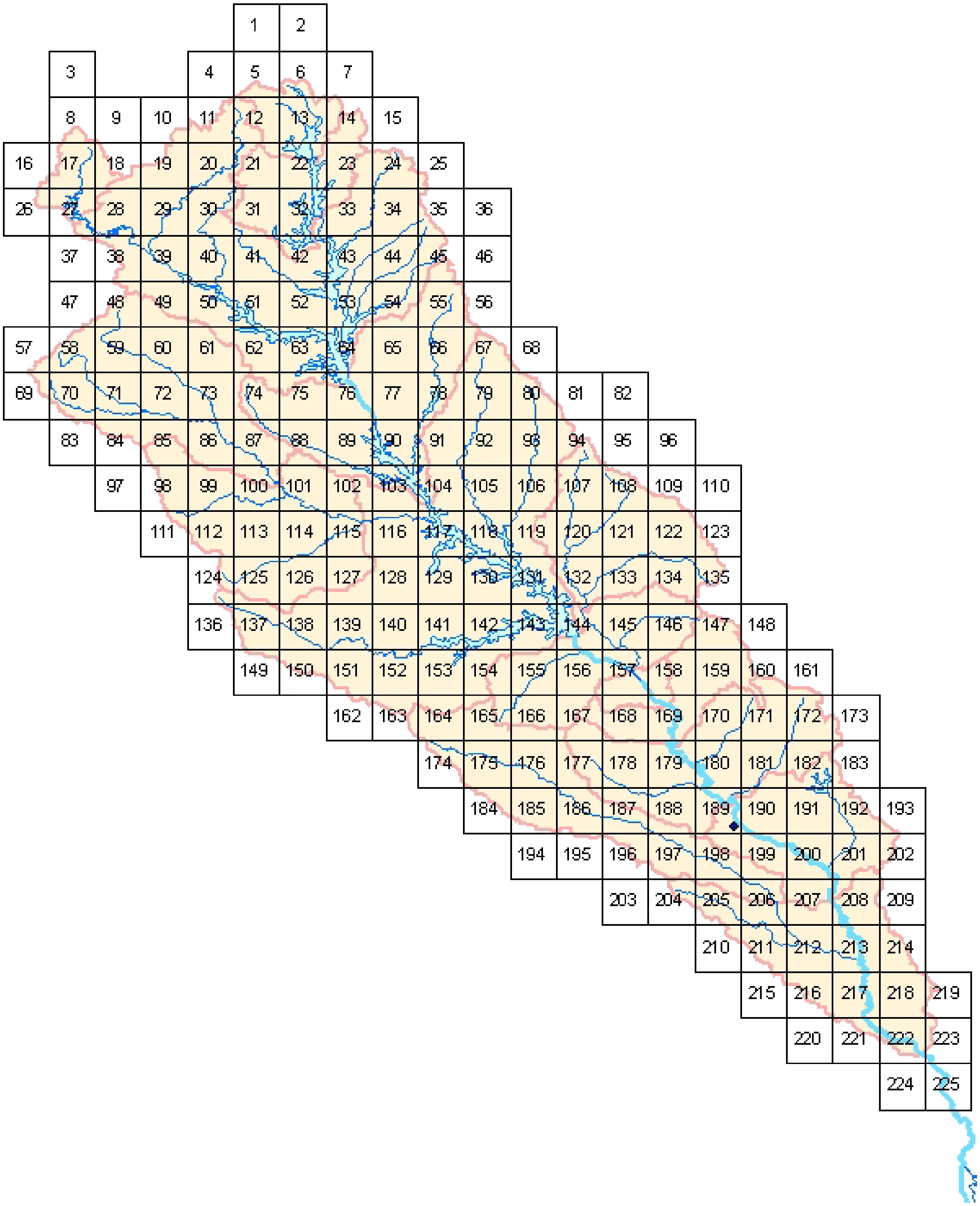


**Figure 2.3.1-2 USGS 7.5-Minute Quadrangle Coverage for Savannah River Watershed**

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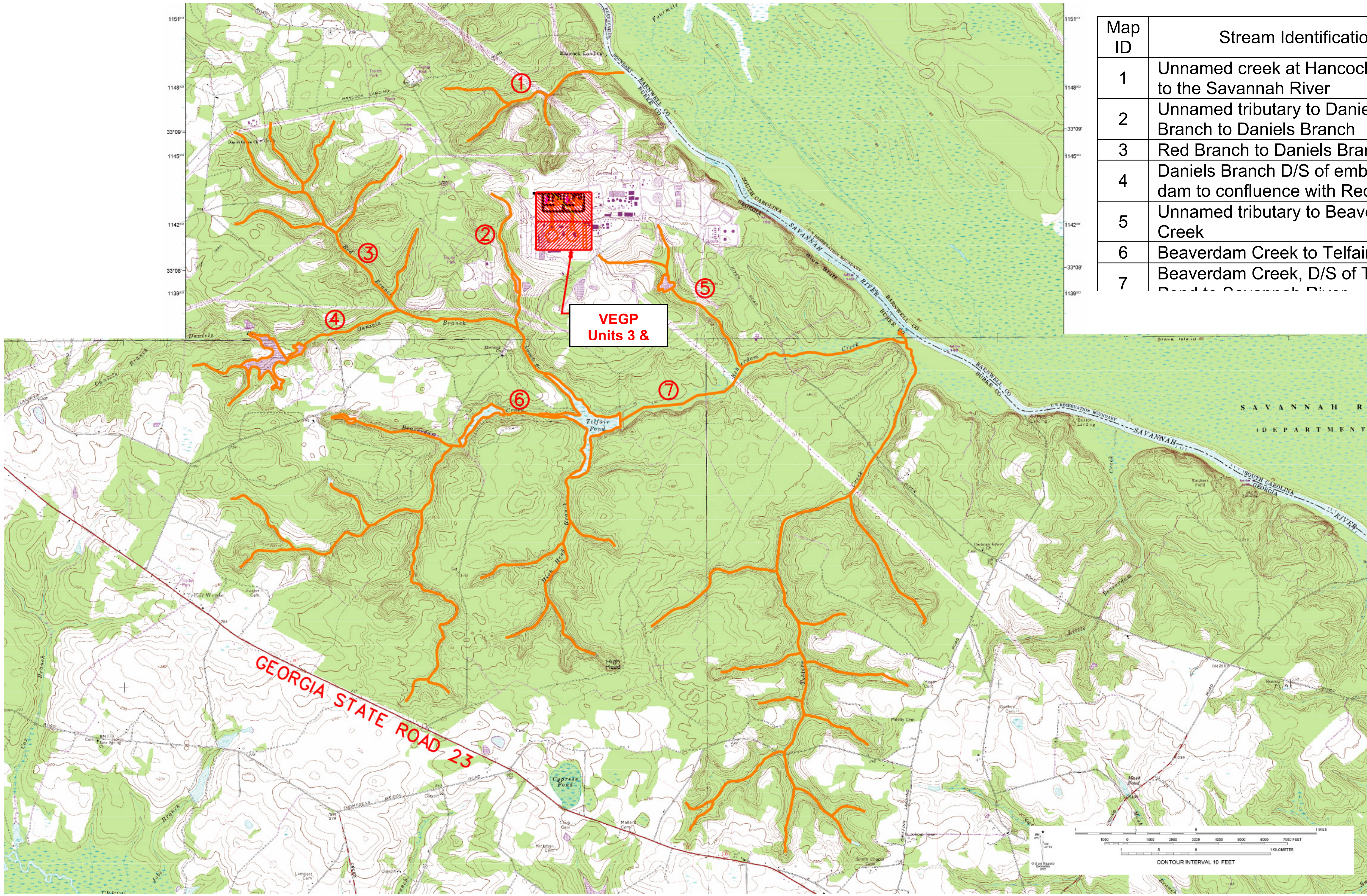


| Map ID | Stream Identification |
|---|---|
| 1 | Unnamed creek at Hancock Landing to the Savannah River |
| 2 | Unnamed tributary to Daniels Branch to Daniels Branch |
| 3 | Red Branch to Daniels Branch |
| 4 | Daniels Branch D/S of embankment dam to confluence with Red Branch |
| 5 | Unnamed tributary to Beaverdam Creek |
| 6 | Beaverdam Creek to Telfair Pond |
| 7 | Beaverdam Creek, D/S of Telfair Pond to Savannah River |

**Figure 2.3.1-3 Local Area Drainage Map**

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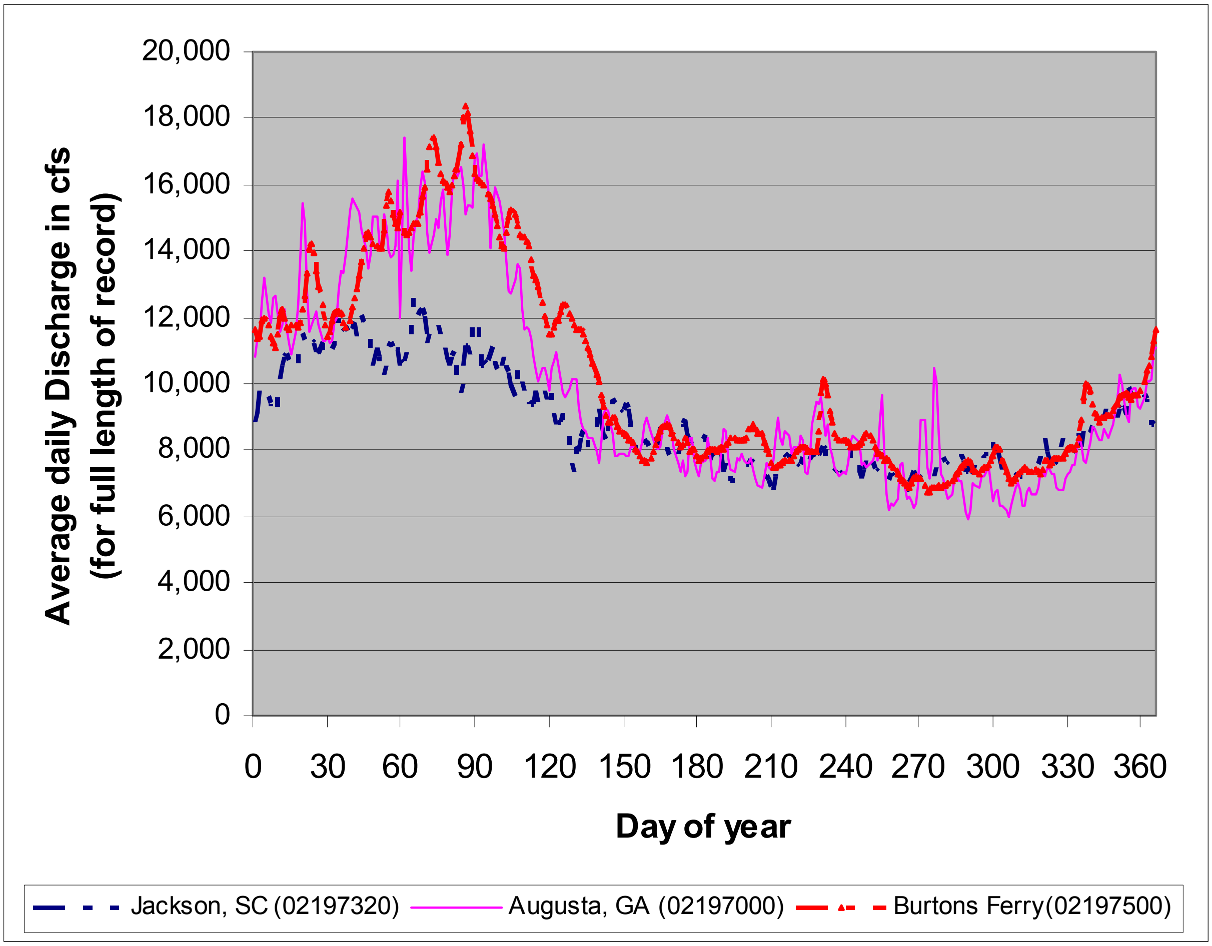



**Figure 2.3.1-4 Average Daily Discharge on the Savannah River at Augusta, Georgia; Jackson, South Carolina; and Burtons Ferry for Entire Period of Record**

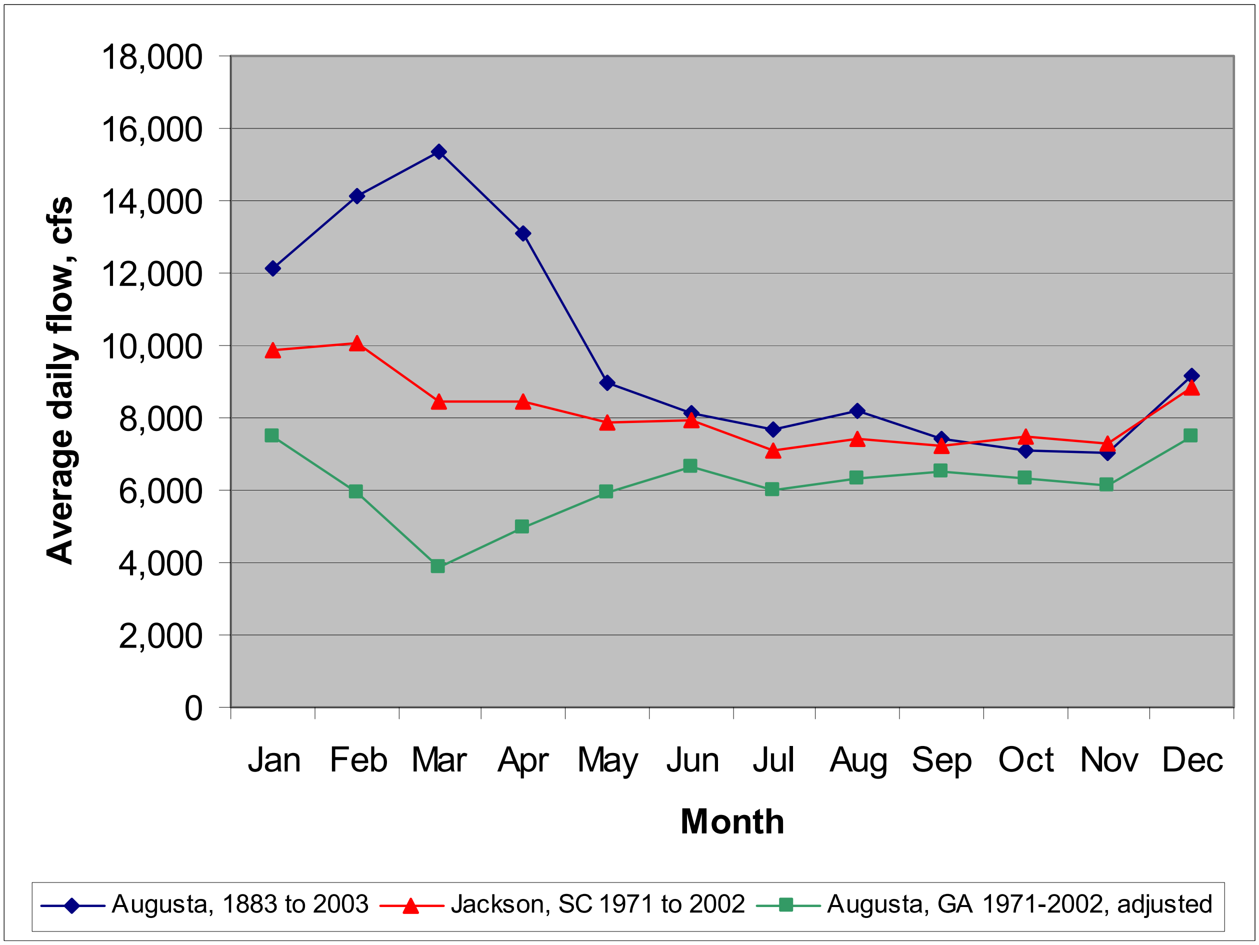



**Figure 2.3.1-5 Full-Period and Adjusted Average Discharges for Each Month on the Savannah River at Augusta, Georgia, and Jackson, South Carolina**

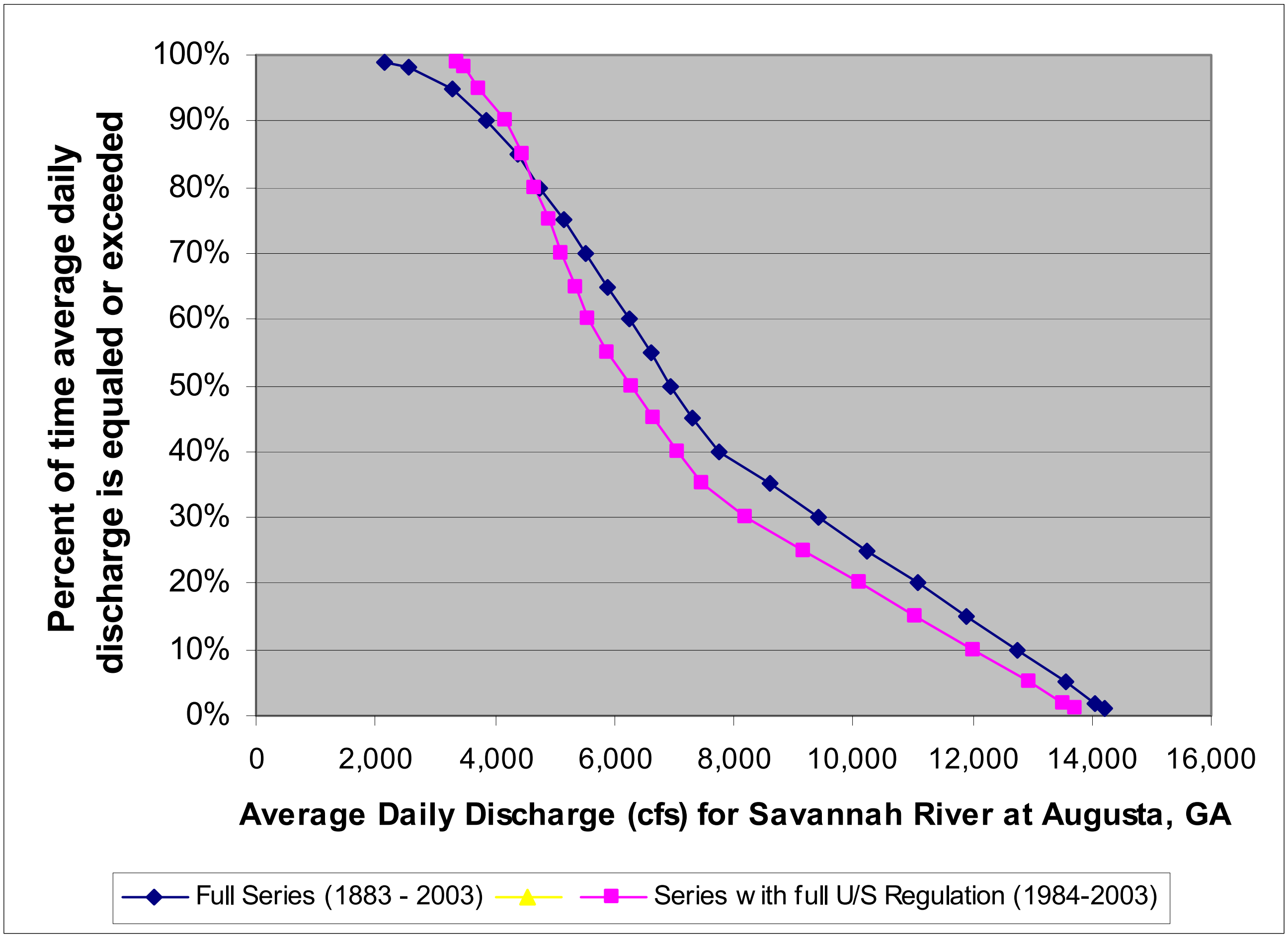



**Figure 2.3.1-6 Flow-Duration Curves for the Savannah River at Augusta, Georgia, for Unregulated and Regulated Periods**

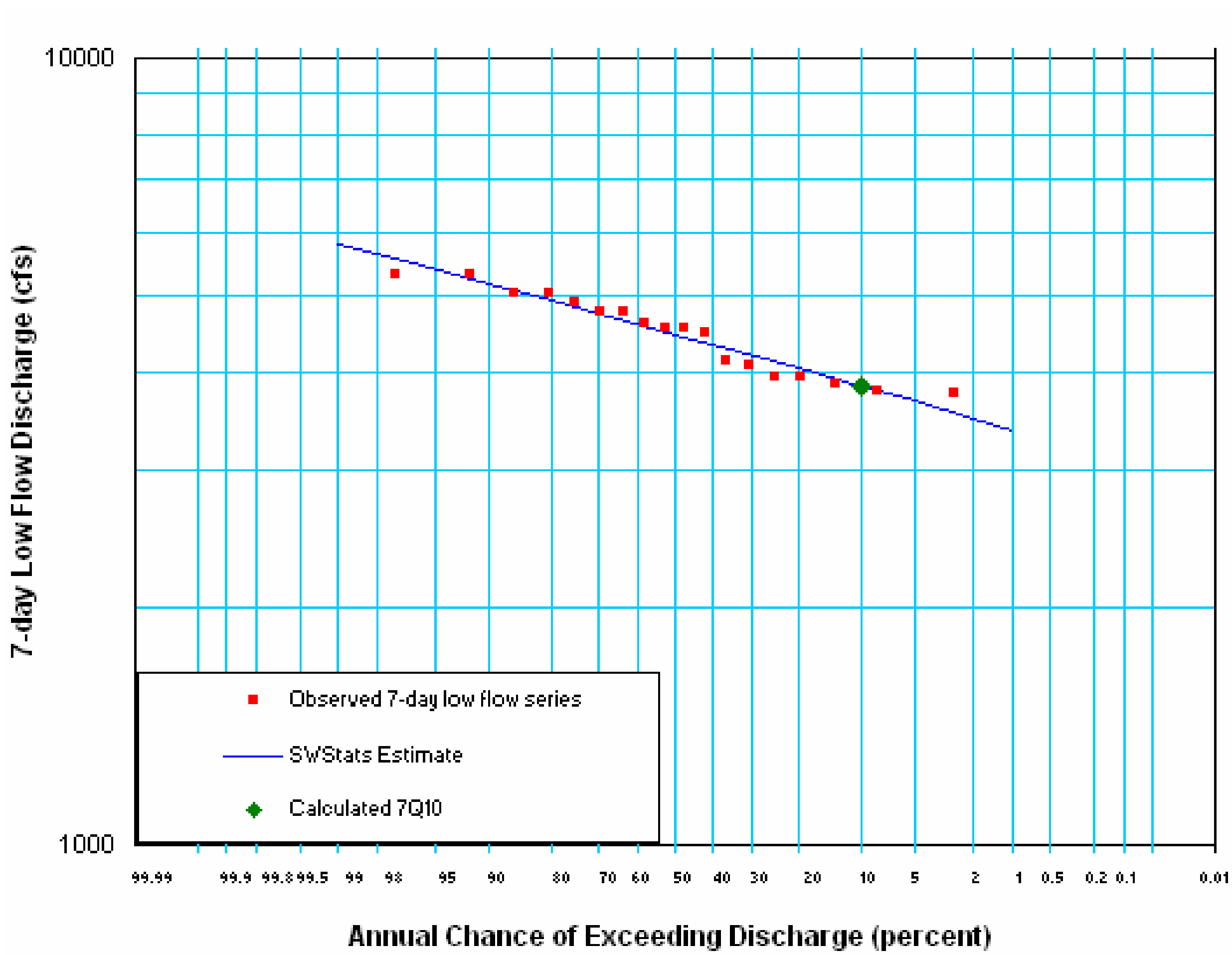
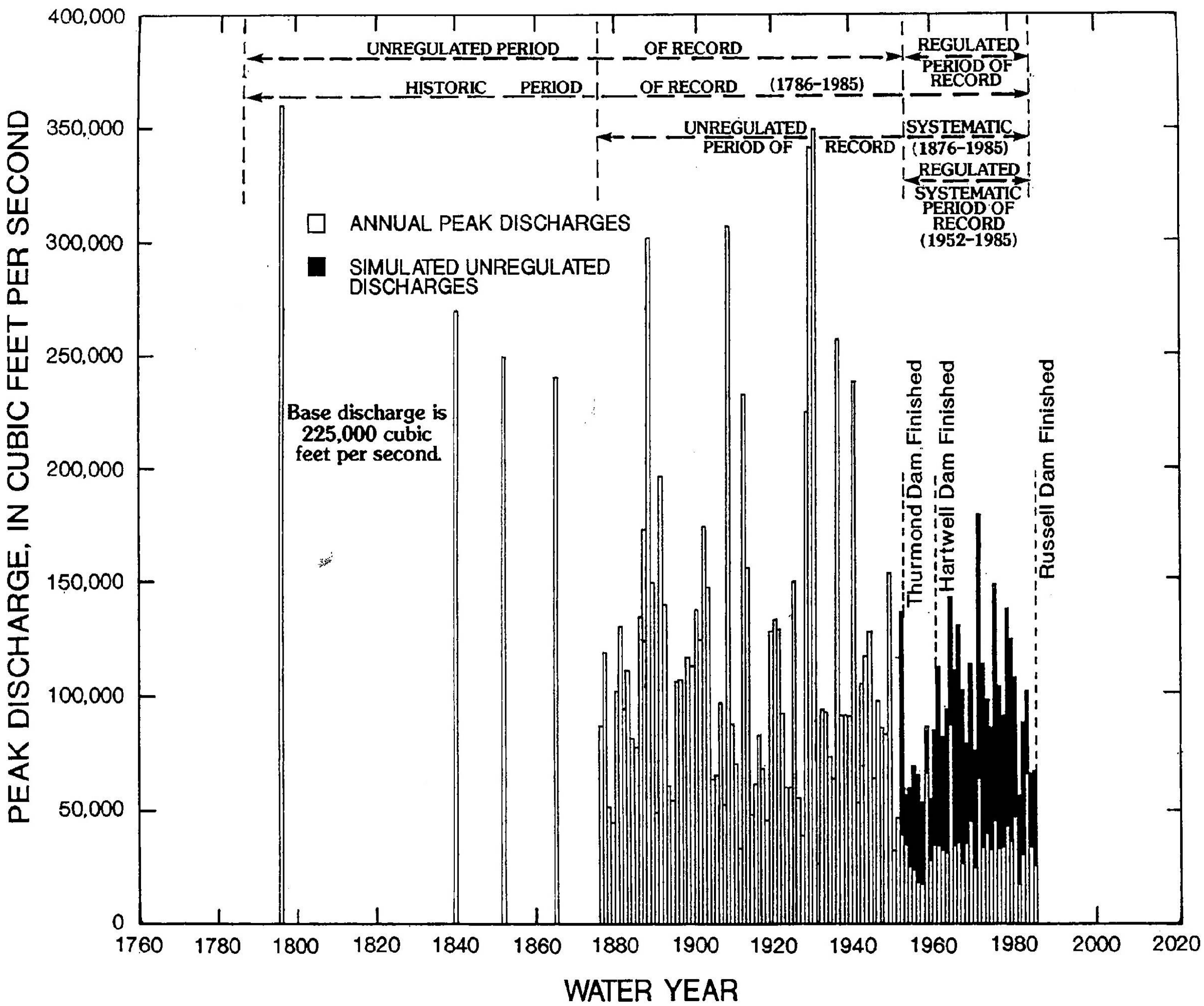
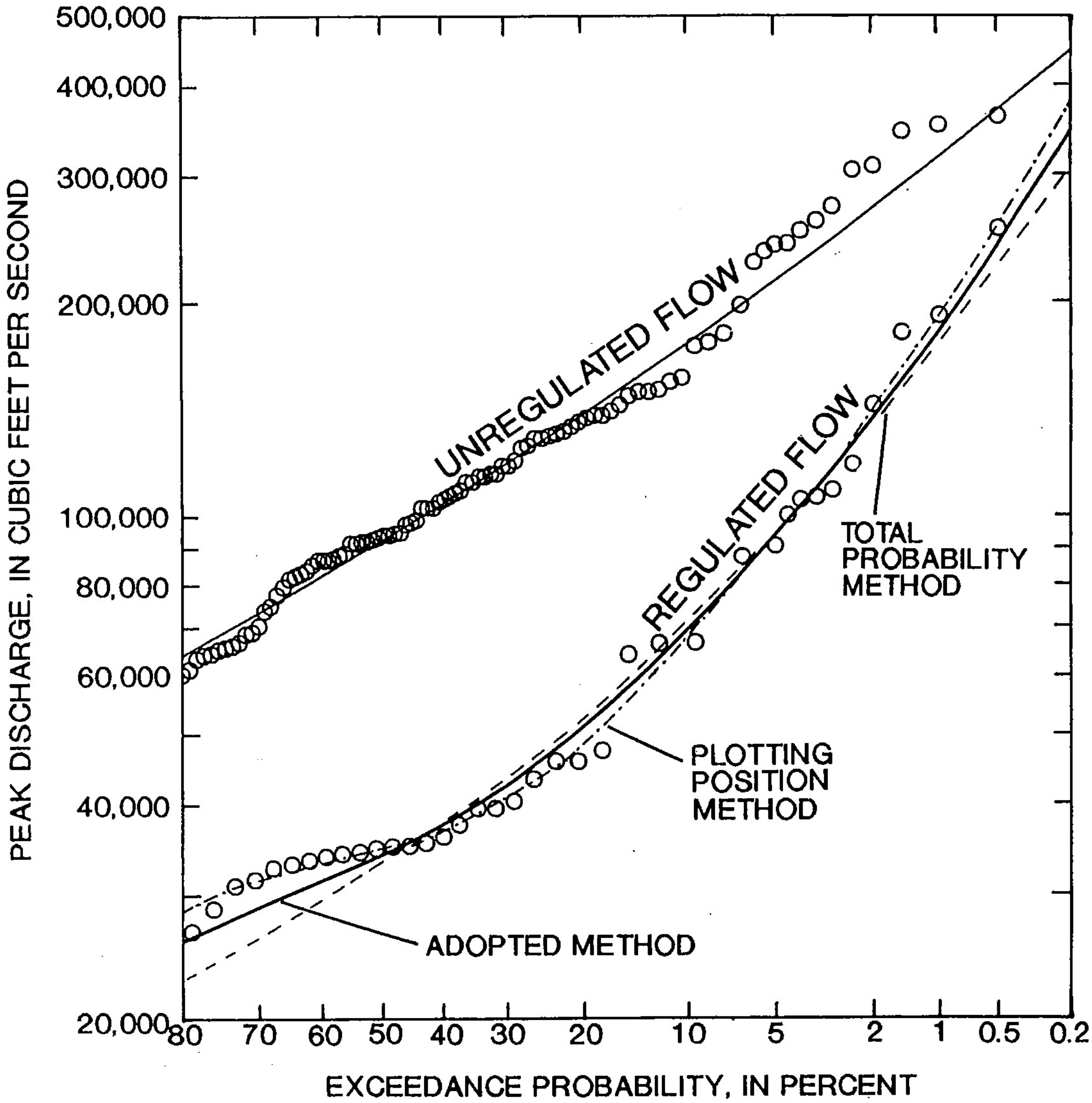



**Figure 2.3.1-7 Log-Pearson III Frequency Plot of 7-Day Low-Flow for Regulated Period on the Savannah River at Augusta, Georgia**



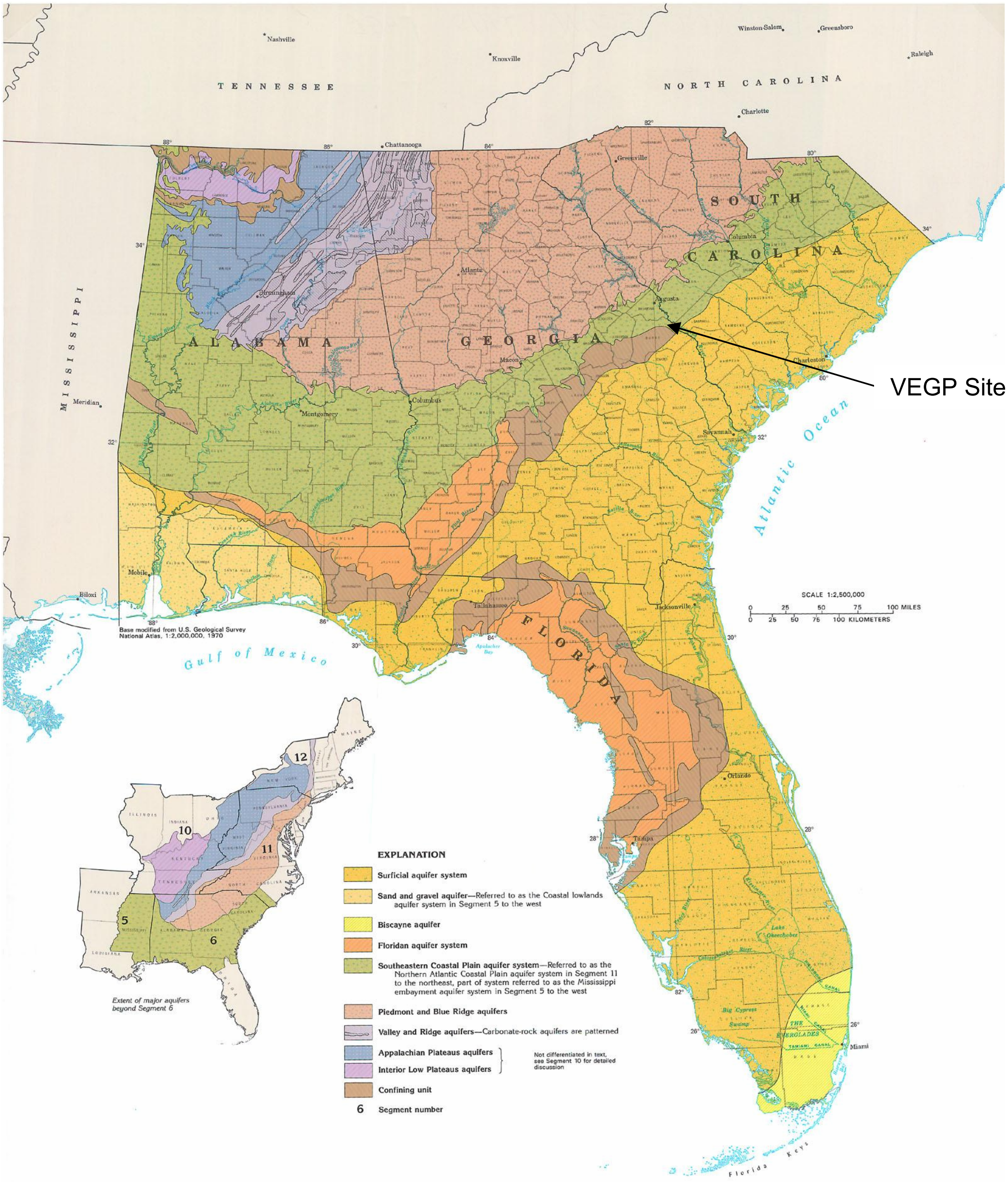

Source: Figure 2 from USGS 1990

**Figure 2.3.1-8 Unregulated and Regulated Peak Discharge Values for the Savannah River at Augusta, Georgia (02197000)**




Source: Figure 35 from USGS 1990

**Figure 2.3.1-9 Unregulated and Regulated Annual Peak Discharge Frequency Curves for the Savannah River at Augusta, Georgia**




**Source: Figure 3 from Miller 1990**

**Figure 2.3.1-10 Extent of Major Aquifers or Aquifer Systems at the Land Surface in the VEGP Site Region**

| GEOLOGIC TIME | | SNC ESP NOMENCLATURE | | |
|---|---|---|---|---|
| PERIOD | SERIES | GEOLOGIC UNIT | HYDROGEOLOGIC UNIT | REGIONAL HYDROGEOLOGIC UNIT |
| TERTIARY | Eocene | Barnwell Gr. | Water Table aquifer | Southeastern Coastal Plain Aquifer System |
| | | Lisbon Fm. / Blue Bluff Mbr. | Confining unit | |
| | | Still Branch Fm.<br>Congaree Fm. | Tertiary sand aquifer | |
| | Paleocene | Snapp Fm.<br>Black Mingo Fm. | Semi-confining unit | |
| Cretaceous | | Steel Creek Fm. | Cretaceous aquifer | |
| | | Gaillard Fm. / Black Creek Fm. | | |
| | | Pio-Nono Fm. / unnamed sands | | |
| | | Cape Fear Fm. | | |

Notes: Geologic unit naming convention **(Huddlestun and Summerour 1996; Falls and Prowell 2001)**
Regional hydrogeologic unit naming convention **(Miller 1990)**

**Figure 2.3.1-11 Schematic Hydrostratigraphic Classification for the VEGP Site**

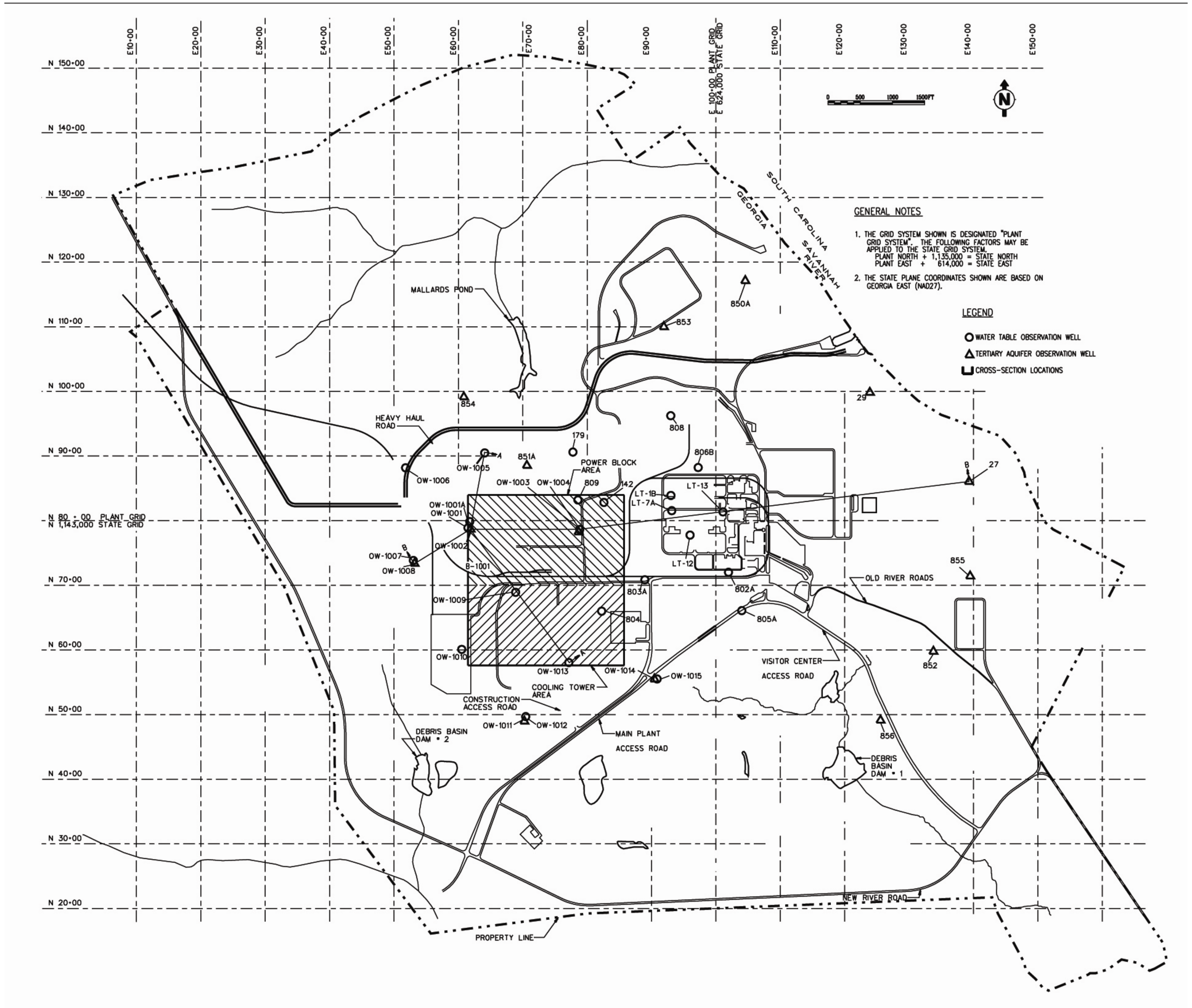



**Figure 2.3.1-12 Observation Well Locations**

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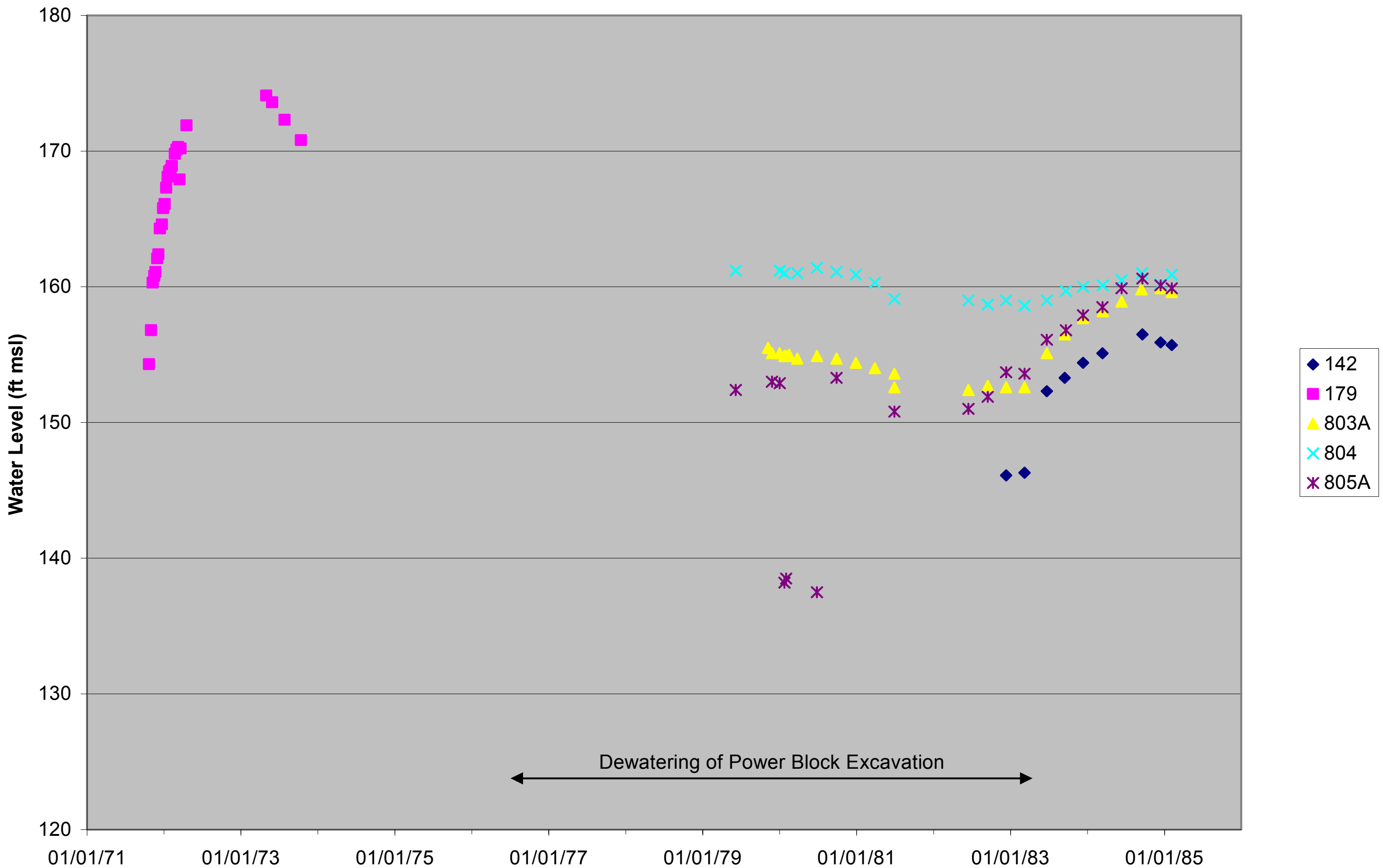


**Figure 2.3.1-13 Water Table Aquifer: 1971–1985 Hydrographs**

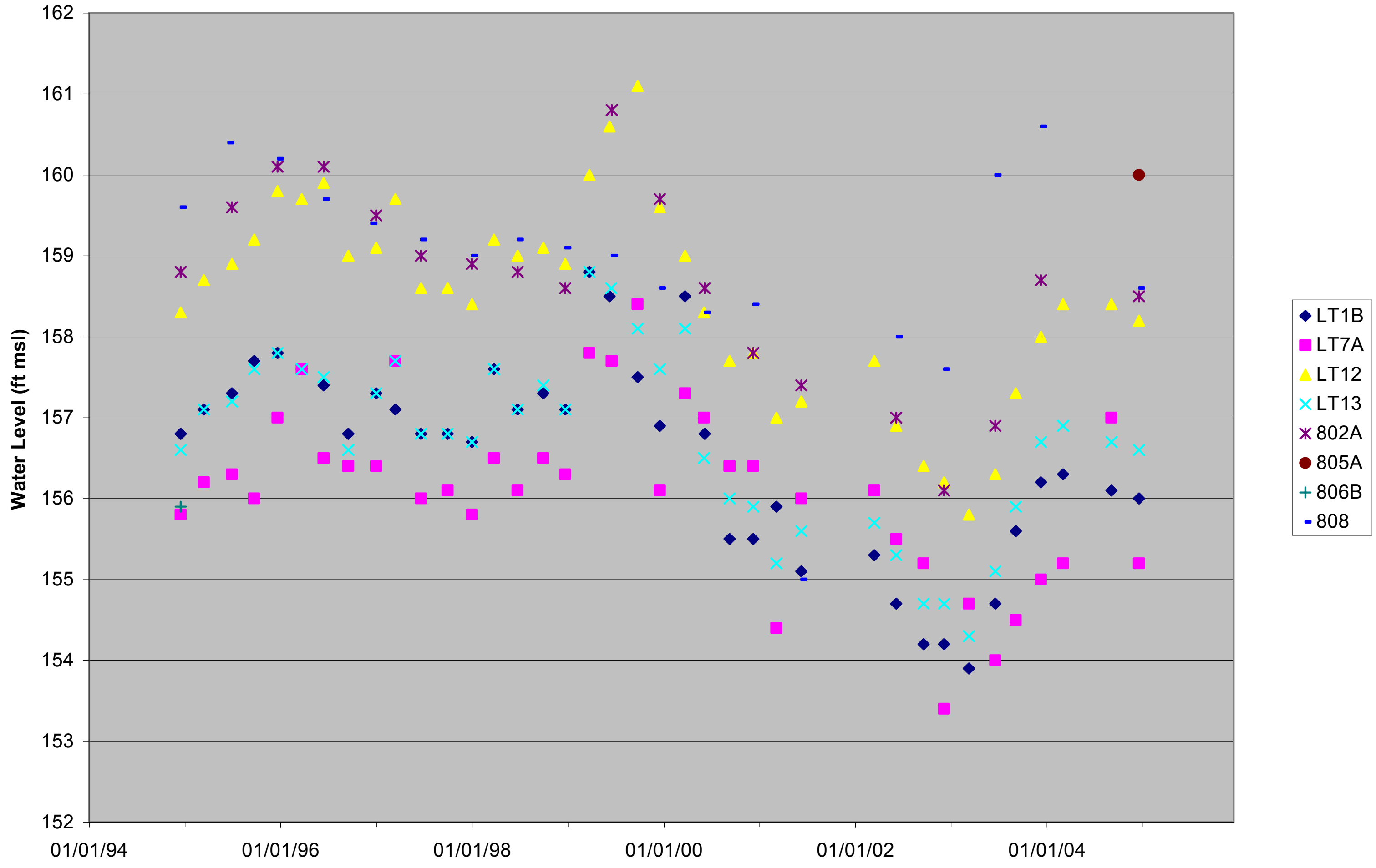


**Figure 2.3.1-14 Water Table Aquifer: 1995–2004 Hydrographs**

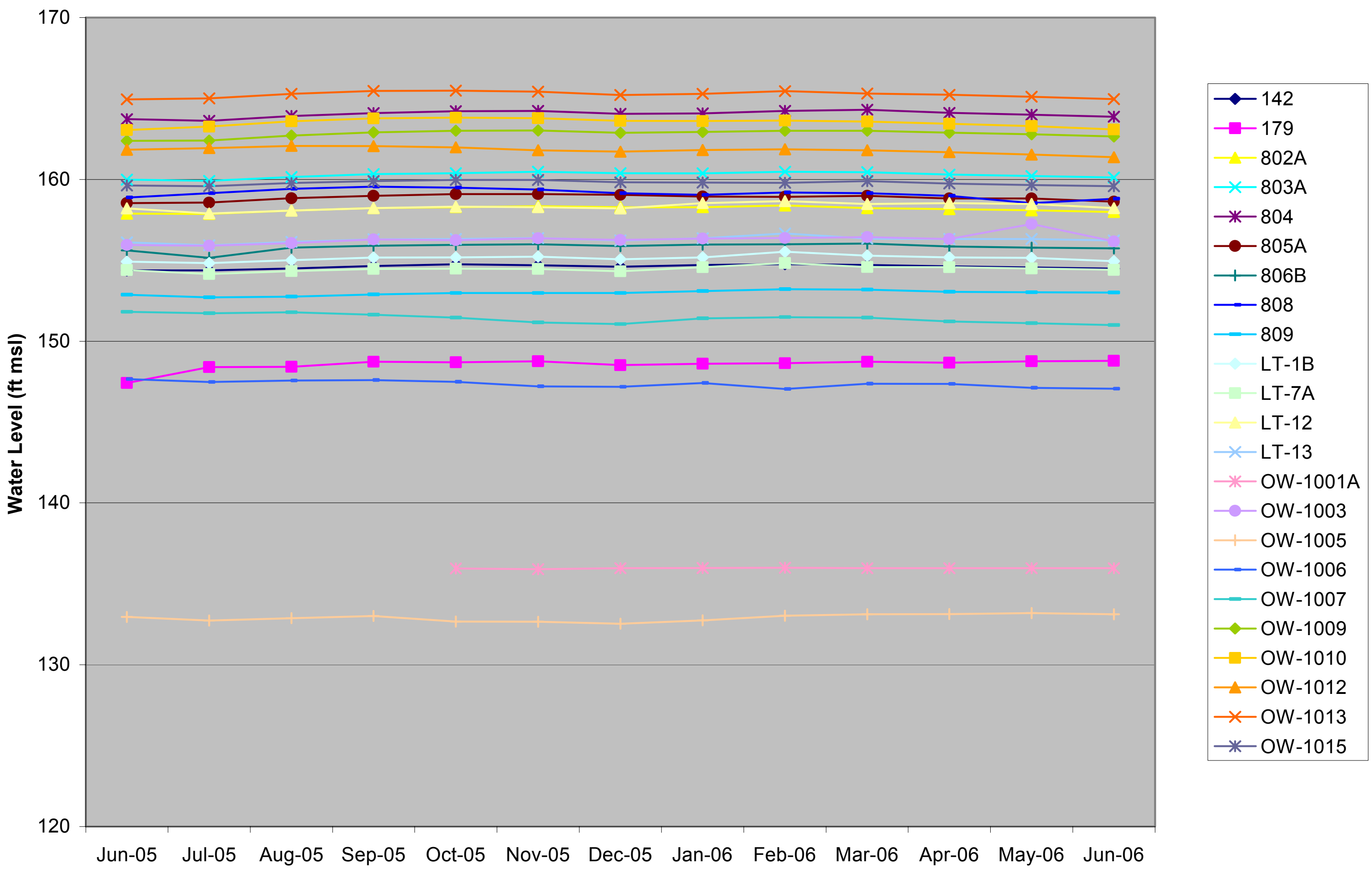


**Figure 2.3.1-15 Water Table Aquifer: June 2005 – June 2006 Hydrographs**

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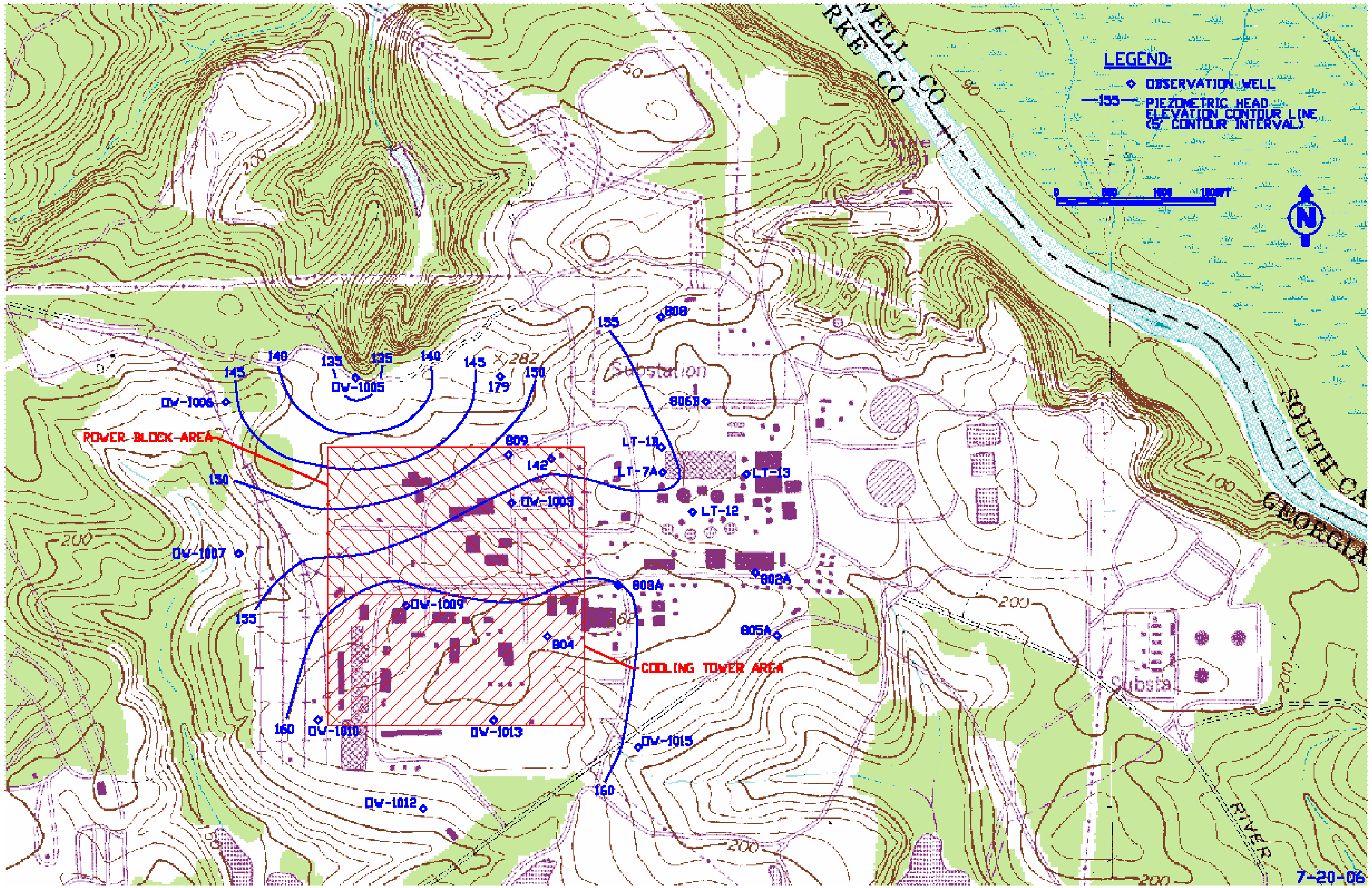


**Figure 2.3.1-16 Water Table Aquifer: Piezometric Contour Map for June 2005**

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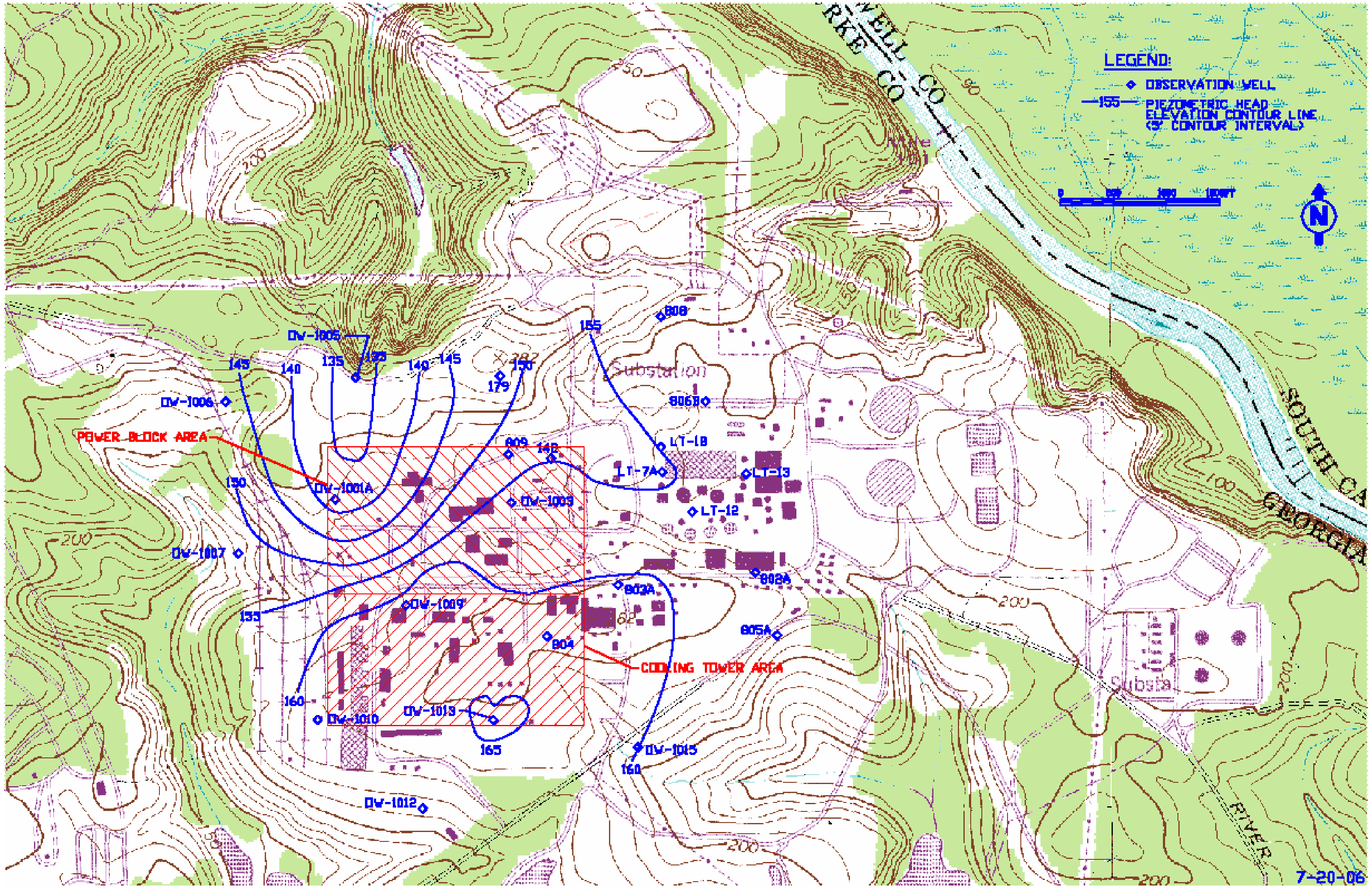


**Figure 2.3.1-17 Water Table Aquifer: Piezometric Contour Map for October 2005**

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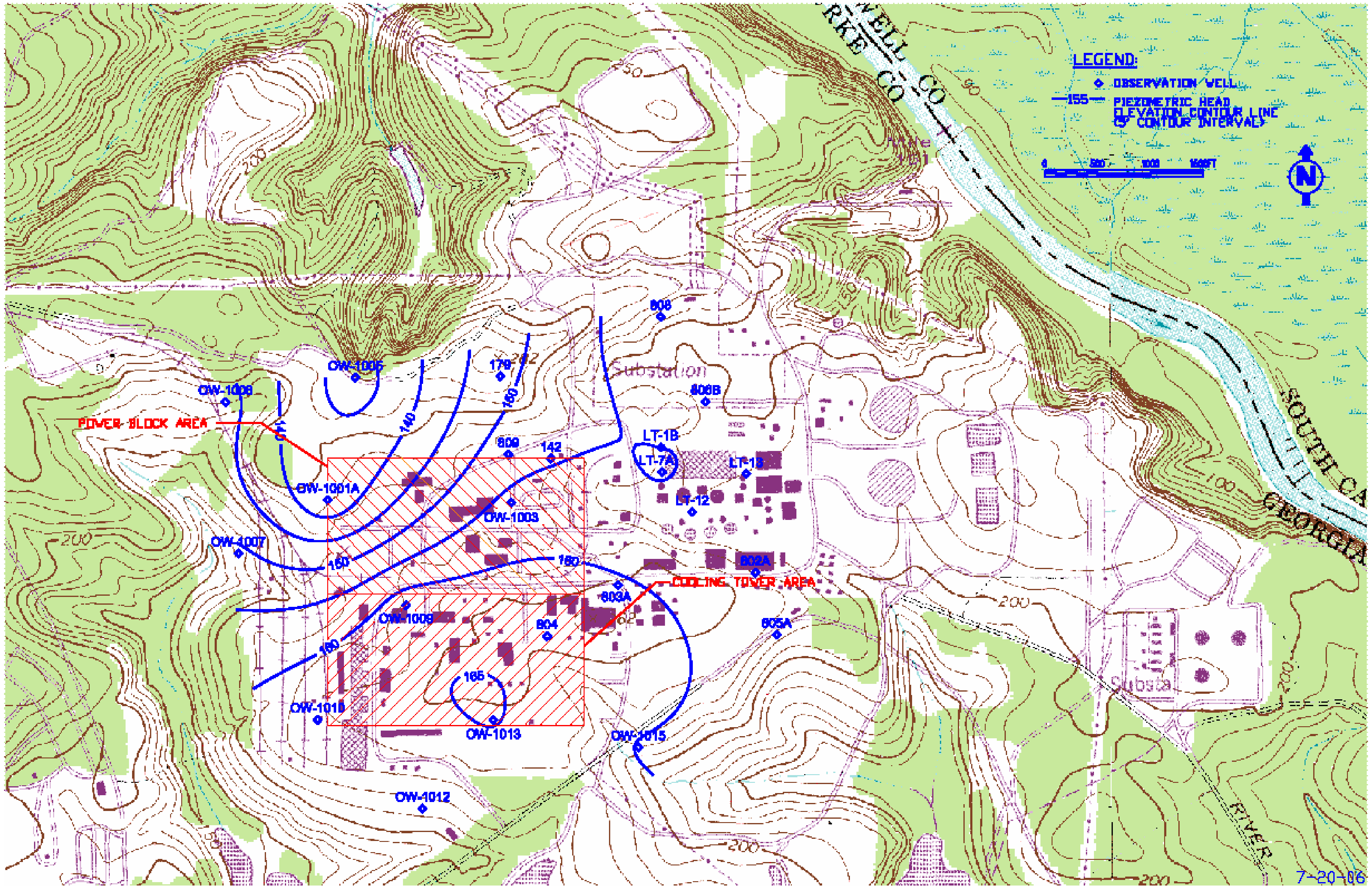


**Figure 2.3.1-18  Water Table Aquifer: Piezometric Contour Map for December 2005**

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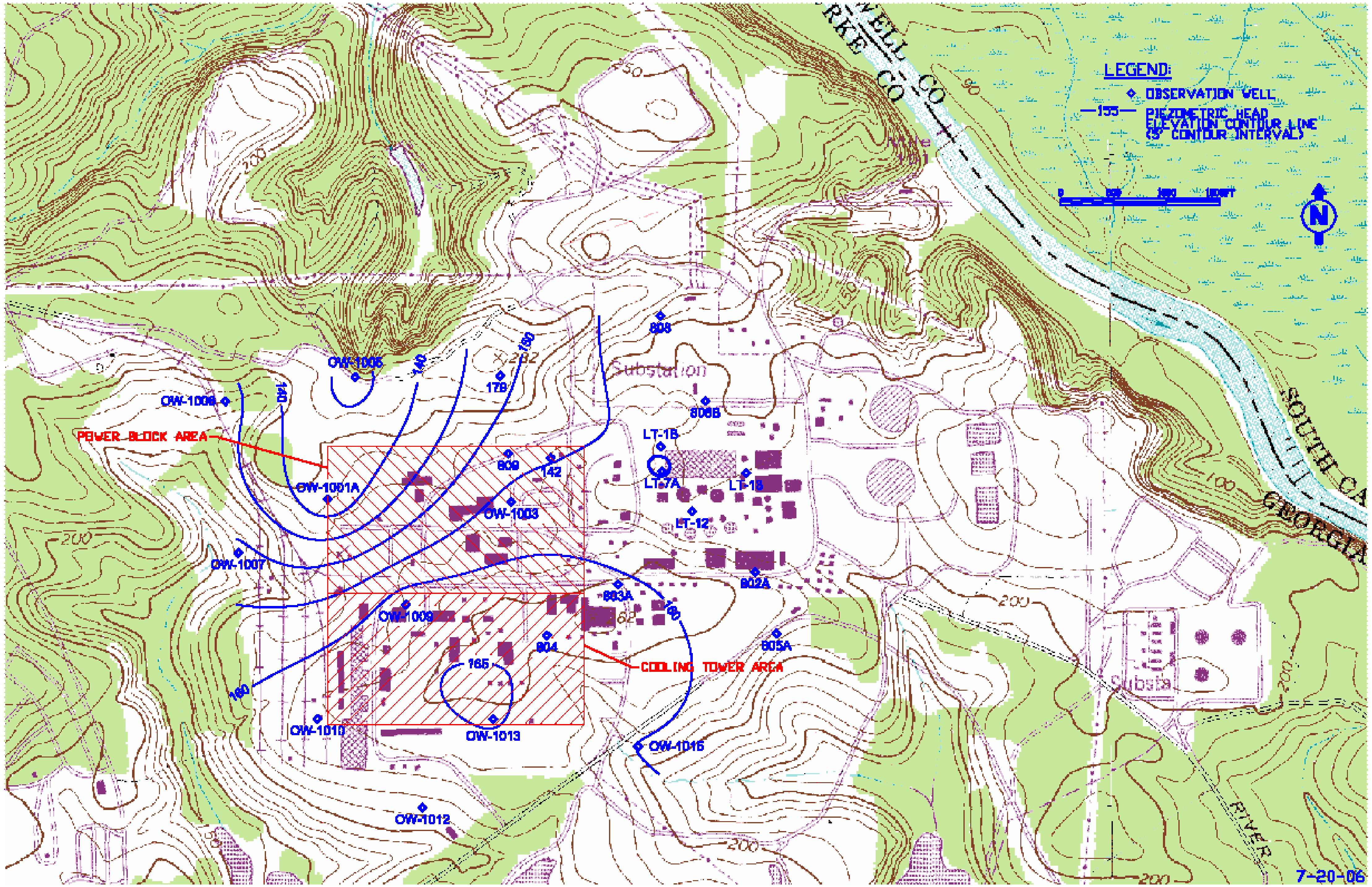


**Figure 2.3.1-19 Water Table Aquifer: Piezometric Contour Map for March 2006**

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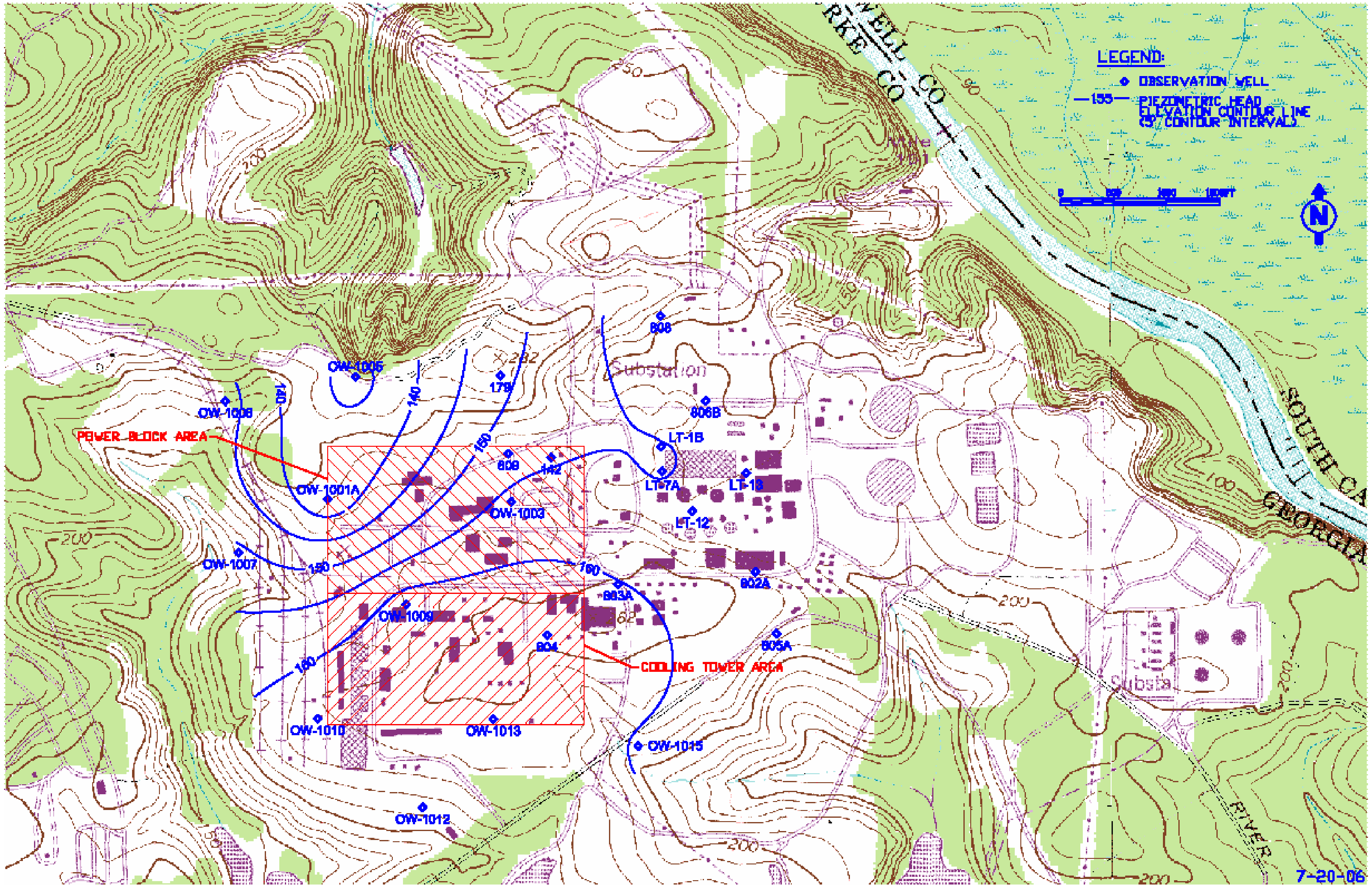


**Figure 2.3.1-20 Water Table Aquifer: Piezometric Contour Map for June 2006**

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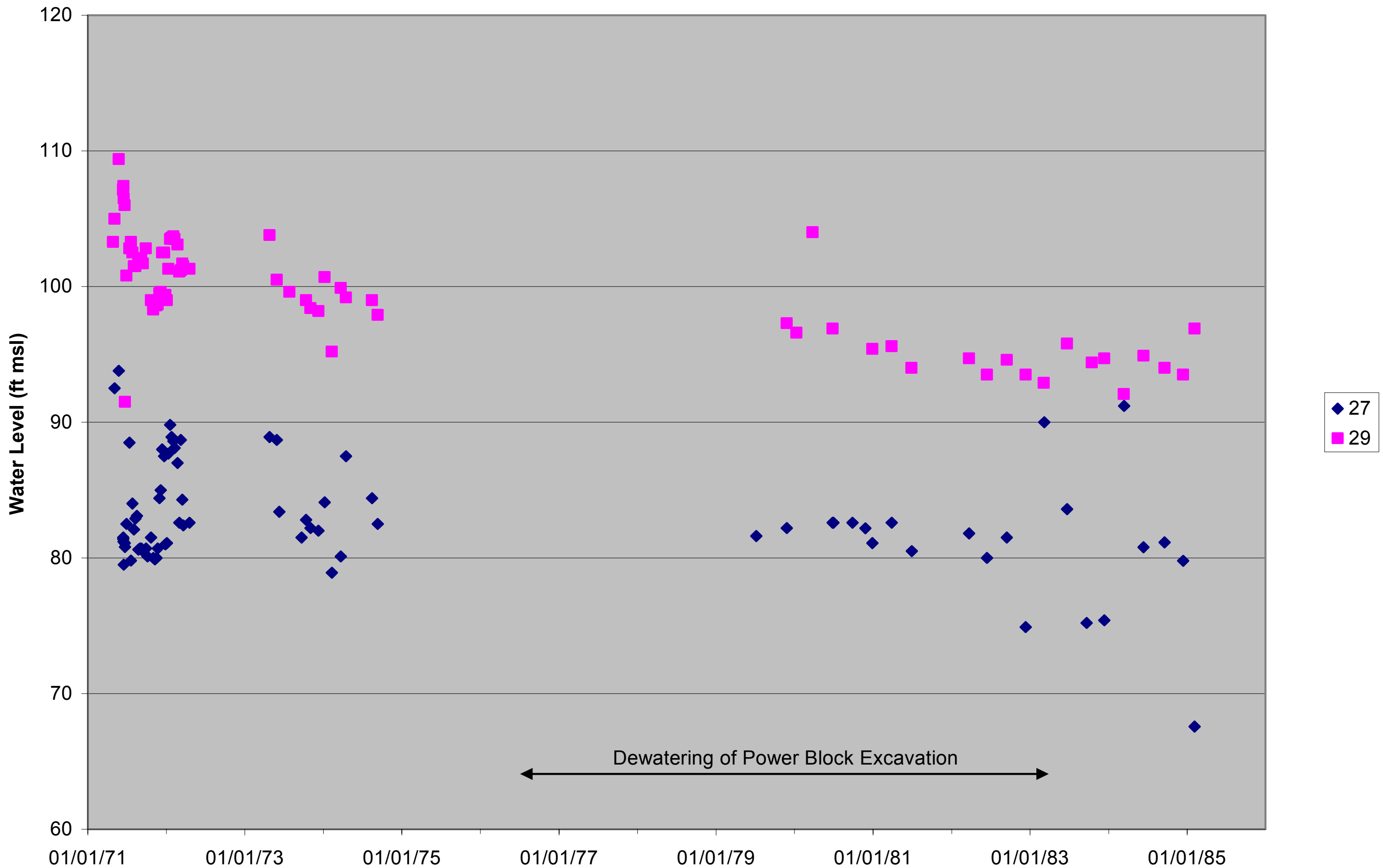


**Figure 2.3.1-21  Tertiary Aquifer: 1971–1985 Hydrographs**

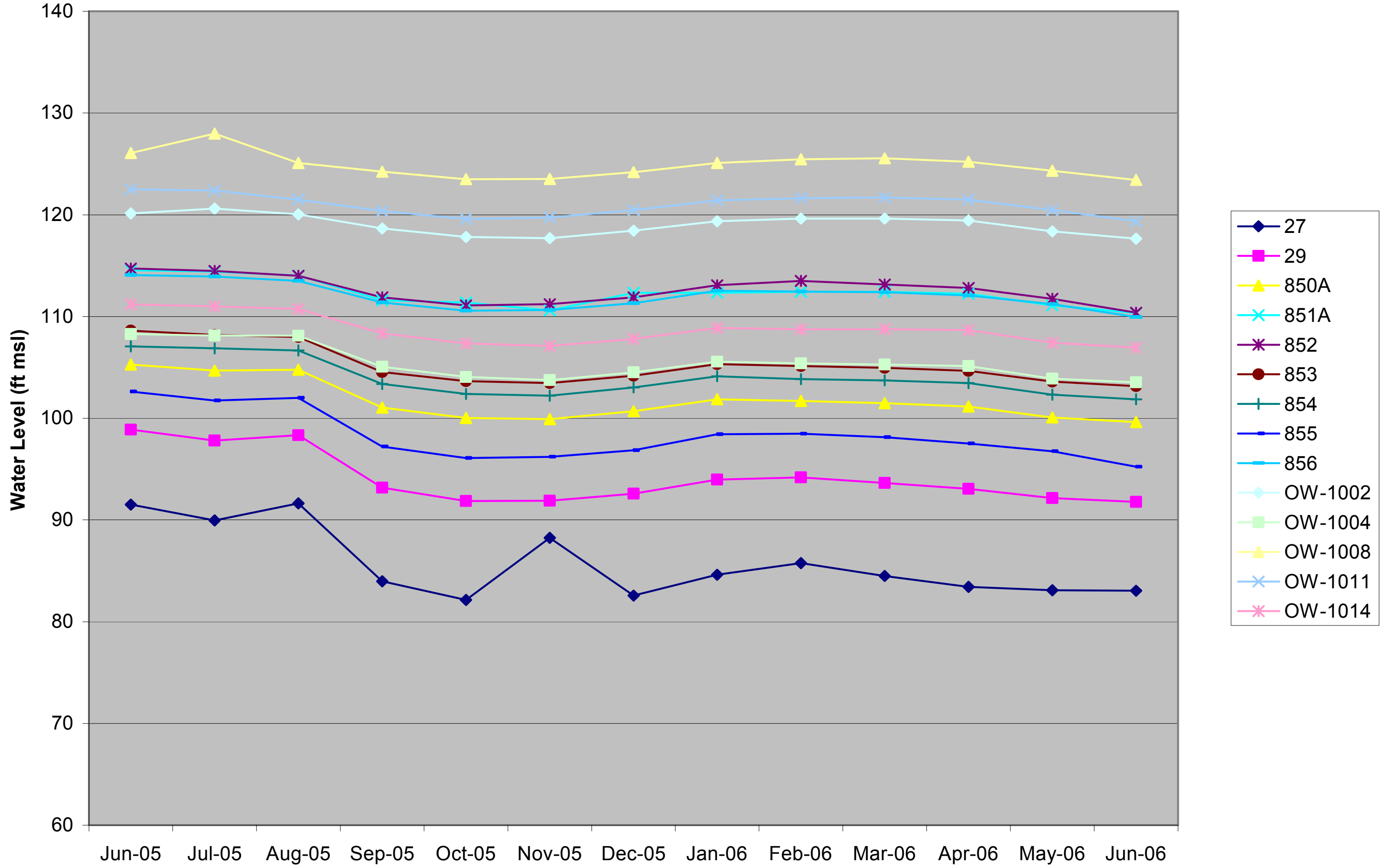


**Figure 2.3.1-22 Tertiary Aquifer: June 2005 – June 2006 Hydrographs**

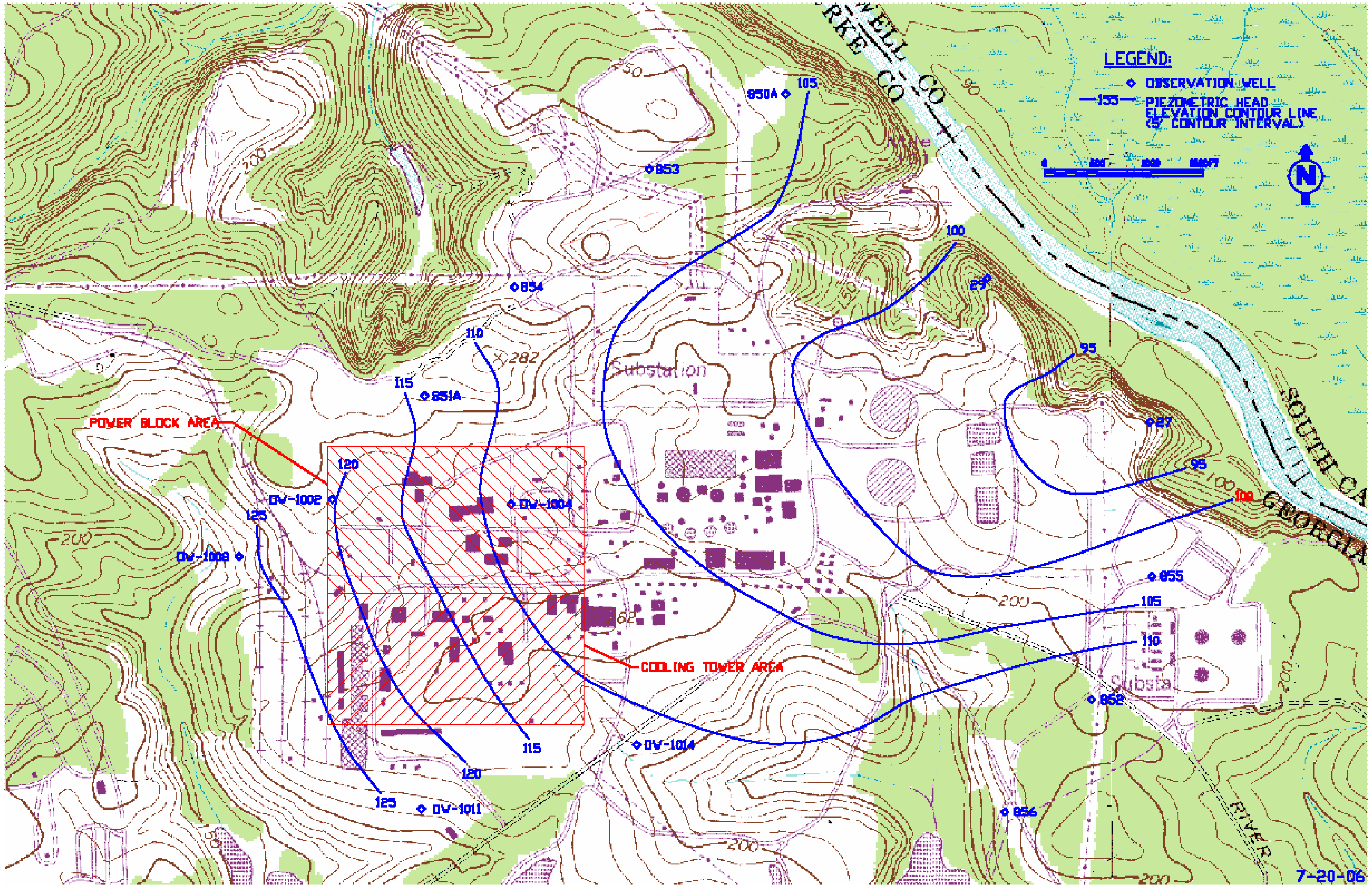


**Figure 2.3.1-23 Tertiary Aquifer: Piezometric Contour Map for June 2005**

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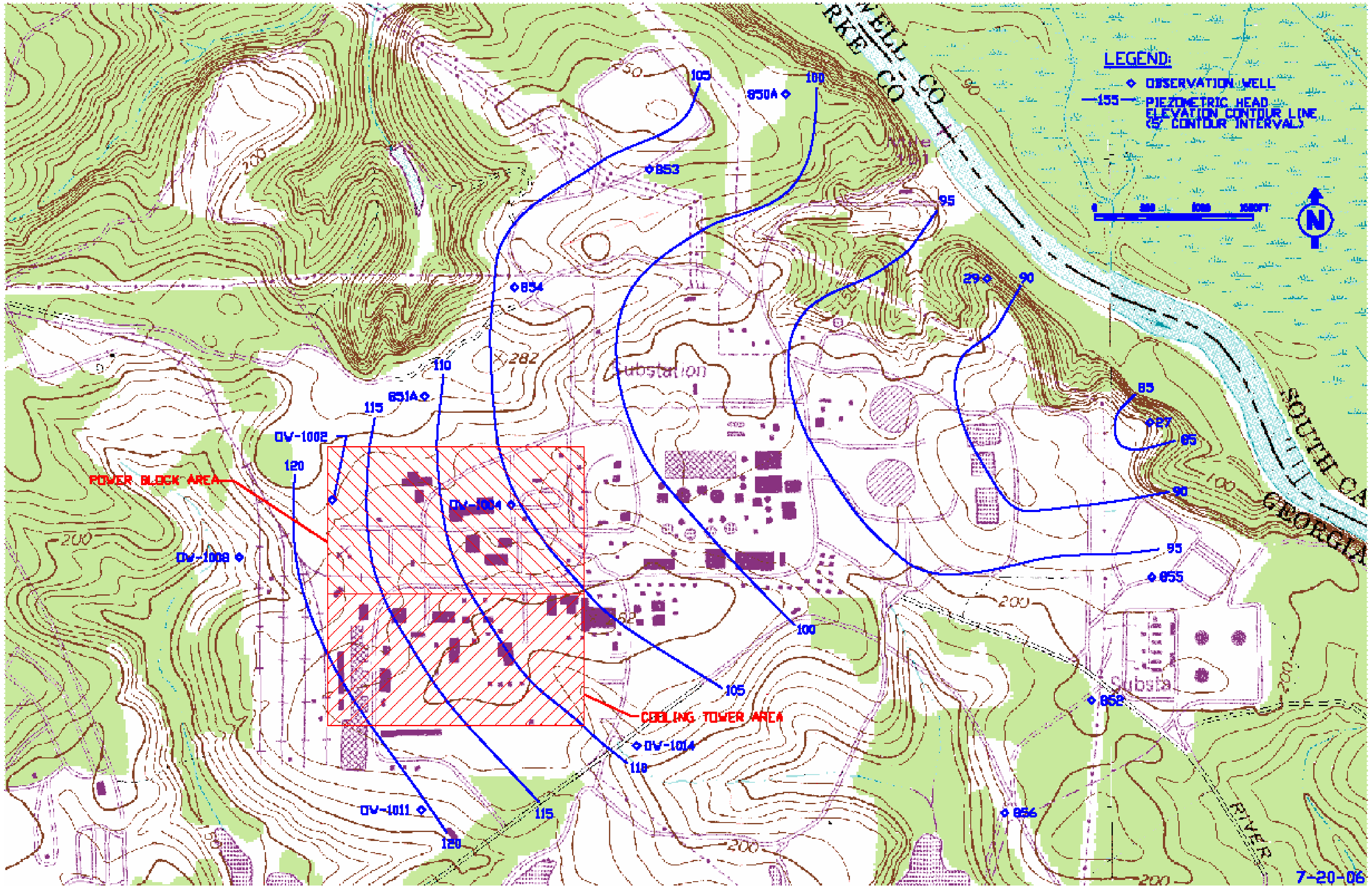


**Figure 2.3.1-24 Tertiary Aquifer: Piezometric Contour Map for September 2005**

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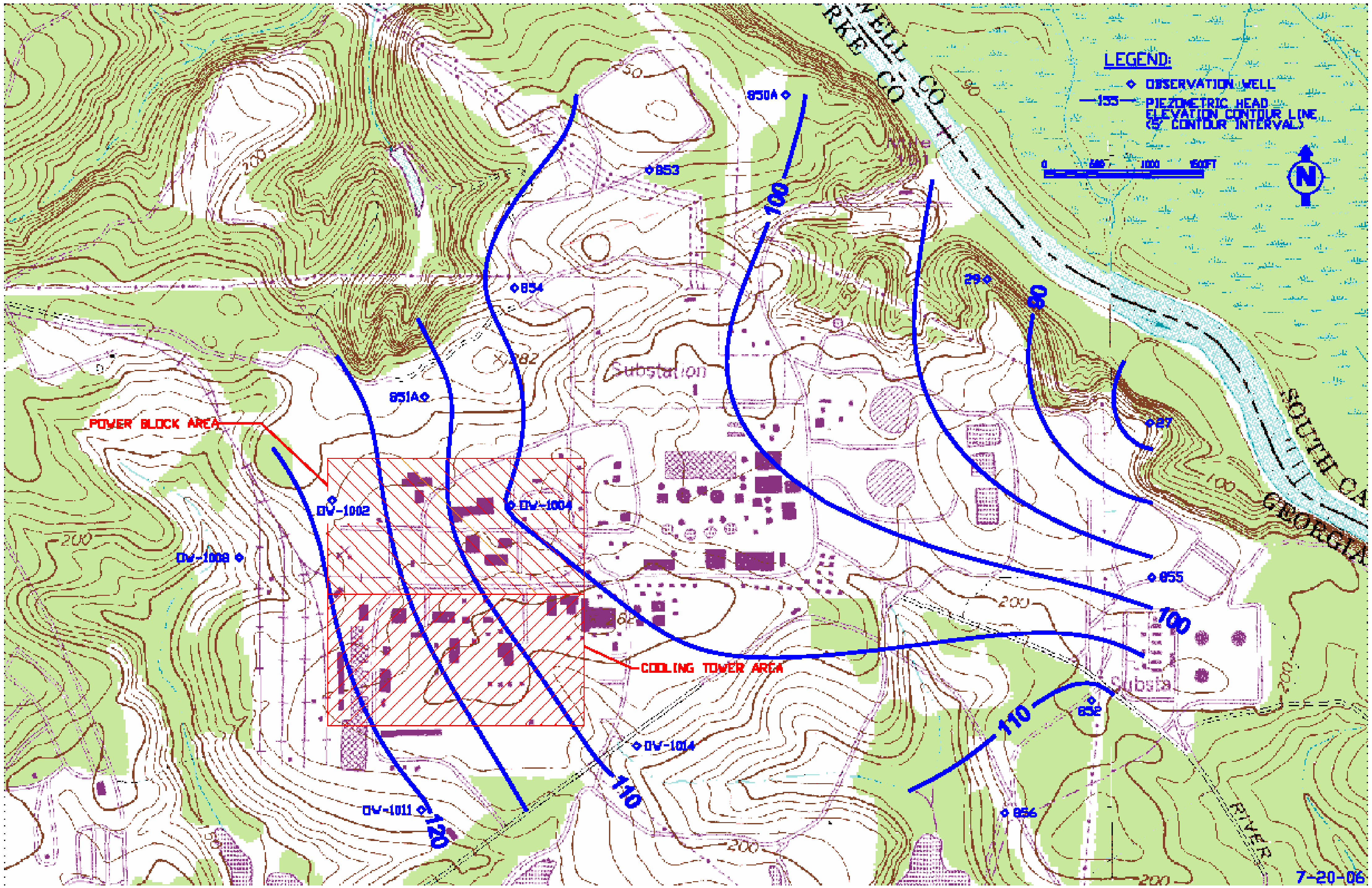


**Figure 2.3.1-25 Tertiary Aquifer: Piezometric Contour Map for December 2005**

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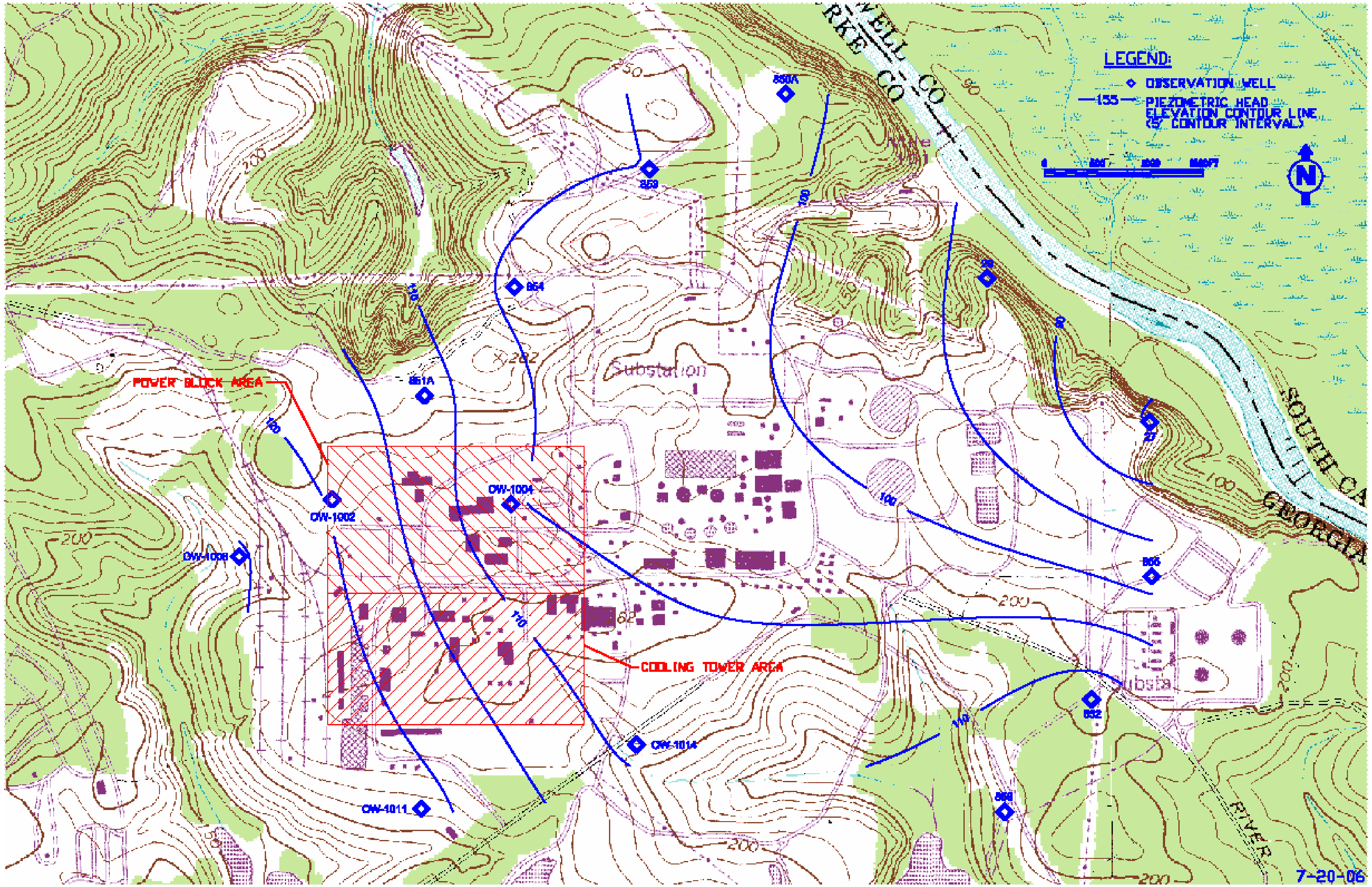


**Figure 2.3.1-26 Tertiary Aquifer: Piezometric Contour Map for March 2006**

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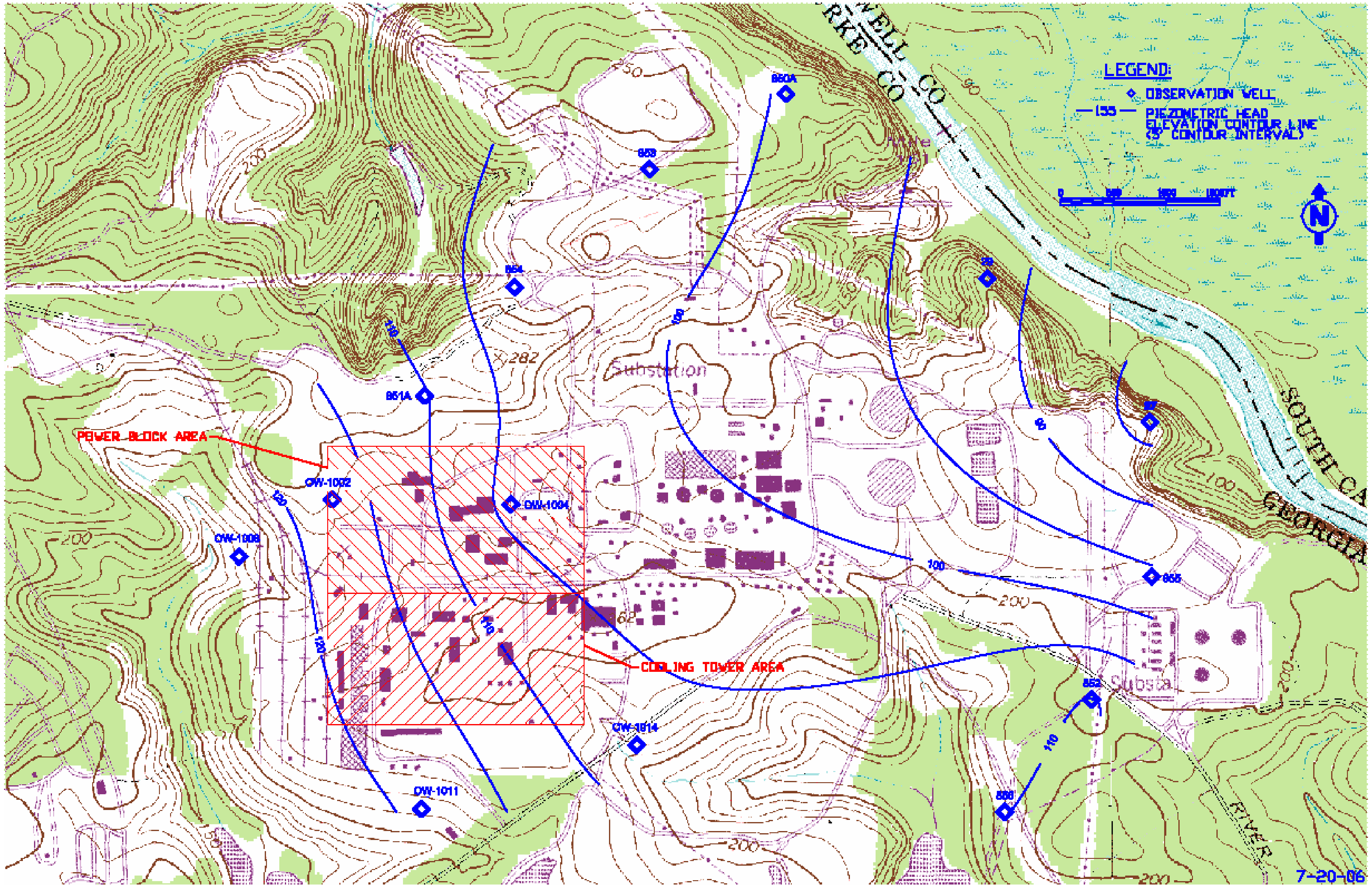


**Figure 2.3.1-27 Tertiary Aquifer: Piezometric Contour Map for June 2006**

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**(USGS 2006f)** South Carolina Office, U.S. Geological Survey; Contact for access to HUC-12 shapefiles for the Savannah River: malowery@usgs.gov.

**(USGS 2006g)** USGS Stream Gage 302197500, Savannah River at Burtons Ferry Bridge near Millhaven, Georgia (http://nwis.waterdata.usgs.gov/nwis/dvstat/?site_no=02197500) (accessed 1-17-2006).

### 2.3.2 Water Use

This section describes surface water and groundwater uses that could affect or be affected by the construction or operation of two AP1000 units (VEGP Units 3 and 4) at the VEGP site. Included are descriptions of the types of consumptive and non-consumptive water uses, identification of their locations, and quantification of water withdrawals and returns.

#### 2.3.2.1 Surface Water

The surface water bodies that are within the hydrologic system in which the VEGP site is located and that may affect or be affected by the construction and operation of VEGP Units 3 and 4, include streams and surface water bodies in the Savannah River basin, which extends a length of over 350 mi. The major rivers in the Savannah River basin watershed area include the Tugaloo River, Keowee River, Seneca River, Savannah River, Broad River, two Little Rivers (one in Georgia and one in South Carolina), Stephens Creek, Brier Creek, Horse Creek, and Ebenezer Creek. A number of reservoirs and lakes are also located within the river basin on the Savannah River and its major tributaries **(USGS 1990a; USACE 1993; USACE 1996)**. Among these reservoirs and lakes, three large federal multipurpose projects on the Savannah River—Hartwell Lake and Dam, Richard B. Russell Lake and Dam, and J. Strom Thurmond (also known as Clarks Hill) Lake and Dam—maintain the maximum influence on the river discharge downstream from the J. Strom Thurmond Dam. These reservoirs are respectively located approximately 138, 108, and 71 River Miles upstream from the VEGP site. Figure 2.3.2-1 presents a mosaic of satellite images, and Figure 2.3.2-2 illustrates the major rivers, along with the locations of major reservoirs in the Savannah River basin.

The Savannah River, which is the principal surface water system in the basin, defines the state boundary between Georgia and South Carolina, and nearly all of the river basin area is shared by the two states. The agencies with important roles in the watershed include the US Army Corps of Engineers (USACE), Savannah District, which is responsible for managing the three dams and the in-stream reservoirs of the Savannah River, and the US Environmental Protection Agency (USEPA) in cooperation with the Georgia Environmental Protection Division (EPD) and the South Carolina Department of Health and Environmental Control (SCDHEC), the organizations responsible for maintaining water quality in the basin. Counties located within 50 mi of the VEGP site and within the Savannah River basin are shown in Figure 2.3.2-3 and listed in Table 2.3.2-1.

EPD and SCDHEC maintain the records of surface water and groundwater withdrawals within the river basin for the states of Georgia and South Carolina, respectively. The water withdrawal types defined by EPD and SCDHEC in maintaining state water use databases differ. EPD defines water withdrawals as public supply, domestic and commercial, industrial and mining, irrigation, livestock, thermoelectric power generation, navigation, recreation, fish and wildlife, waste assimilation, and environmental water demand **(Fanning 2003)**. SCDHEC water withdrawal categories are specified as aquaculture, golf course irrigation, hydroelectric, industrial, irrigation, mining process, other use, thermoelectric, and water supply **(SC DHEC 2005)**.

Among the water use categories specified by EPD and SCDHEC, hydroelectric water use, navigation, fish (aquaculture) and wildlife, and environmental water demand constitute non-consumptive water usage. The remaining categories constitute consumptive water use, which is considered lost from the immediate surface water environment. Consumptive water uses have been identified from the water use database maintained by EPD **(Georgia DNR 2006)** and from the water use report by SCDHEC **(SC DHEC 2005)**. EPD's water use database includes users whose average daily withdrawal during any single month exceeds 100,000 gallons per day (gpd) **(Fanning 2003)**. SCDHEC maintains records of registered water use that withdraws water in excess of 3 million gallons in any given month from a single groundwater well or surface water intake, or multiple wells or surface water intakes under common ownership **(SC DHEC 2005)**.

As of September 2005, 46 intake facilities in Georgia were registered for surface water withdrawal activities within the Savannah River basin **(Georgia DNR 2006)**. This excludes the permits identified in the EPD database as suspended, revoked, or expired. In South Carolina, 55 facilities were registered (with 71 intake locations) in 2004; an additional 5 facilities registered for dual surface water and groundwater withdrawals **(SC DHEC 2005)**. Figure 2.3.2-4 shows the locations of the surface water intakes in the Savannah River basin within 50 miles of the VEGP site. Table 2.3.2-2 identifies the surface water user, the water body from which withdrawals are made, and the permitted maximum volume of surface water withdrawals within the Savannah River basin in Georgia. County-wide surface water uses within the South Carolina part of the river basin are presented in Table 2.3.2-3.

These data indicate that the use of water in thermoelectric power generation constitutes the largest consumptive use of surface water in the Savannah River basin. Surface water withdrawal from the Savannah River by the existing VEGP Units 1 and 2 for cooling purposes is one of the major consumptive uses in the basin. The combined GPC surface water withdrawals from the Savannah River, at several locations in Chatham and Effingham counties in Georgia, constitute the largest water use downstream from the VEGP site.

Upstream, thermoelectric water use in Oconee County, South Carolina, which is in the headwaters of the Savannah River in the Blue Ridge Mountains, constitutes the largest water use in the basin. However, this water is used in the once-through cooling system of the Oconee

Nuclear Power Plant, most of which is immediately returned to the Savannah River basin surface water system.

The other major water uses in the Savannah River basin include public water supply for the cities of Augusta, Port Wentworth, and Savannah in Georgia, and the counties of Beaufort and Jasper in South Carolina. Major industrial users include International Paper and PCS Nitrogen Fertilizer in Richmond County, Georgia.

Approximately 80 percent of all surface water used in the basin is cleaned and returned back to the river system **(USACE 2006)**.

#### 2.3.2.1.1 Local and Onsite Water Use

Surface water bodies within a 6-mile radius of the VEGP site include the Savannah River and several small tributaries. The tributaries in the site vicinity include Beaverdam Creek, Daniel's Branch, and Newberry Creek on the west bank of the Savannah River, and Fourmile Branch and Pen Branch on the east bank, as illustrated in Figure 2.3.2-5. Major consumptive uses of surface water within the 6-mile area include VEGP and the Savannah River Site (SRS) including the D-Area power house. No surface water is withdrawn for municipal water supply from this river reach. Further upstream from the VEGP site, SCE&G withdraws water from the Savannah River for its Urquhart power station in South Carolina. Monthly water uses from these facilities in recent years are presented in Table 2.3.2-4.

Current non-consumptive use of Savannah River water includes hydroelectric power generation, minimum stream flow requirements for navigation and environmental maintenance, fish and wildlife water demand, and recreation. Water use classification for the Savannah River within 6 miles of the VEGP site shows that the river is classified as fishing, the non-consumptive use category for fish and wildlife **(Georgia DNR 2001)**. The only section of the Savannah River classified by EPD as impaired under Sections 305(b) and 303(d) of the Federal Clean Water Act is the reach from J. Strom Thurmond Lake to the Stevens Creek Dam, upstream of Augusta, Georgia **(Georgia EPD 2006)**. Although improved navigation from Augusta to Savannah was included in the project objectives for the Hartwell and J. Strom Thurmond Dams, except for occasional freight transport, regular commercial navigation between Savannah and Augusta ceased operation in 1979 **(USACE 1989)**. No information on recreational use of the river within 6 miles from the VEGP site is available; however, public boat landings are located just downstream of VEGP; at Jackson, SC, upstream of VEGP; and below Steel Creek, downstream of VEGP on the South Carolina side of the river.

Compilation of water use data for Georgia between 1980 and 2000 indicates that surface water and groundwater withdrawal rates remained nearly unchanged during this period **(Fanning**

**2003)**. However, for Burke County, where the VEGP site is located, the total increase in future water demand for combined surface water and groundwater usage is estimated to be over 50 percent by 2035 **(Rutherford 2000)**. For South Carolina, combined water demand for industry, public supply, irrigation, and domestic use is projected to increase by nearly 50 percent by 2045 **(SC DNR 2004)**. This future water use estimate also includes water use for power generation.

Most water users in the Savannah River basin depend primarily on surface water to satisfy current and future demands. Many groundwater users in the lower basin will be required to replace groundwater use with surface water due to concerns about salt water intrusion into groundwater. Because of increased saltwater intrusion in the lower basin, Georgia and South Carolina capped current groundwater use at specified levels, directing that future coastal water supply be met with surface water from the Savannah River **(USACE 1999)**.

The USACE, Savannah District, along with Georgia and South Carolina, are developing an updated comprehensive water resources management plan to determine water supply allocations, including future demands in the Savannah River basin. The study will also examine flood control, drought contingency, hydropower, water quality, habitat, aquatic plant control, and recreation issues **(USACE 2006)**. As part of their comprehensive water management scenarios, a revised drought management plan is now actively considered, which would increase the low flow release through J. Strom Thurmond Dam under some drought conditions **(USACE 2006c)**.

#### 2.3.2.1.2 Surface Water Use for VEGP Units 3 and 4

VEGP Units 3 and 4 will use Westinghouse AP1000 (AP1000) reactor plants for power generation. The only use of water from the Savannah River for the AP1000 units will be for the circulating water system/turbine plant cooling water system makeup, where river water will be required to replace cooling tower evaporative water losses, drift losses, and blowdown discharge. Under normal operating conditions and design ambient conditions, river water demand for the two AP1000 units will be 82.9 cfs (37,224 gpm). The maximum water requirement for plant operation will be 128.7 cfs (57,784 gpm) for the two units. Depending on the cycles of concentration at which the cooling tower is operated, approximately 50-75 percent of the cooling tower makeup flow will be to replace water lost to evaporation. The total cooling tower blowdown volume would likely vary between approximately 25 and 50 percent of the makeup flow. Further detailed discussion on plant water use for VEGP Units 3 and 4 is provided in Section 3.3.1. Water use diagrams for the new VEGP units are shown in Figure 3.3-1 and Figure 3.3-2. Components of the conceptually-designed intake system are described in Section 3.4.2.

The new AP1000 reactor plants will have a grade elevation of approximately 220 ft msl. The radiological effluent holdup tanks will be located at the lowest level of the AP1000 auxiliary building. The floor elevation of the auxiliary building is approximately 186.5 ft msl, which is approximately 25 to 30 ft above the water table. Consequently, direct release of radiological effluents in to the surface water system is very unlikely. As described in ESP SSAR Section 2.4.13, accidental radionuclide release to surface water would be through the groundwater system moving northward to Mallard Pond, which drains to the Savannah River northeast of the VEGP site. The nearest surface water users downstream from the VEGP site on the Savannah River include Fort James Operating Company and GPC located in Effingham County, Georgia, approximately 106 River Miles from the VEGP site, as shown in Table 2.3.2-2.

Non-radiological effluents from VEGP Units 3 and 4 will consist of cooling tower blowdown and other wastewater streams and will be discharged into the Savannah River through a pipe at a location downstream from the discharge location for existing VEGP Units 1 and 2. The discharge system described in Section 3.4 will be designed to meet federal, state and USACE regulatory and design guidelines for effluent discharge and navigation and maintenance criteria. The nearest users of surface water downstream from the effluent discharge location include Fort James Operating Company and GPC approximately 106 River Miles from the VEGP site, as shown in Table 2.3.2-2.

### 2.3.2.2 Groundwater Use

The majority of Georgia's groundwater use occurs in the Coastal Plain Physiographic Province. Groundwater is withdrawn from both unconfined, shallow aquifer systems and deeper, confined aquifer systems. These aquifers are recharged principally in their outcrop areas along the western boundary of the province and from localized infiltration of precipitation within the province. Precipitation migrates downward and laterally through the unconsolidated surficial materials for discharge to nearby streams and low areas, or percolates vertically downward into the deeper unconsolidated and consolidated material. The thickness and areal extent of the Coastal Plain sediments result in a storage capacity for groundwater that exceeds that of any other physiographic province in Georgia **(Miller 1990)**.

Within the Savannah River basin, as of September 2005, 72 facilities were registered for groundwater withdrawal activities in Georgia **(Georgia DNR 2006)**. Table 2.3.2-5 identifies the permitted groundwater users, permitted withdrawal rates, number of wells, and source aquifers within 50 mi of the VEGP site in Georgia, excluding those for irrigation use. In South Carolina, 43 facilities consisting of 158 groundwater wells were registered in 2004 **(SC DHEC 2005)**. The water withdrawal locations for groundwater wells within the Savannah River basin and within 50 mi of the VEGP site are shown in Figure 2.3.2-6. County-wide groundwater use data within the river basin in South Carolina are presented in Table 2.3.2-6 for 2004 for the counties within

50 mi of the VEGP site. A county-wide summary of groundwater use for irrigation is provided in Table 2.3.2-7 for Georgia within 50 mi of the VEGP site. The table also shows the range of groundwater well depths and diameters, and total permitted withdrawal rates in the counties. There were no permitted irrigation water wells in Glascock County.

No sole-source aquifers are designated within the 200-mi radius of the site **(EPA 2006a)**.

#### 2.3.2.2.1 Local Use

Present groundwater uses within 25 mi of the VEGP site are primarily municipal, industrial, and agricultural. Most of the groundwater wells withdraw water from the Cretaceous aquifer. Apart from water withdrawals for VEGP Units 1 and 2, the immediate area near the VEGP site has mainly domestic users, with no large users nearby. The nearest domestic well is located just west of the VEGP site across River Road.

The Georgia EPD issues permits for industrial, municipal and agricultural wells having average daily withdrawals that exceed 100,000 gpd during any single month. Table 2.3.2-8 lists the permitted groundwater users, aquifer and withdrawal rates, and annual average withdrawal rates for municipal and industrial wells within 25 mi of the VEGP site and permitted by the Georgia EPD. Table 2.3.2-9 lists similar data for agricultural wells within 25 mi of the VEGP site and permitted by the Georgia EPD. The Safe Drinking Water Information System (SDWIS) maintained by the US EPA lists community, non-transient non-community, and transient non-community water systems that serve the public. Community water systems are defined as those that serve the same people year-round (e.g., in homes or businesses). Non-transient non-community water systems are those that serve the same people, but not year-round (e.g., schools that have their own water system). Transient non-community water systems are those that do not consistently serve the same people (e.g., rest stops, campground, gas stations). Table 2.3.2-10 lists the community, non-transient non-community, and transient non-community water systems using groundwater as their primary water source within 25 mi of the VEGP site.

The locations of the agricultural, industrial, and municipal wells permitted by the Georgia EPD along with the public water system wells listed in the SDWIS database within 25 mi of the VEGP site are shown in Figure 2.3.2-7. (Note that wells currently serving existing VEGP Units 1 and 2 are not shown on Figure 2.3.2-7; these wells are discussed in Section 2.3.2.2.2, Onsite Use.) These data indicate the nearest permitted agricultural well (William Hatcher, A-28 to be about 3.4 mi northwest of the VEGP site, while the nearest permitted industrial well (International Paper, I-1) is about 8.5 mi northwest of the site. The nearest municipal well (City of Waynesboro, M-1) is seen to be about 14.5 mi west-southwest of the VEGP site. The nearest SDWIS-listed well (Dealigle Mobile Home Park, C-6) is about 4.9 mi southwest of the VEGP site. These wells are sufficiently distant from the VEGP site such that pumping these wells would have no effect on groundwater levels at the VEGP site. The recharge areas for the source aquifers for the nearest Georgia EPD-permitted wells are in their outcrop areas located up-gradient of the VEGP site and beyond the influence of the new units.

Regionally, projected overall water use is expected to increase through 2035 for Burke County. Surface water usage is increasing; however, it is increasing at a much slower rate than groundwater usage, approximately 5 percent versus 17 percent. Burke County's water usage, including both surface and groundwater, is projected to be 100 to 120 mgd for 2035 **(Fanning et al. 2003)**. Projections for Burke County total water demand are provided in the Comprehensive Water Supply Management Plan for Burke County and its Municipalities **(Rutherford 2000)**. Assuming current water use usage patterns, daily water demands are projected to nearly double between 2000 and 2050 with 2050 demands projected to be 10.94 mgd for domestic use, 14.73 mgd for industrial use, and 40.96 mgd for agricultural use, which totals 66.63 mgd **(Rutherford 2000)**.

#### 2.3.2.2.2 Onsite Use

Local groundwater use includes domestic wells and wells supplying water to existing VEGP Units 1 and 2. Uses include makeup process water, utility water, potable water, and supply for the fire protection system. Table 2.3.2-11 lists these wells, while Figure 2.3.2-8 identifies their location. Current permitted withdrawal rates are a monthly average of 6 mgd and an annual average of 5.5 mgd, as permitted by the Georgia EPD. Three of the wells are in the Cretaceous aquifer at depths varying from 851 to 884 ft, with design yields of 1,000 to 2,000 gpm. These wells provide makeup water for the plant processes. The remaining six wells extend into the Tertiary aquifer, range in depth from 200 to 370 ft, and have design yields of 20 to 150 gpm. Average annual usage levels for 1999 to 2004 from all wells excluding SEC are from 0.79 to 1.44 mgd **(SNC 2005b)**. The SEC well was added in 2005 and will be included on water usage data for 2006. Recent groundwater usage from June 2005 to December 2005 is in Table 2.3.2-12.

Table 2.3.2-13 shows projected groundwater use for two AP1000 units with normal and maximum usage values. Service water system make-up, potable water system, demineralized water system, fire protection system, and miscellaneous users are the intended uses. Groundwater needed to supply VEGP Units 3 and 4 will be obtained from wells installed in the Tertiary and/or Cretaceous aquifers. The number and depths of the wells will be developed during the COL stage. SNC's groundwater use permit **(SNC 2005a)** will be modified accordingly.

## Table 2.3.2-1 List of Counties Located in the Savannah River Basin and Within 50 Miles of the VEGP Site

| Counties within the Savannah River Basin | | Comments |
|---|---|---|
| **Georgia** | **South Carolina** | |
| McDuffie | | |
| Glascock | | A small area is within the river basin |
| Columbia | | |
| Jefferson | | A small area is within the river basin |
| Richmond | | |
| Burke | | |
| Jenkins | | A small area is within the river basin |
| Screven | | |
| Effingham | | A small area is within 50-mi radius |
| | McCormick | A small area is within 50-mi radius |
| | Edgefield | |
| | Aiken | |
| | Barnwell | |
| | Allendale | |
| | Hampton | |
| | Jasper | A small area is within the river basin and 50 mi radius |

## Table 2.3.2-2 Registered Surface Water Users in the Savannah River Basin Within the State of Georgia

| Serial No. | County | Facility | Municipal/ Industrial[1] | Source Water | Max Daily Withdrawal (mgd)[2] | Monthly Average (mgd) | Approximate Location |
|---|---|---|---|---|---|---|---|
| 1 | Banks | Banks County Board of Commissioners | M | Mtn. Cr. Res. Strctr 11 | 1.00 | 1.00 | Tributary to the Broad River[a] |
| 2 | Burke | Southern Nuclear Operating Co., Inc. | I | Savannah River | 127.00 | 85.00 | River Mile 151.1 |
| 3 | Burke | Waynesboro, City of | M | Brier Creek | 1.50 | 1.00 | The Brier Creek[b] |
| 4 | Chatham | International Paper Corporation | I | Savannah River | 58.00 | 50.00 | Between River Miles 8.0 and 29.0 |
| 5 | Chatham | Kerr-McGee Chemical, LLC | I | Savannah River | 30.00 | 20.00 | Between River Miles 8.0 and 29.0 |
| 6 | Chatham | Georgia Power Co-Riverside | I | Savannah River | 174.00 | 174.00 | Between River Miles 8.0 and 29.0 |
| 7 | Chatham | Georgia Power Co-Pt Wentworth | I | Savannah River | 267.00 | 267.00 | Between River Miles 8.0 and 29.0 |
| 8 | Chatham | Weyerhauser Company | I | Savannah River | 30.50 | 27.50 | Between River Miles 8.0 and 29.0 |
| 9 | Chatham | Weyerhauser Company | I | Savannah River | 60.00 | 30.00 | Between River Miles 8.0 and 29.0 |
| 10 | Columbia | Columbia County Water System | M | J.S. Thurmond[3] Reservoir | 8.00 | 8.00 | From J.S. Thurmond Reservoir[c] |
| 11 | Columbia | Columbia County Water System | M | Stevens Creek Reservior | 31.00 | 31.00 | Approximate River Mile 210.0 |
| 12 | Effingham | Fort James Operating Company | I | Savannah River | 35.00 | 35.00 | Approximate River Mile 45.0 |
| 13 | Effingham | Georgia Power Co-McIntosh | I | Savannah River | 130.00 | 130.00 | Approximate River Mile 45.0 |
| 14 | Effingham | Savannah Ind. & Domestic Water | M | Abercorn Creek | 55.00 | 50.00 | Aabercorn Creek[d] |
| 15 | Elbert | Elberton, City of | M | Beaverdam Creek | 2.20 | 1.70 | Beaverdam Creek[e] |
| 16 | Elbert | Elberton, City of | M | Lake Russell | 4.10 | 3.70 | Beaverdam Creek[e] |
| 17 | Franklin | Lavonia, City of | M | Crawford Creek | 1.50 | 1.50 | Tributary to the Broad River[a] |
| 18 | Franklin | Lavonia, City of | M | Lake Hartwell | 3.00 | 3.00 | Hartwell Reservoir[f] |
| 19 | Franklin | Royston, City of | M | N Fork of Broad River | 1.00 | 1.00 | The Broad River[a] |
| 20 | Greene | Union Point, City of | M | Sherrill Cr Reservoir | 0.45 | 0.33 | Tributary to the Little River, GA[g] |
| 21 | Hart | Hartwell, City of | M | Lake Hartwell | 4.50 | 3.50 | Hartwell Reservoir[f] |
| 22 | Jackson | Commerce, City of | M | Grove Creek | 4.50 | 4.20 | Tributary to the Broad River[a] |

## Table 2.3.2-2 (cont.) Registered Surface Water Users in the Savannah River Basin Within the State of Georgia

| Serial No. | County | Facility | Municipal/ Industrial[1] | Source Water | Max Daily Withdrawal (mgd)[2] | Monthly Average (mgd) | Approximate Location |
|---|---|---|---|---|---|---|---|
| 23 | Jefferson | J M Huber Corp - Reedy Creek | I | Reedy Creek | 5.80 | 4.00 | Tributary to the Brier Creek[b] |
| 24 | Lincoln | Lincolnton, City of | M | J.S. Thurmond Reservoir | 0.63 | 0.63 | J.S. Thurmond Reservoir[c] |
| 25 | Madison | Turner Concrete Company, Incorporated | I | Broad River | 0.60 | 0.30 | The Broad River[a] |
| 26 | Mcduffie | Thomson-McDuffie County W/S Commission | M | J.S. Thurmond Reservoir | 3.00 | 2.00 | J.S. Thurmond Reservoir[c] |
| 27 | Mcduffie | Thomson-McDuffie County W/S Commission | M | Usry's Lake | 2.00 | 1.50 | Tributary to the Brier Creek[b] |
| 28 | Oglethorpe | Crawford, City of | M | Trib To Long Creek | 0.43 | 0.25 | Tributary to the Broad River[a] |
| 29 | Rabun | Clayton-Rabun Co. Water & Sewer Authority | M | Lake Rabun | 2.00 | 2.00 | Close to the border with North Carolina |
| 30 | Richmond | Augusta-Richmond County | M | Augusta Canal | 50.00 | 45.00 | Between River Miles 187 and 210 |
| 31 | Richmond | Augusta-Richmond County | M | Savannah River | 21.00 | 15.00 | Between River Miles 187 and 210 |
| 32 | Richmond | Avondale Mills - Augusta Canal | I | Augusta Canal | 1.44 | 0.65 | Between River Miles 187 and 210 |
| 33 | Richmond | DSM Chemicals Augusta, Iinc. | I | Savannah River | 8.20 | 6.80 | Between River Miles 187 and 210 |
| 34 | Richmond | Fort Gordon - Butler Creek | I | Butler Creek | 5.40 | 5.00 | Between River Miles 187 and 210 |
| 35 | Richmond | Fort Gordon - Cow Branch | I | Cow Branch | 0.70 | 0.60 | Between River Miles 187 and 210 |
| 36 | Richmond | Fort Gordon - Lietner Lake | I | Lietner Lake | 0.50 | 0.40 | Between River Miles 187 and 210 |
| 37 | Richmond | Fort Gordon - Union Mill Pond | I | Union Mill Pond | 0.25 | 0.20 | Between River Miles 187 and 210 |
| 38 | Richmond | General Chemical Corp., Augusta Plant | I | Savannah River | 5.65 | 5.30 | Between River Miles 187 and 210 |
| 39 | Richmond | International Paper - Augusta Mill | I | Savannah River | 79.00 | 72.00 | Between River Miles 187 and 210 |
| 40 | Richmond | PCS Nitrogen Fertilizer, L.P | I | Savannah River | 21.60 | 10.80 | Between River Miles 187 and 210 |
| 41 | Stephens | Toccoa, City of | M | Lake Yonah | 6.00 | 6.00 | Tributary to the Tugaloo River[h] |
| 42 | Stephens | Toccoa, City of - Lake Toccoa | M | Lake Toccoa | 9.00 | 9.00 | Tributary to the Tugaloo River[h] |
| 43 | Warren | J M Huber Corp -Brier Creek | I | Brier Creek | 5.00 | 2.50 | The Brier Creek[b] |

## Table 2.3.2-2 (cont.) Registered Surface Water Users in the Savannah River Basin Within the State of Georgia

| Serial No. | County | Facility | Municipal/ Industrial[1] | Source Water | Max Daily Withdrawal (mgd)[2] | Monthly Average (mgd) | Approximate Location |
|---|---|---|---|---|---|---|---|
| 44 | Warren | Thiele Kaolin Company | I | Newsome's Mill Pond | 0.75 | 0.50 | Tributary to the Brier Creek[b] |
| 45 | Wilkes | Washington, City of - Clarks Hill | M | J.S. Thurmond Reservoir | 2.20 | 2.00 | J.S. Thurmond Reservoir[c] |
| 46 | Wilkes | Washington, City of - Old Plant | M | Little Beaverdam Cr | 2.20 | 1.80 | Tributary to the Little Rive, GA[g] |

[1] M = Municipal; I =Industrial

[2] (mgd) million gallons per day

[3] J. Strom Thurmond

[a] Confluence of the Broad River with the Savannah River is at River Mile 269.6

[b] Confluence of the Brier Creek with the Savannah River is at River Mile 102.5

[c] J. Storm Thurmond Dam located at River Mile 221.6

[d] Abercorn Creek mouth at River Mile 29.0

[e] The Beaverdam Creek is tributary to Richard B. Russell Reservoir; the Richard B. Russell Dam is located at River Mile 259.1

[f] Hartwell Dam located at River Mile 288.9

[g] Mouth of the Little River at River Mile 223.4

[h] Tugaloo River fork at River Mile 312.1

Location Source: Georgia DNR 2006; Fanning 2003; and USACE 1996

Source: Georgia DNR 2006

## Table 2.3.2-3 County-wise Surface Water Withdrawals, in Million Gallons Per Day (mgd), for Different Consumptive Surface Water Use Categories Within the State of South Carolina for 2004

| Serial No. | County | Agriculture | Golf Course | Industrial | Water Supply | Thermo-electric | Total | Comments |
|---|---|---|---|---|---|---|---|---|
| 1 | Greenville | 0.00 | 0.00 | 0.00 | 18.89 | 0.00 | 18.89 | |
| 2 | Pickens | 0.00 | 0.19 | 8.32 | 3.26 | 0.00 | 11.77 | |
| 3 | Oconee | 0.09 | 0.28 | 1.84 | 9.78 | 5891.37 | 5,903.36 | Thermoelectric water use is for once-through cooling in the Oconee Nuclear Power Plant |
| 4 | Anderson | 0.00 | 0.25 | 0.16 | 18.34 | 0.80 | 19.54 | |
| 5 | Abbeville | 0.00 | 0.00 | 0.00 | 2.78 | 0.00 | 2.78 | |
| 6 | Greenwood | 0.00 | 0.06 | 0.00 | 0.00 | 0.00 | 0.06 | |
| 7 | McCormick | 0.00 | 0.11 | 0.00 | 1.15 | 0.00 | 1.26 | |
| 8 | Edgefield | 0.19 | 0.12 | 0.00 | 4.22 | 0.00 | 4.53 | |
| 9 | Aiken | 0.00 | 0.49 | 3.42 | 3.99 | 0.00 | 7.90 | |
| 10 | Barnwell | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 11 | Allendale | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 12 | Hampton | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | |
| 13 | Jasper | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 14 | Beaufort | 0.00 | 0.00 | 0.00 | 19.62 | 0.00 | 19.62 | |

Note: mgd values are obtained from the reported annual total water use.

Source: SC DHEC 2005

## Table 2.3.2-4 Annual Surface Water Use Within 6 Miles of the VEGP Site

| **Location** | **VEGP (mgd)** | | | | **SRS (mgd)** | **D-Area Power house (mgd)** | | | | **Urquhart Station (mgd)** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **2004** | | **2003** | | **2004** | **2004** | | **2005** | | **2004** | | **2005** | |
| **Month** | Monthly Avg. | Daily Max. | Monthly Avg. | Daily Max. | Monthly Avg. | Monthly Avg. | Daily Max. | Monthly Avg. | Daily Max. | Monthly Avg. | Daily Max. | Monthly Avg. | Daily Max. |
| January | 63.4 | 63.4 | 63.4 | 63.4 | 2.9 | | | 37.3 | 40.1 | | | 96.0 | 190.0 |
| February | 64.0 | 75.6 | 63.3 | 66.3 | 2.9 | | | 45.6 | 55.6 | | | 78.0 | 78.0 |
| March | 64.5 | 70.8 | 63.8 | 70.0 | 2.9 | | | 49.1 | 58.8 | | | 70.0 | 78.0 |
| April | 66.8 | 80.6 | 64.0 | 71.0 | 2.9 | | | 56.6 | 66.6 | | | 78.0 | 78.0 |
| May | 64.1 | 68.9 | 65.2 | 75.6 | 2.9 | | | 47.1 | 63.3 | | | 78.0 | 78.0 |
| June | 63.5 | 67.3 | 63.9 | 67.0 | 2.9 | 60.8 | 65.0 | | | 80.0 | 134.0 | | |
| July | 64.1 | 68.8 | 65.0 | 74.8 | 2.9 | 43.1 | 53.6 | | | 103.0 | 190.0 | | |
| August | 64.3 | 71.3 | 55.2 | 76.2 | 2.9 | 36.3 | 37.5 | | | 91.0 | 190.0 | | |
| September | 63.8 | 71.9 | 67.6 | 78.1 | 2.9 | 38.5 | 43.3 | | | 83.0 | 190.0 | | |
| October | 63.4 | 65.7 | 63.4 | 63.5 | 2.9 | 36.2 | 38.8 | | | 82.0 | 134.0 | | |
| November | 63.8 | 69.8 | 63.8 | 70.5 | 2.9 | 42.6 | 53.6 | | | 75.0 | 134.0 | | |
| December | 64.3 | 74.2 | 63.4 | 63.4 | 2.9 | 37.4 | 40.7 | | | 75.0 | 78.0 | | |

## Table 2.3.2-5 Registered Groundwater Users in the Savannah River Basin Within 50 Miles of the VEGP Site in Georgia

| Serial No. | COUNTY | PERMIT USER NAME | PERMIT EXPN. DATE | PERMITTED MONTHLY AVG W/D (mgd)[1] | PERMITTED YEARLY AVG W/D (mgd) | # OF WELLS | PERMITTED AQUIFER |
|---|---|---|---|---|---|---|---|
| 1 | Burke | Waynesboro, City of | 21-Dec-07 | 4.00 | 3.50 | 3 | Cretaceous Sand |
| 2 | Burke | Southern Nuclear Operating Co-Plant Vogtle | 6-Aug-10 | 6.00 | 5.50 | 8 | Cretaceous Sand |
| 3 | Burke | International Paper - McBean Woodyard | 2-Oct-08 | 0.95 | 0.95 | 2 | Cretaceous Sand |
| 4 | Burke | Sardis, City of | 31-Oct-13 | 0.40 | 0.40 | 2 | Cretaceous Sand |
| 5 | Columbia | Harlem, City of | 21-Dec-14 | 0.28 | 0.25 | 4 | Crystalline Rock |
| 6 | Columbia | Grovetown, City of | 18-Apr-15 | 0.90 | 0.90 | 4 | Crystalline Rock |
| 7 | Columbia | Columbia County Water Department | 22-Dec-06 | 0.58 | 0.58 | 1 | Crystalline Rock |
| 8 | Columbia | Southern Beverage Packers, Inc | 10-Nov-12 | 0.14 | 0.14 | 7 | Crystalline Rock |
| 9 | Effingham | Rincon, City of | 31-Dec-05[a] | 1.25 | 0.87 | 4 | Floridan |
| 10 | Effingham | Springfield, City of | 31-Dec-05[a] | 0.40 | 0.38 | 2 | Floridan |
| 11 | Effingham | Georgia Power Co - Plant McIntosh | 31-Dec-05[a] | 0.55 | 0.45 | 2 | Floridan |
| 12 | Effingham | Fort James Operating Company | 31-Dec-05[a] | 4.00 | 3.00 | 5 | Floridan |
| 13 | Effingham | Lost Plantation Golf Course | 31-Dec-05[a] | 0.40 | 0.40 | 1 | Floridan |
| 14 | Effingham | Springfield, City of - Effingham county Industrial Development Authority | 31-Dec-05[a] | 0.40 | 0.40 | 2 | Floridan |
| 15 | Effingham | Coastal Water & Sewerage Company | 31-Dec-05[a] | 0.30 | 0.30 | 2 | Floridan |
| 16 | Effingham | Effingham Conty Board of Commissioners | 31-Dec-05[a] | 0.12 | 0.12 | 3 | Floridan |
| 17 | Glascock | Thiele Kaolin Co - Reedy Creek Plant | 23-Jan-15 | 0.10 | 0.10 | 2 | Barnwell (Eocene Age) |
| 18 | Jefferson | J.M. Huber Corp - Wrens Plant | 26-Sep-14 | 1.87 | 1.69 | 4 | Dublin - Midville |
| 19 | Jefferson | Wrens, City of | 21-Aug-15 | 0.80 | 0.65 | 4 | Cretaceous Sand |
| 20 | Jefferson | J.M. Huber Corp - Wrens Plant | 10-Mar-11 | 0.70 | 0.60 | 2 | Cretaceous Sand |
| 21 | Richmond | Prayon, Inc | 29-Aug-14 | 0.42 | 0.38 | 2 | Cretaceous Sand |
| 22 | Richmond | Hephzibah, City of | 1-Oct-10 | 1.20 | 1.20 | 3 | Cretaceous Sand |

**Table 2.3.2-5 (cont.) Registered Groundwater Users in the Savannah River Basin Within 50 Miles of the VEGP Site in Georgia**

| Serial No. | COUNTY | PERMIT USER NAME | PERMIT EXPN. DATE | PERMITTED MONTHLY AVG W/D (mgd)[1] | PERMITTED YEARLY AVG W/D (mgd) | # OF WELLS | PERMITTED AQUIFER |
|---|---|---|---|---|---|---|---|
| 23 | Richmond | Augusta-Richmond Utilities Department | 29-Jan-05[b] | 18.40 | 17.40 | 31 | Cretaceous Sand |
| 24 | Richmond | East Central Regional Hospital - Gracewood Campus | 19-Mar-06 | 0.50 | 0.40 | 4 | Cretaceous Sand |
| 25 | Richmond | Olin Corporation | 25-Apr-15 | 1.22 | 1.22 | 2 | Cretaceous Sand |
| 26 | Richmond | Thermal Ceramics, Inc. | 6-Mar-15 | 0.90 | 0.90 | 5 | Cretaceous Sand |
| 27 | Richmond | Pine Hill W&S / Bought by Richmond County | 12-Dec-99[b] | | | | Cretaceous Sand |
| 28 | Richmond | Procter & Gamble Manufacturing Company | 21-Mar-08 | 0.70 | 0.70 | 2 | Cretaceous Sand |
| 29 | Richmond | Olin Corporation - Corrective Action Wells | 23-Jul-06 | 0.91 | 0.91 | 15 | Cretaceous Sand, KT-3, KT-1 |
| 30 | Richmond | Alternate Energy Resources, Inc | 27-Sep-07 | 0.43 | 0.43 | 15 | Cretaceous Sand (Upper) |
| 31 | Richmond | Southern Wood Piedmont Company | 13-Nov-10 | 0.65 | 0.65 | 12 | Cretaceous Sand (Gaillard) |
| 32 | Richmond | Fort Gordon - Department of the Army | 12-Oct-11 | 0.15 | 0.15 | 12 | Crystalline Rock, Cretaceous Sand |
| 33 | Screven | Sylvania, City of | 7-Jan-07 | 1.50 | 1.30 | 4 | Floridan |

[1] (mgd) million gallons per day
[a] Information updated as of September 2005
[b] Water used not specified as expired

Source: Georgia DNR 2006

**Table 2.3.2-6 Groundwater Withdrawals for 2004, in Million Gallons Per Day (mgd), within South Carolina Part of the Savannah River Basin and within 50 Miles of the VEGP Site by Different Counties and for Different Consumptive Water Use Categories**

| Serial No. | County | Agriculture | Golf Course | Industrial | Water Supply | Mining | Total |
|---|---|---|---|---|---|---|---|
| 1 | Edgefield | 0.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.21 |
| 2 | Aiken | 0.01 | 0.08 | 3.62 | 10.80 | 0.08 | 14.59 |
| 3 | Barnwell | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.15 |
| 4 | Allendale | 1.94 | 0.00 | 2.43 | 0.00 | 0.00 | 4.37 |
| 5 | Hampton | 0.36 | 0.08 | 0.00 | 0.34 | 0.00 | 0.78 |
| 6 | Jasper | 0.14 | 0.00 | 0.00 | 0.26 | 0.00 | 0.40 |

Note: mgd values are obtained from the reported annual total water use.

Source: SC DHEC 2005

**Table 2.3.2-7 Groundwater Withdrawals, in Million Gallons per Day (mgd), for Irrigation Use within Georgia Part of the Savannah River Basin and within 50 Miles of the VEGP Site by Different Counties**

| County | State | No. of Permitted Wells | Well Depth Range (ft) | | Well Diameter (in.) | | Total Permitted Withdrawal (mgd) |
|---|---|---|---|---|---|---|---|
| | | | Min. | Max. | Min. | Max. | |
| Burke | GA | 87 | 58 | 640 | 4 | 18 | 122.2 |
| Columbia | GA | 8 | 100 | 285 | 3 | 6 | 0.8 |
| Jefferson | GA | 60 | 200 | 598 | 4 | 18 | 92.7 |
| Jenkins | GA | 55 | 120 | 650 | 4 | 16 | 53.8 |
| McDuffie | GA | 17 | 150 | 410 | 6 | 8 | 3.4 |
| Richmond | GA | 6 | 170 | 340 | 4 | 6 | 1.1 |
| Screven | GA | 133 | 110 | 750 | 4 | 16 | 140.8 |

## Table 2.3.2-8 Georgia EPD Permitted Municipal and Industrial Groundwater Use Within 25 Miles of the VEGP Site

| Well ID | Permit Holder | County | Aquifer | Year | Permitted Monthly Average, gpm (mgpd) | Permitted Annual Average, gpm (mgpd) | Average Annual Water Use, gpm (mgpd) |
|---|---|---|---|---|---|---|---|
| C-2 | City of Sardis | Burke | Floridan | 2004 | 278 (0.40) | 278 (0.40) | 63 (0.09) |
| | | | | 2005 | 278 (0.40) | 278 (0.40) | NA |
| C-12 | East Central Regional Hospital - Gracewood Campus | Richmond | Cretaceous Sand | 2004 | 347 (0.50) | 278 (0.40) | 146 (0.21) |
| | | | | 2005 | NA | NA | 76 (0.11) |
| C-13 | City of Hephzibah | Richmond | Cretaceous Sand | 2004 | 833 (1.20) | 833 (1.20) | 160 (0.23) |
| | | | | 2005 | NA | NA | 236 (0.34) |
| C-19 | Olin Corporation | Richmond | Cretaceous Sand | 2004 | 847 (1.22) | 847 (1.22) | 514 (0.74) |
| | | | | 2005 | NA | NA | 486 (0.70) |
| C-19 | Olin Corporation - Corrective Action Wells | Richmond | Cretaceous Sand | 2004 | 632 (0.91) | 632 (0.91) | 229 (0.33) |
| | | | | 2005 | NA | NA | 250 (0.36) |
| I-1 | International Paper | Burke | Cretaceous Sand | 2004 | 660 (0.95) | 660 (0.95) | 181 (0.26) |
| | | | | 2005 | 660 (0.95) | 660 (0.95) | 35 (0.05) |
| I-2 | Prayon, Inc | Richmond | Cretaceous Sand | 2004 | 292 (0.42) | 264 (0.38) | 35 (0.05) |
| | | | | 2005 | NA | NA | 63 (0.09) |
| I-3 | Thermal Ceramics, Inc. | Richmond | Cretaceous Sand | 2004 | 625 (0.90) | 625 (0.90) | 313 (0.45) |
| | | | | 2005 | NA | NA | 208 (0.30) |
| I-4 | Procter & Gamble Manufacturing Company | Richmond | Cretaceous Sand | 2004 | 486 (0.70) | 486 (0.70) | 278 (0.40) |
| | | | | 2005 | NA | NA | 243 (0.35) |
| I-5 | Southern Wood Piedmont Company | Richmond | Cretaceous Sand | 2004 | 451 (0.65) | 451 (0.65) | 188 (0.27) |
| | | | | 2005 | NA | NA | 174 (0.25) |
| M-1 | City of Waynesboro | Burke | Cretaceous Sand | 2004 | 2778 (4.00) | 2431 (3.50) | NA |
| | | | | 2005 | 2778 (4.00) | 2431 (3.50) | NA |
| M-2 | Augusta-Richmond Utilities Department | Richmond | Cretaceous Sand | 2004 | 12778 (18.40) | 12083 (17.40) | 8285 (11.93) |
| | | | | 2005 | NA | NA | 8.40 |
| | Southern Nuclear Operating Co. | Burke | Cretaceous Sand | 2004 | 4167 (6.00) | 3819 (5.50) | 556 (0.80) |
| | | | | 2005 | 4167 (6.00) | 3819 (5.50) | 583 (0.84) |

Notes: NA – not available
Groundwater permit and usage data **(Voudy 2006)**
Groundwater aquifer description **(Georgia DNR 2006)**
Well locations are labeled on Figure 2.3.2-7 using the listed Well IDs.
Southern Nuclear Operating Co. well locations are shown on Figure 2.3.2-8.

## Table 2.3.2-9 Georgia EPD Permitted Agricultural Groundwater Use Within 25 Miles of the VEGP Site

| Well ID | Permit Holder | County | Depth (ft) | Permit (gpm) |
|---|---|---|---|---|
| A-1 | ANDERSON JOHN | Burke | 363 | 1500 |
| A-2 | BLANCHARD HENRY | Burke | 500 | 1200 |
| A-3 | BLANCHARD HENRY | Burke | 450 | 1400 |
| A-4 | BOLLWEEVIL PLANATION | Burke | 300 | 190 |
| A-5 | Chance Bill | Burke | 500 | 450 |
| A-6 | CHANDLER FARM | Burke | 580 | 1600 |
| A-7 | Chandler Michael | Burke | 556 | 2400 |
| A-8 | Chandler Randall | Burke | 579 | 2500 |
| A-9 | COCHRAN IRBY | Burke | 420 | 1350 |
| A-10 | COLLINS ROBERT | Burke | 430 | 1350 |
| A-11 | COLLINS ROBERT | Burke | 530 | 1200 |
| A-12 | COLLINS ROBERT | Burke | 480 | 1100 |
| A-13 | COLLINS ROBERT | Burke | 440 | 1100 |
| A-14 | Collins Robert | Burke | 490 | 1700 |
| A-15 | DIXON CARL | Burke | 600 | 2000 |
| A-16 | DIXON JAMES | Burke | 210 | 400 |
| A-17 | DIXON JAMES | Burke | 200 | 200 |
| A-18 | DIXON JOANNE | Burke | 640 | 1150 |
| A-19 | DIXON PERCY | Screven | 560 | 2000 |
| A-20 | DIXON PERCY | Burke | 560 | 2000 |
| A-21 | DIXON PERCY | Burke | 350 | 115 |
| A-22 | DIXON PERCY | Burke | 350 | 115 |
| A-23 | DIXON PERCY | Burke | 550 | 3400 |
| A-24 | DIXON PERCY | Burke | 350 | 200 |
| A-25 | DIXON PERCY | Burke | 575 | 2500 |
| A-26 | DIXON PERCY | Burke | 550 | 2500 |
| A-27 | GWR Partnership LLP | Burke | 360 | 200 |
| A-28 | Hatcher William | Burke | 300 | 500 |
| A-29 | HEATH CLAXTON | Burke | 300 | 150 |
| A-30 | HEATH CLAXTON | Burke | 400 | 250 |
| A-31 | HEATWOLE BYARD | Burke | 325 | 200 |
| A-32 | HOPKINS HENRY | Burke | 363 | 350 |
| A-33 | Horst Isaac | Burke | 260 | 250 |
| A-34 | MALLARD CLYDE | Burke | 320 | 400 |
| A-35 | MALLARD CLYDE MALLARD FARMS | Burke | 210 | 250 |
| A-36 | MALLARD J. | Burke | 200 | 150 |
| A-37 | McGregor Charles | Burke | 430 | 350 |
| A-38 | MOBLEY DANNY | Burke | 396 | 350 |
| A-39 | Mobley Danny | Burke | 424 | 650 |
| A-40 | MOBLEY HERBERT | Burke | 465 | 1100 |
| A-41 | MOBLEY HERBERT | Burke | 500 | 1250 |
| A-42 | MOBLEY JAMES F. | Burke | 572 | 2000 |
| A-43 | PENNINGTON FARMS- INC. | Burke | 240 | 250 |
| A-44 | RAYMOND NEIL | Burke | 430 | 1350 |

## Table 2.3.2-9 (cont.) Georgia EPD Permitted Agricultural Groundwater Use Within 25 Miles of the VEGP Site

| Well ID | Permit Holder | County | Depth (ft) | Permit (gpm) |
|---|---|---|---|---|
| A-45 | Shepherd Joseph | Burke | 421 | 1500 |
| A-46 | SMART DARRELL | Burke | 300 | 350 |
| A-47 | SMART DARRELL | Burke | 300 | 350 |
| A-48 | SMART DARRELL | Burke | 300 | 350 |
| A-49 | SMART DARRELL | Burke | 300 | 400 |
| A-50 | MIMS JOHN | Jenkins | 445 | 1500 |
| A-51 | MIMS JOHN | Jenkins | 460 | 1500 |
| A-52 | MULKEY A. | Jenkins | 300 | 1000 |
| A-53 | MULKEY A. | Jenkins | 400 | 500 |
| A-54 | PARKER GEORGE | Jenkins | 450 | 700 |
| A-55 | PARKER GEORGE | Jenkins | 300 | 450 |
| A-56 | PARKER GEORGE | Jenkins | 300 | 450 |
| A-57 | Parker George | Jenkins | 450 | 450 |
| A-58 | POINTE SOUTH GOLF CLUB- INC. | Richmond | 311 | 400 |
| A-59 | BRAGG SOL | Screven | 380 | 240 |
| A-60 | BRIAR CREEK COUNTRY CLUB | Screven | 180 | 300 |
| A-61 | CAIN BRIAN | Screven | 390 | 600 |
| A-62 | Cain Brian | Screven | 493 | 1100 |
| A-63 | CLEMENT INVESTMENTS | Screven | 282 | 1250 |
| A-64 | FOREHAND FARMS | Screven | 160 | 250 |
| A-65 | Lee Mike | Screven | 480 | 1800 |
| A-66 | Mill Haven Company Inc. | Screven | 600 | 1200 |
| A-67 | MILLHAVEN CO.- INC. | Screven | 553 | 1900 |
| A-68 | MILLHAVEN CO.- INC. | Screven | 565 | 1400 |
| A-69 | NEWTON JAMES | Screven | 350 | 400 |
| A-70 | SOWELL CAROLYN | Screven | 275 | 300 |
| A-71 | STEPONGZI FRANK & PEARL | Screven | 225 | 300 |
| A-72 | THOMPSON JAMES | Screven | 475 | 750 |
| A-73 | THOMPSON ROGER | Screven | 500 | 1000 |
| A-74 | WADE PLANTATION | Screven | 215 | 200 |
| A-75 | WADE PLANTATION | Screven | 250 | 190 |
| A-76 | WADE PLANTATION | Screven | 460 | 1200 |
| A-77 | WADE PLANTATION | Screven | 119 | 1000 |
| A-78 | WADE PLANTATION | Screven | 750 | 1800 |
| A-79 | WADE PLANTATION | Screven | 494 | 900 |
| A-80 | WADE PLANTATION | Screven | 475 | 1200 |
| A-81 | WADE PLANTATION | Screven | 672 | 1100 |
| A-82 | WADE PLANTATION | Screven | 475 | 1100 |
| A-83 | WADE PLANTATION | Screven | 525 | 1400 |
| A-84 | Wade Plantation | Screven | 467 | 1100 |

Notes: Groundwater permit data **(Lewis 2006)**
Well locations are labeled on Figure 2.3.2-7 using the listed Well IDs.

## Table 2.3.2-10 SDWIS Listed Public Water Systems Supplied From Groundwater Within 25 Miles of the VEGP Site in Georgia

| Well ID | Water System ID | Water System Name | County Served | Type | System Status |
|---|---|---|---|---|---|
| C-1 | GA0330000 | Girard | Burke | Community | Active |
| C-2 | GA0330002 | Sardis | Burke | Community | Active |
| C-3 | GA0330013 | Mamie Joe Rhodes Harrison Subdivision | Burke | Community | Closed |
| C-4 | GA0330006 | Burke Academy | Burke | Non-Transient Non-Community | Active |
| C-5 | GA0330022 | Burke County Training Center | Burke | Non-Transient Non-Community | Active |
| C-6 | GA0330020 | Delaigle Mobile Home Park | Burke | Transient Non-Community | Closed |
| C-7 | GA1650000 | Millen | Jenkins | Community | Active |
| C-8 | GA1650001 | Perkins Water Authority | Jenkins | Community | Active |
| C-9 | GA1650006 | Jockey International, Inc. | Jenkins | Non-Transient Non-Community | Active |
| C-10 | GA1650005 | DNR - Magnolia Springs State Pk. | Jenkins | Transient Non-Community | Active |
| C-11 | GA1650008 | National Fish Hatchery | Jenkins | Transient Non-Community | Closed |
| C-12 | GA2450023 | East Central Regional Hospital | Richmond | Community | Active |
| C-13 | GA2450002 | Hephzibah | Richmond | Community | Active |
| C-14 | GA2450017 | Hephzibah - Oakridge | Richmond | Community | Active |
| C-15 | GA2450014 | Mars Trailer Park | Richmond | Community | Active |
| C-16 | GA2450016 | Mobile Home Country Club MHP | Richmond | Community | Active |
| C-17 | GA2450004 | Richmond County | Richmond | Community | Closed |
| C-18 | GA2450159 | Albion Kaolin Company | Richmond | Non-Transient Non-Community | Closed |
| C-19 | GA2450152 | Olin Chemicals | Richmond | Non-Transient Non-Community | Closed |
| C-20 | GA2510000 | Hiltonia | Screven | Community | Active |
| C-21 | GA2510015 | Buck Creek M.H.P. | Screven | Community | Closed |
| C-22 | GA2510052 | Millhaven Plantation | Screven | Community | Closed |
| C-23 | GA2510011 | DOT - Georgia Welcome Center | Screven | Transient Non-Community | Active |
| C-24 | GA2510057 | Savannah River Challenge Program | Screven | Transient Non-Community | Active |
| | GA0330035 | Southern Nuclear - Simulator Bld | Burke | Non-Transient Non-Community | Active |
| | GA0330017 | Southern Nuclear - Vogtle Makeup | Burke | Non-Transient Non-Community | Active |
| | GA0330036 | Southern Nuclear - Vogtle Rec | Burke | Transient Non-Community | Active |

Notes: US EPA SDWIS Database **(EPA 2006b)**
Well locations are labeled on Figure 2.3.2-7 using the listed Well IDs.
Southern Nuclear Operating Co. well locations are shown on Figure 2.3.2-8.

## Table 2.3.2-11 VEGP Water-Supply Well Specifications and Yields[1]

| Water Supply Well No. | Well Depth (ft) | Aquifer | Design Yield (gpm)[2] | Water Use |
|---|---|---|---|---|
| MU-1 [a] | 851 | Cretaceous | 2000 | Make-up water for plant use (e.g. nuclear service cooling water system; make-up to the water treatment plant demineralizer, and potable water source). |
| MU-2A [a] | 884 | Cretaceous | 1000 | Make-up water for plant use (e.g. nuclear service cooling water system; make-up to the water treatment plant demineralizer, and potable water source). |
| TW-1 [a] | 860 | Cretaceous | 1000 | Back-up water for the production make-up well system. |
| SW-5[a] | 200 | Tertiary | 20 | Water supply for old security tactical training area. |
| IW-4 [a] | 370 | Tertiary | 120 | Irrigation water for ornamental vegetation. |
| CW-3 [a] | 220 | Tertiary | | Water supply for nuclear operations garage. |
| REC [a] | 265 | Tertiary | 150 | Potable water supply for recreation area. |
| SB [a] | 340 | Tertiary | 50 | Potable water supply for simulator training building. |
| SEC [b] | 320 | Tertiary | 10 | Non-potable water for lavatory use at a new plant entrance security building |

Note: [1] Well locations, excluding Well REC, are shown on Figure 2.3.2-8. Well REC is located approximately 9300 ft southwest from Well IW-4.

[2] (gpm) gallons per minute

Source:[a] SNC 2005b

[b] SNC 2005a

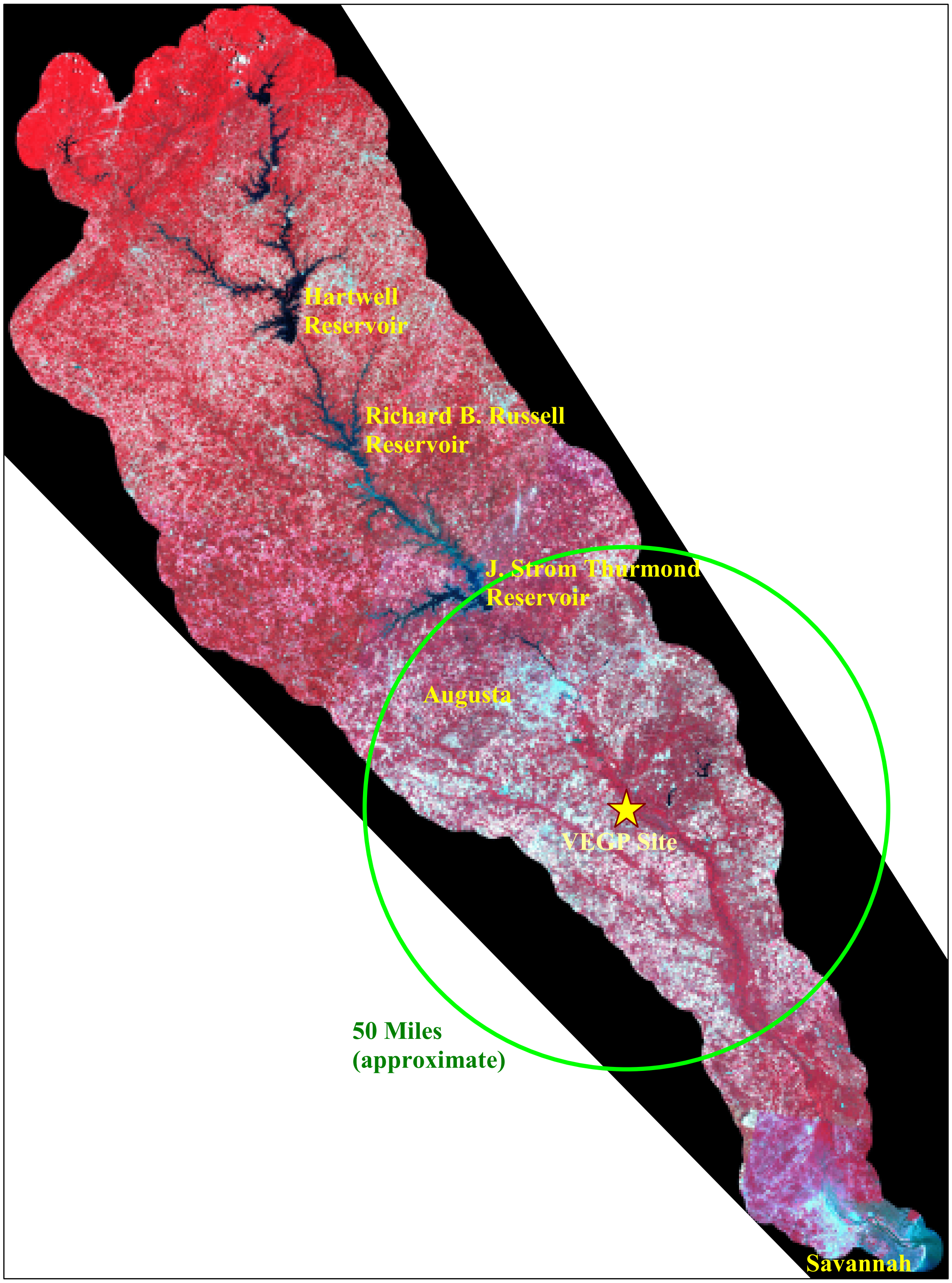
## Table 2.3.2-12 Onsite Groundwater Use by VEGP for 2005, in Thousand Gallons per Month

| Month | Well MU-1 | Well MU-2A | Well TW-1 | Well SW-5 | Well IW-4 | Well CW-3 | Well REC | Well SB |
|---|---|---|---|---|---|---|---|---|
| January | 19,209 | 0 | 0 | 0 | 0 | 3 | 28 | 2 |
| February | 17,416 | 0 | 0 | 0 | 0 | 2 | 50 | 58 |
| March | 21,601 | 0 | 0 | 0 | 0 | 2 | 41 | 54 |
| April | 26,211 | 0 | 0 | 0 | 0 | 1 | 47 | 65 |
| May | 29,648 | 0 | 0 | 0 | 0 | 2 | 67 | 75 |
| June | 35,625 | 0 | 0 | 0 | 14 | 2 | 42 | 83 |
| July | 23,846 | 0 | 0 | 0 | 55 | 2 | 125 | 118 |
| August | 24,560 | 0 | 0 | 0 | 126 | 6 | 104 | 66 |
| September | 28,020 | 0 | 0 | 0 | 134 | 4 | 84 | 69 |
| October | 30,290 | 0 | 0 | 0 | 0 | 3 | 79 | 49 |
| November | 20,282 | 2,880 | 0 | 0 | 0 | 2 | 72 | 104 |
| December | 26,363 | 0 | 0 | 0 | 0 | 2 | 41 | 160 |
| Total | 303,071 | 2,880 | 0 | 0 | 329 | 31 | 779 | 904 |
| Monthly Average | 25,256 | 240 | 0 | 0 | 27 | 3 | 65 | 75 |

## Table 2.3.2-13 Projected Groundwater Use by AP1000, in Gallons per Minute (gpm)

| **Well Water Supply**[a] | **Normal Case (gpm)** | **Maximum Case (gpm)** |
|---|---|---|
| Total well water demand | 752 | 3,140 |
| Power plant makeup water | 215 | 787 |
| Well water for service water system makeup | 537 | 2,353 |

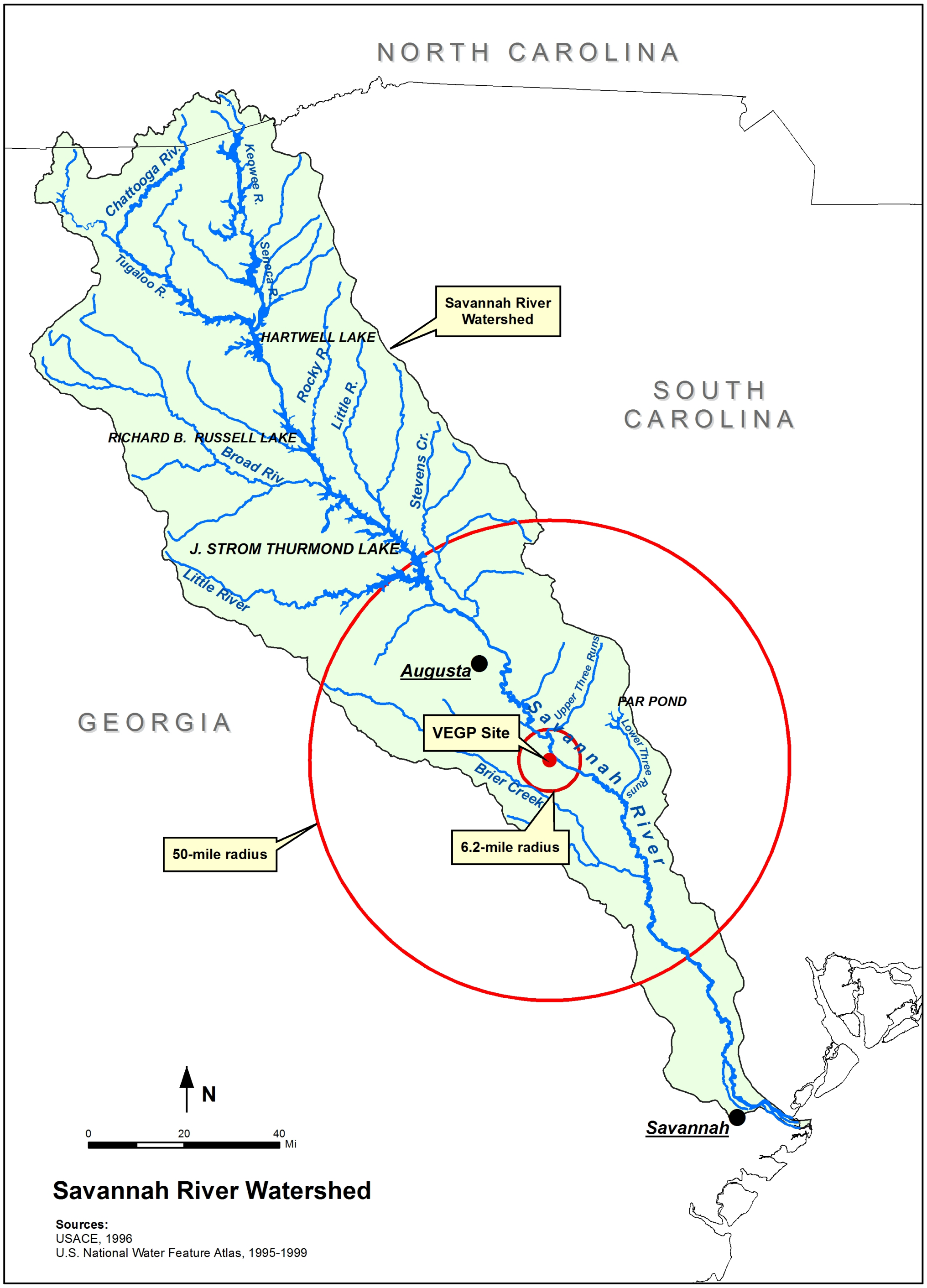
[a] Values are from Figure 3.3-1 and Figure 3.3.-2 in Section 3.3.1.




Note: River basin within approximately 50 mi of the VEGP site shown by the green circle

Source: EPA 1999

**Figure 2.3.2-1 Major Surface Water Bodies Within the Affected Hydrologic System**

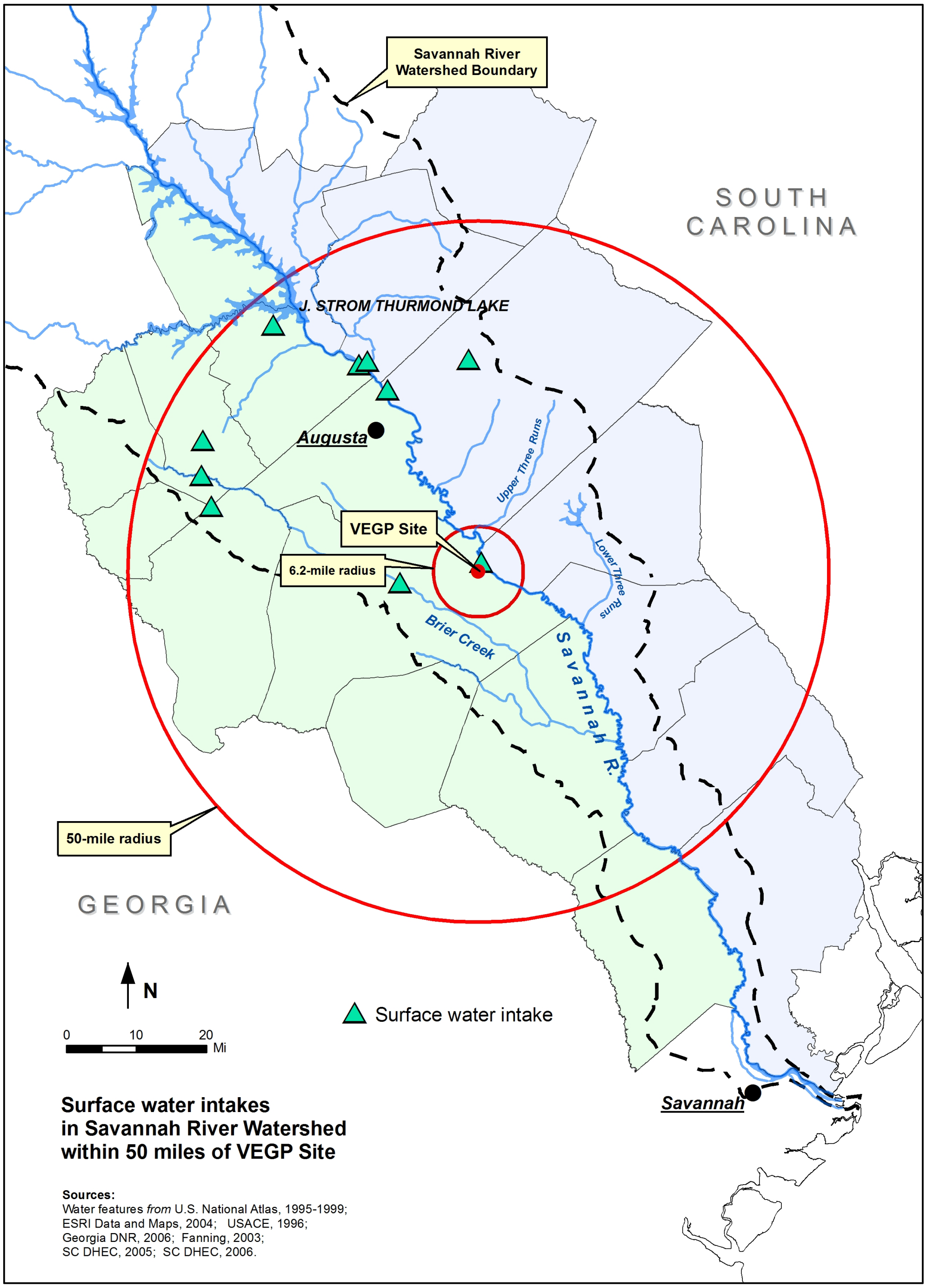



Source: USACE 1996; USNWFA 1999

**Figure 2.3.2-2 Major Rivers and Streams, and the Location of Major Reservoirs in the Savannah River Basin**


Source: USACE 1996; USNWFA 1999; ESRI 2004

**Figure 2.3.2-3 Counties Located within a 50-Mile Radius from the VEGP Site and within the Savannah River Basin**




Source: USACE 1996; USNWFA 1999; ESRI 2004; Georgia DNR 2006; Fanning 2003; SC DHEC 2006; SC DHEC 2005

**Figure 2.3.2-4 Location of Surface Water Withdrawal Intakes Within the Savannah River Basin and Within 50 Miles of the VEGP Site**

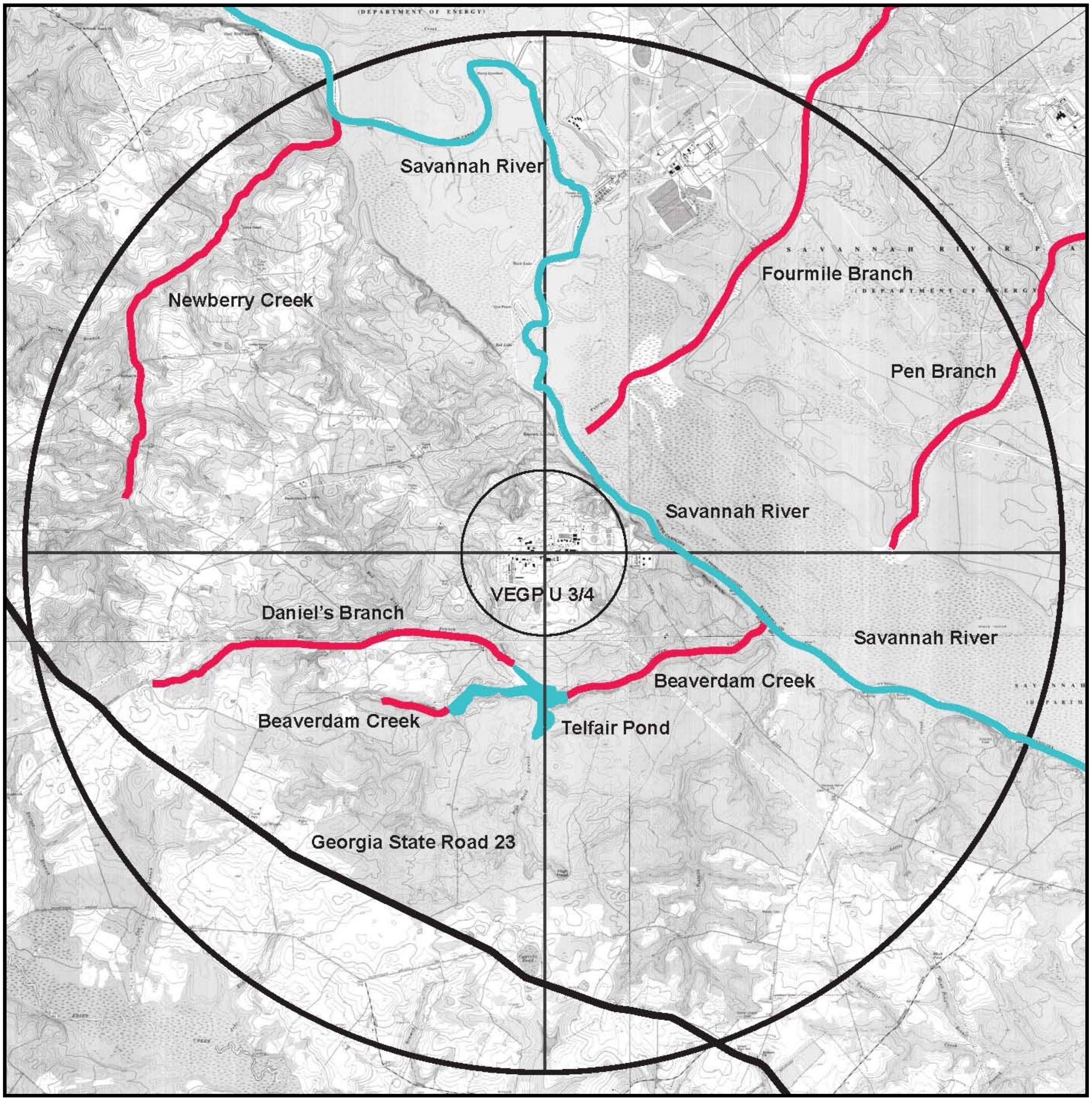
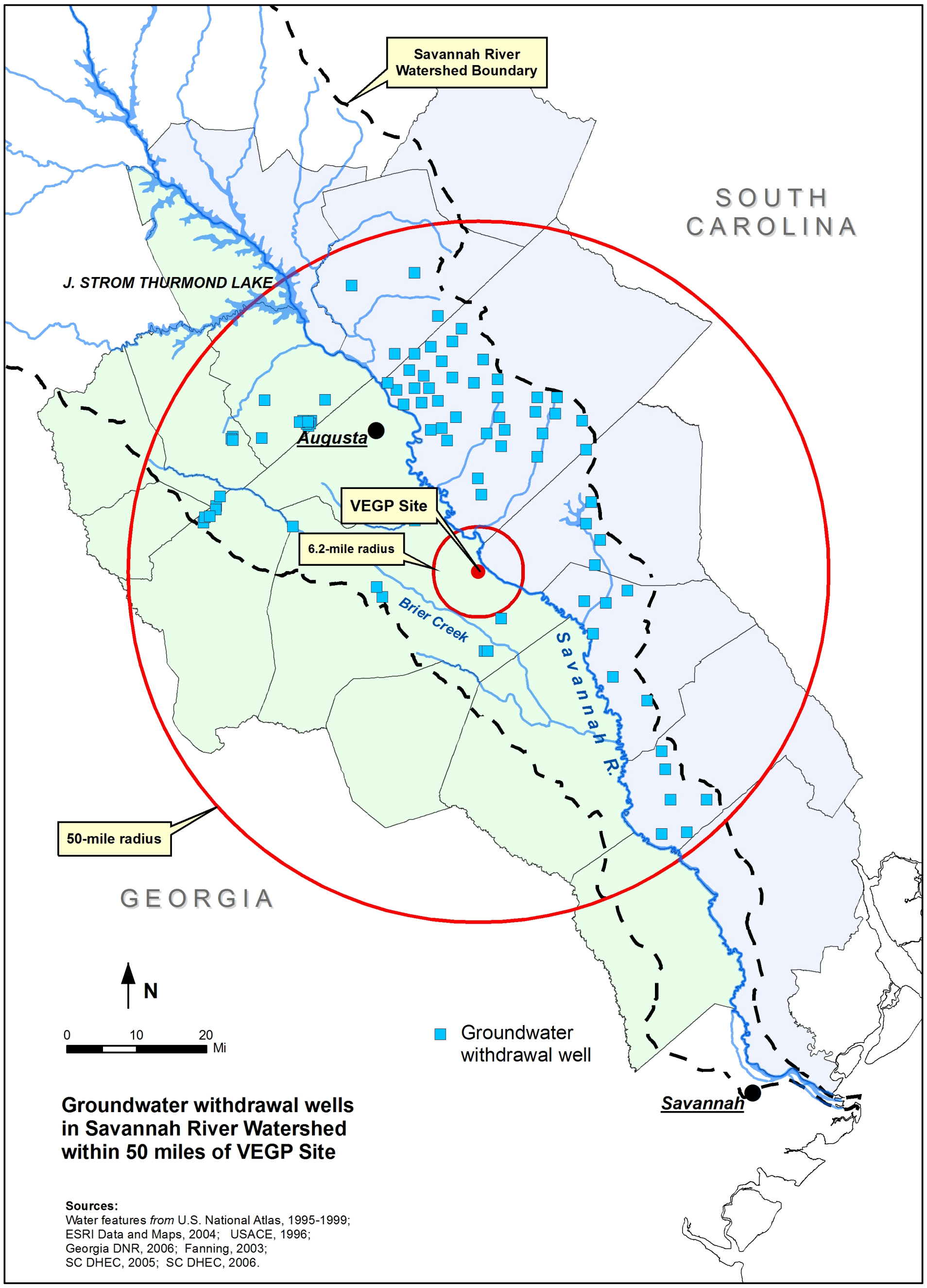



**Figure 2.3.2-5 Major Surface Water Bodies Within a 6.2-Mile (10-km) Radius of the VEGP Site**




Source: USACE 1996; USNWFA 1999; ESRI 2004; Georgia DNR 2006; Fanning 2003; SC DHEC 2005; SC DHEC 2006

**Figure 2.3.2-6 Location of Groundwater Withdrawal Wells Within the Savannah River Basin and Within 50 Miles of the VEGP Site**

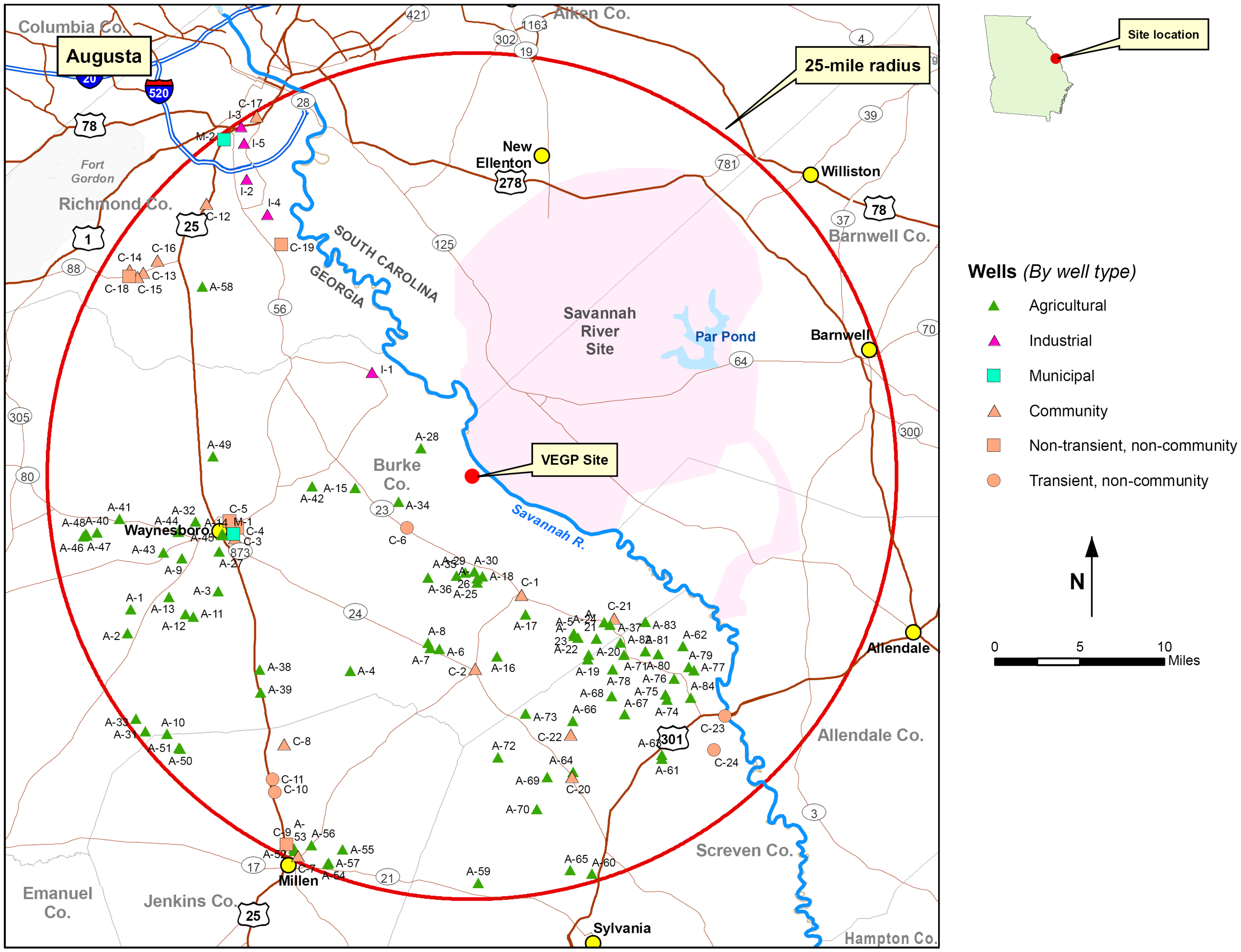



**Figure 2.3.2-7 Locations of Water-Supply Wells Within 25 Miles of the VEGP Site**

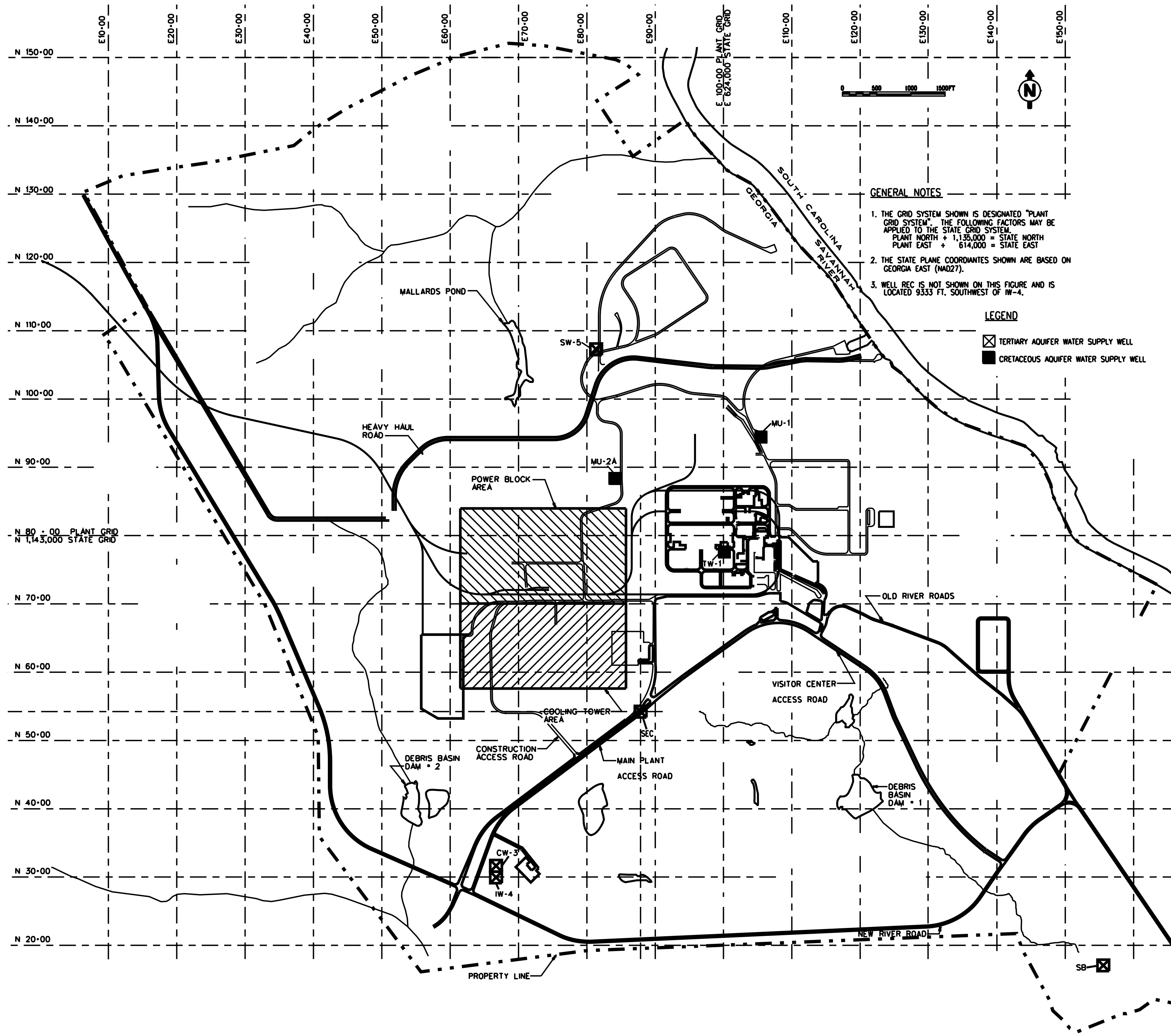



**Figure 2.3.2-8 Location of Groundwater Withdrawal Wells for VEGP Units 1 and 2**

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### 2.3.3 Water Quality

#### 2.3.3.1 Surface Water

The new units will withdraw makeup water from the Savannah River through a new intake structure located upstream of the existing intake structure as discussed in Section 1.2.4. All cooling system discharges from the new units, including cooling tower blowdown, will be discharged to the Savannah River via a new discharge structure that will be built downstream of the existing discharge structure. Aside from some small on-site ponds and streams, the Savannah River is the only surface water body that could be affected by construction and operation of new units at the VEGP site.

The Environmental Protection Division (EPD) of Georgia Department of Natural Resources (GDNR) monitors water quality of the Savannah River as part of its River Basin Management Planning (RBMP) initiative **(GDNR 2001)**. This initiative was intended to promote cooperation between the public and private sectors and to encourage citizens and agencies to work together to identify and reduce sources of pollution, improve water quality, protect fish and wildlife habitats, restore degraded habitats, and enhance public recreational opportunities.

The USGS has divided the Savannah River into seven sub-basins and assigned Hydrologic Unit Codes (HUCs) to each. The approximately 122-mile-long portion of the river from J. Strom Thurmond Dam (impounding Clarks Hill Lake) to Brier Creek, downstream of VEGP, has been designated HUC 03060106, Middle Savannah River (see Figure 2.3-1). To facilitate monitoring water quality trends in the greater Augusta, Georgia area, GDNR has subdivided this reach of river into four segments (see Table 2.3.3-1), two upstream, one including VEGP, and one downstream of VEGP.

Water quality in the Middle Savannah River Basin is generally good, with 104 of 122 river miles fully supporting designated uses **(GDNR 2002)**. The two stream segments with degraded water quality are both upstream of VEGP, in Columbia and Richmond Counties. The tailwaters of both Clarks Hill Lake and Stevens Creek Reservoir periodically experience low levels of dissolved oxygen, particularly in late summer when Clarks Hill Lake is stratified and hypolimnetic water, low in oxygen, is released to generate electricity at the J. Strom Thurmond Dam powerhouse. The U.S. Army Corps of Engineers installed five auto-venting turbines at the J. Strom Thurmond Dam powerhouse in 2004 (two more will be installed in 2006) which are expected to increase dissolved oxygen downstream in the Savannah River by more than 2 parts per million **(COE 2004; Pavey 2004)**. The water use classification of Fishing/Drinking Water was not fully supported in the Stevens Creek to Highway 78/278 segment due to low dissolved oxygen and exceedances of the water quality standards for fecal coliform bacteria. These deficiencies have, in the past, been attributed to a combination of urban runoff, malfunctioning septic systems, sanitary sewer overflow, and/or animal wastes **(GDNR 2001)**.

Although water quality in the Middle Savannah River generally supports designated uses, Georgia DNR has announced fish consumption advisories based on elevated mercury concentrations in certain fish species for several reaches of river including between J. Strom Thurmond Dam and Burke County. **(GDNR 2005a)**

Like Georgia, South Carolina monitors Savannah River water quality. The South Carolina Department of Health and Environmental Control (SCDHEC) maintains three water quality monitoring stations in Aiken County upstream of VEGP and another downstream of VEGP in Allendale County **(SCDHEC 2003)**. The three upstream stations are at US 1 (Station SV-251), SC Highway 28 (Station SV-252), and Savannah River Lock and Dam (Station SV-323). In a Watershed Water Quality Assessment, SCDHEC examined Savannah River Basin water quality at these three stations for the 1996-2000 period and concluded that recreational uses were fully supported at all three sites. **(SCDHEC 2003)**. Recreational uses also were fully supported at the downstream monitoring station (Station SV-118). **(SCDHEC 2003)**

In 2004, SCDHEC issued a Fish Consumption Advisory for 53 South Carolina waterbodies, including the Savannah River, because of concerns about mercury contamination. The advisory also cautioned that "some fish also contain [the radionuclides] cesium-137 and strontium-90." **(SCDHEC 2005b)**

In addition to Georgia and South Carolina, the U.S. Department of Energy (DOE) has monitored Savannah River water quality for more than 50 years, initially to assess potential impacts of the SRS's nuclear and industrial facilities on the river's aquatic communities and later to ensure compliance with the provisions of the Clean Water Act, enacted in 1972. These water quality data provide a valuable long-term baseline dataset against which to measure man-induced change in the middle reach of the Savannah River.

DOE monitors Savannah River water quality at a series of stations up- and downstream of SRS tributary streams that receive NPDES-regulated effluents from SRS facilities **(Mamatey 2004).** These river sampling sites are located at RM-160, RM-150.4, RM-141.5, RM-129.1, and RM-118. The existing VEGP discharge is at RM-150.4 (see Figure 2.3-1 for approximate location). In 2003, the last year for which data are available, water quality data from the five Savannah River stations showed no indication of water quality degradation or impairment (Table 2.3.3-2). Temperatures and dissolved oxygen levels were within a range known to support aquatic organisms. Contaminants were either present in low concentrations (metals) or below the lower limit of detection (pesticides).

In addition to non-radiological constituents, DOE monitors radionuclides in Savannah River water at points above and below SRS, and below the point at which VEGP liquid discharges enter the river **(Mamatey 2004)**. Composite samples are collected weekly at five river locations and analyzed for tritium, cobalt-60 (Co-60), cesium-137 (Cs-137), gross alpha, and gross beta. An annual grab sample is obtained at each location and analyzed for strontium-89/90 (Sr-89/90), technetium-99 (Tc-99), isotopes of uranium (234, 235, and 238), isotopes of plutonium

(238 and 239), americium-241 (Am-241), and curium-244 (Cm-244). The results of these analyses for 2003, which is the latest year for which data are available, are shown in Table 2.3.3-3. All measured concentrations were below the applicable regulatory criteria.

### 2.3.3.2 Groundwater

Information on the quantity and quality of groundwater in the vicinity of VEGP may be found in the VEGP UFSAR. There are two aquifers of interest at the VEGP site. The lower aquifer system is referred to as the Cretaceous aquifer system (now generally referred to as the Dublin and Midville aquifer systems) and consists primarily of the sands, gravels, and clays of the Tuscaloosa Formation. The upper aquifer system is variously referred to as the Tertiary aquifer system, the principal artesian aquifer, the limestone aquifer, and as the Floridan aquifer system. In the vicinity of the site, the Floridan also includes the water table aquifer. It consists primarily of the limestones and permeable sands of the Lisbon formation or stratigraphic equivalents. They are separated by a 60 to 70 foot thick aquiclude of hard, clayey marl referred to as "Blue Bluff marl." The Blue Bluff marl, which is the principal load-bearing stratum for the plant, is located about 85 feet below grade at 134 feet below mean sea level **(NRC 1985)**. The water table aquifer system beneath the plant is hydraulically isolated by stream channels (Savannah River to the east, Hancock Landing drainage to north, Beaverdam Creek to the south that represent hydraulic bearing to groundwater flow). Groundwater in this shallow aquifer is replenished by precipitation that percolates to the water table and moves laterally to the aforementioned interceptor streams **(GPC 1972)**.

Overall, the groundwater of the VEGP area is the calcium-sodium bicarbonate type, with total dissolved solids less than 200 parts per million. Groundwater from the water table aquifer contains from 20 to 170 parts per million total dissolved solids; groundwater from the deeper confined aquifer contains from 110 to 194 parts per million. The variation in total dissolved solids is apparently due to the length of time the water has remained in the ground; more time allows more leaching of solids. Sodium is the dominant cation in groundwater from both shallow and confined aquifers.

EPD is the entity within GDNR with the responsibility for protecting the state's groundwater quality. To this end, EPD has implemented a comprehensive state-wide groundwater management policy of anti-degradation and instituted a groundwater quality assessment program that includes the Georgia Ground-Water Monitoring Network **(Donahue 2004)**. The Geological Survey Branch of EPD maintains the network, which is designed to monitor the ambient groundwater quality of nine major aquifer systems in Georgia. One of these nine, locally named aquifer systems, the Jacksonian Aquifer System (part of Floridan aquifer system) of central and east-central Georgia, underlies VEGP.

Over the last 50 years as the coastal region of Georgia developed, subtle changes began to occur in the Upper Floridan aquifer that supplies the majority of the groundwater in the region. This porous limestone aquifer has extremely high productivity and provides drinking water to the major population centers on the Georgia, South Carolina and northern Florida Atlantic Coasts. Over time as a result of increasing use, the direction of flow in the aquifer changed and groundwater containing salt began to flow upward into major pumping centers in Savannah, GA-Hilton Head, SC; Brunswick, GA; and Jacksonville-Fernandina beach FL. This problem was first recognized in the 1960s. In the late 1970s and 1980s, a number of studies were done to define the problem and in 1995, Georgia EPD began a public education program and voluntary efforts to control the saltwater intrusion problems in the Upper Floridan aquifer. In 1997, the Georgia Department of Natural Resources, Environmental Protection Division (GADNR EPD) developed a two-stage approach to addressing the issue. The first stage was the implementation of an interim strategy that addressed groundwater withdrawal permitting from 1997 to 2005. The interim strategy instituted a moratorium on groundwater withdrawal permits for municipal, industrial, and agricultural uses within a 24-county area of coastal Georgia (including Burke but not Richmond or Columbia counties). The second stage, called the Coastal Sound Science Initiative (CSSI), consisted of scientific and engineering investigations to generate information and data to build a plan for managing salt water intrusion. The results indicate that there are three major locations where salt water intrusion is taking place. Model simulation indicates that if current pumping rates are maintained through the 21st century, the rate of movement of the largest of the three plumes will be about 130 feet per year. GADNR EPD believes that if the plumes continue to expand at the 1965-2004 rate, then salt water will not be a problem in Georgia for more than 100 years. Groundwater management will vary by county and be guided by each county's proximity to the three plumes **(GDNR 2005b)**. Burke County is one of the more distant counties from the plumes. The interim Strategy defined three sub-regions with requirements that become more stringent near the coast. Burke County, where the VEGP site is located is in sub-region 3, the least restrictive sub-region. It consists of 19 full counties plus the portion of Effingham County north of Highway 119. The strategy for this region provides for conservation and reuse, justification of need, and monitoring to ensure the groundwater resource is protected for the future. Although more stringent than for some other counties in Georgia, the requirements placed on groundwater withdrawal in Burke County should not significantly impact withdrawal of groundwater to support the proposed VEGP Units 3 and 4.

Between January 2003 and January 2004, EPD monitored the water quality of eight wells in the Jacksonian Aquifer System **(Donahue 2004)**. Three of the wells, arrayed around a significant recharge area, were in Burke County west of VEGP. The other five wells were south and west of VEGP in Jefferson, Emanuel, Johnson, and Bleckley counties. Five of the wells are in the northern clastic facies (sands) of the Barnwell Group; two wells are in the less permeable silts and clays of a transition facies **(Donahue 2004)**. One well, north of the VEGP site, draws from an isolated limestone body.

The pH of water in the eight wells ranged from 4.62 to 7.44, while conductivity ranged from 37 to 228 micro-siemens per centimeter. Lowest pH and conductivity values were from the shallow "updip" well (J-7, approximately 25 miles west of the VEGP site) in the clastic facies. All samples were tested for volatile organic compounds (VOC), including the gasoline additive methyl tert-butyl ether (MTBE). No VOCs were detected. Excessive levels of beryllium have been detected in the past in well J-8 (approximately 40 miles west of the VEGP site), but in 2003-2004 concentrations were below the primary maximum contaminant limit (MCL; 4 parts per billion). Nitrate/nitrite, as nitrogen, ranged from undetectable to 7.6 ppm, and was detectable in six of the eight wells. The elevated nitrogen value was also from well J-8.

EPD is also responsible for monitoring radiation and radioactive materials in the environment. Since 1976, EPD has monitored radiation at nine nuclear facilities in Georgia and the bordering states of Alabama, Tennessee, and South Carolina **(GDNR 2004**, Executive Summary). Georgia DNR's most extensive environmental radiation monitoring network is focused on an area in Georgia adjacent to and downstream of the SRS and VEGP **(GDNR 2004)**. Because the two sites are across the Savannah River from one another, EPD has, since 1978, combined monitoring at the two facilities into a single program or "monitoring network" designed to detect radionuclides not only in groundwater but also in air, soils, crops, wildlife, surface water, and fish in the region.

Tritium was reported from several relatively deep wells in Burke County in 1991, and the Geologic Survey Branch of GDNR, with the assistance of DOE, began an investigation of the source of the tritium and the extent of contamination. The groundwater testing program in Burke County included an examination of existing wells, drilling and monitoring of several test wells, and testing of rainfall to determine its tritium content. As of 2002, no significant tritium contamination had been found in any deep aquifers in the VEGP area. More tritium was found in groundwater associated with the shallow (up to 200 feet deep) Upper Three Runs aquifer, however. Tritium concentrations averaged less than 1,000 pico-curies per liter (pci/L) over the 2000-2002 period, less than or equal to 5 percent of the MCL. Based on the areas with highest concentrations (southwest of SRS facilities), tritium appears to be transported by air (rain) from SRS **(GDNR 2004)**.

Tritium concentrations have been highest in the Tobacco Road Sand and Irwington Sand Member formations (20 to 80 feet deep) of the Upper Three Runs aquifer (**GDNR 2004**, Figure D-14B). Tritium concentrations in other Upper Three Runs formations have been much lower, and have been undetectable in the deeper Gordon, Millers Pond, and Dublin aquifers **(Georgia DNR 2004)**. EPD geologists theorize that the vertical profile reflects the historical rainout of airborne tritium from SRS, looking backward in time, from top to bottom of the Upper Three Runs aquifer. Maximum concentrations are presumed to relate to deposition of tritium in 1950s, 1960s, and 1970s, when SRS production facilities were operating at or near capacity and airborne releases from tritium facilities were at their highest levels.

## Table 2.3.3-1 Stream Segments and Classifications, Middle Savannah River

| Segment Described | County or Counties | Length (mi) | Classification | Fully or Partially Supporting Designated Uses |
|---|---|---|---|---|
| Thurmond Dam to Stevens Creek | Columbia | 9 | Drinking Water | Partially[a] |
| Stevens Creek Dam to Hwy 78/278 | Columbia<br>Richmond | 9 | Drinking Water | Partially[b] |
| Hwy 78/278 to Johnsons Landing (reach adjacent to VEGP) | Richmond<br>Burke<br>Screven | 78 | Fishing | Fully |
| Johnsons Landing to Brier Creek | Screven | 26 | Fishing/Drinking Water | Fully |

Source: **GDNR 2002**, Appendix A

[a] Did not meet water quality standard for dissolved oxygen

[b] Did not meet water quality standards for dissolved oxygen and fecal coliforms

## Table 2.3.3-2 Savannah River Water Quality in 2003

| | | Location | | | | |
|---|---|---|---|---|---|---|
| | | **RM-118.8** | **RM-129.1** | **RM-141.5** | **RM-150.4[a]** | **RM-160** |
| **Parameter** | **Unit** | **Range (Mean)** | **Range (Mean)** | **Range (Mean)** | **Range (Mean)** | **Range (Mean)** |
| Temperature | °C | 9.4-25.7 (18.05) | 9-23.3 (17.558) | 9-22.8 (17.408) | 9.2-23.1 (17.267) | 9-22.4 (17.025) |
| Dissolved Oxygen (DO) | mg/L | 5.25-11.33 (8.042) | 6.11-10.53 (7.767) | 6.04-10.96 (7.788) | 6.13-11.4 (8.37) | 7.19-10.21 (8.473) |
| pH | SU | 5.8-7.02 (6.6) | 5.7-7.27 (6.628) | 5.8-7.09 (6.518) | 6.24-6.93 (6.682) | 5.94-7.3 (6.697) |
| Hardness | mg/L | 11-18 (15.333) | 12-27 (18.417) | 13-19 (15.417) | 12-20 (15.583) | 12-19 (15.455) |
| Total Suspended Solids | mg/L | 4-20 (8.5) | 1-17 (8.636) | 2-26 (9.25) | 4-34 (11.75) | 2-26 (9.167) |
| Nitrate Nitrogen | mg/L | 0.19-0.42 (0.29) | 0.026-0.32 (0.226) | 0.2-0.37 (0.284) | 0.23-0.38 (0.303) | 0.24-0.34 (0.285) |
| Total Phosphate Phosphorus | mg/L | 0.084-0.16 (0.116) | 0.034-0.16 (0.091) | 0.038-0.15 (0.103) | 0.064-0.42 (0.138) | 0.03-0.23 (0.103) |
| Total Organic Carbon (TOC) | mg/L | 3.8-6 (4.742) | 4-15 (6.025) | 3.7-6.8 (4.792) | 3-7.6 (4.517) | 3.1-6.1 (4.245) |
| Aluminum | mg/L | 0.055-0.696 (0.316) | 0.049-0.695 (0.3) | 0.045-1.207 (0.369) | 0.059-1.071 (0.391) | 0.057-0.71 (0.36) |
| Beryllium | mg/L | 0.306-0.306 (0.306) | 0.002-0.002 (0.002) | 0.002-0.002 (0.002) | 0.002-0.002 (0.002) | 0.0004-0.002 (0.001) |
| Cadmium | mg/L | 0.0003-0.002 (0.001) | 0.0001-0.003 (0.001) | 0.001-0.003 (0.001) | 0.0001-0.003 (0.001) | 0.0002-0.003 (0.001) |
| Chromium | mg/L | 0.001-0.001 (0.001) | 0.001-0.001 (0.001) | 0.001-0.002 (0.001) | 0.001-0.002 (0.001) | 0.001-0.001 (0.001) |
| Copper | mg/L | 0.001-0.002 (0.002) | 0.001-0.002 (0.001) | 0.001-0.002 (0.002) | 0.001-0.002 (0.001) | 0.001-0.744 (0.15) |
| Iron | mg/L | 0.487-1.402 (0.867) | 0.396-1.893 (0.915) | 0.41-1.905 (0.921) | 0.396-1.566 (0.782) | 0.422-1.165 (0.656) |
| Mercury | ug/L | 0.011-1.158 (0.237) | 0.015-0.141 (0.074) | 0.024-0.153 (0.07) | 0.018-0.246 (0.111) | 0.01136-0.165 (0.072) |
| Manganese | mg/L | 0.023-0.162 (0.097) | 0.017-0.18 (0.092) | 0.063-0.205 (0.114) | 0.072-0.293 (0.121) | 0.066-0.486 (0.144) |
| Nickel | mg/L | 0.004-0.134 (0.031) | 0.004-0.01 (0.006) | 0.005-0.009 (0.007) | 0.003-0.009 (0.006) | 0.005-0.01 (0.008) |
| Lead | mg/L | 0-0 (ND) | 0-0 (ND) | 0-0 (ND) | 0-0 (ND) | 0-0 (ND) |

## Table 2.3.3-2 (cont.) Savannah River Water Quality in 2003

| | | Location | | | | |
|---|---|---|---|---|---|---|
| | | **RM-118.8** | **RM-129.1** | **RM-141.5** | **RM-150.4[a]** | **RM-160** |
| **Parameter** | **Unit** | **Range (Mean)** | **Range (Mean)** | **Range (Mean)** | **Range (Mean)** | **Range (Mean)** |
| Thallium | mg/L | 0-0 (ND) | 0-0 (ND) | 0.009-0.009 (0.009) | 0-0 (ND) | 0.011-0.011 (0.011) |
| Zinc | mg/L | 0-0 (ND) | 0-0 (ND) | 0-0 (ND) | 0.011-0.014 (0.013) | 0-0 (ND) |

Source: **Mamatey 2004**

ND = no data

[a] Location of VEGP discharge.

## Table 2.3.3-3 Radioactivity in Savannah River Water in 2003

| Radionuclide | Location | Number of samples | Sample mean (pCi/l) | Standard Deviation (pCi/l) |
|---|---|---|---|---|
| H-3 | River Mile 118.8 | 52 | 7.49E+02 | 4.32E+01 |
| | River Mile 141.5 | 52 | 8.89E+02 | 6.03E+01 |
| | River Mile 150.0 | 52 | 7.24E+02 | 6.06E+01 |
| | River Mile 150.4 | 52 | 1.17E+03 | 1.45E+02 |
| | River Mile 160.0 | 52 | 1.20E+02 | 1.26E+01 |
| Co-60 | River Mile 118.8 | 52 | 1.29E-01 | 5.78E-02 |
| | River Mile 141.5 | 52 | 1.06E-01 | 5.09E-02 |
| | River Mile 150.0 | 52 | 1.01E-01 | 4.11E-02 |
| | River Mile 150.4 | 52 | 2.32E-01 | 1.11E-01 |
| | River Mile 160.0 | 52 | 1.15E-01 | 5.80E-02 |
| Cs-137 | River Mile 118.8 | 52 | 8.08E-02 | 6.35E-02 |
| | River Mile 141.5 | 52 | 4.21E-02 | 6.25E-02 |
| | River Mile 150.0 | 52 | 3.27E-02 | 5.50E-02 |
| | River Mile 150.4 | 52 | -4.15E-04 | 6.76E-02 |
| | River Mile 160.0 | 52 | 7.19E-02 | 5.96E-02 |
| Sr-89/90 | River Mile 118.8 | 1 | 1.55E-01 | 4.28E-02 |
| | River Mile 141.5 | 1 | 1.13E-01 | 3.97E-02 |
| | River Mile 150.0 | 1 | 4.81E-02 | 2.69E-02 |
| | River Mile 150.4 | 1 | 7.36E-02 | 3.86E-02 |
| | River Mile 160.0 | 1 | 5.20E-02 | 3.43E-02 |
| Tc-99 | River Mile 118.8 | 1 | -1.10E+00 | 1.64E+00 |
| | River Mile 141.5 | 1 | 1.21E+00 | 1.83E+00 |
| | River Mile 150.0 | 1 | -1.56E-03 | 1.74E+00 |
| | River Mile 150.4 | 1 | 1.10E+00 | 1.83E+00 |
| | River Mile 160.0 | 1 | -1.56E-03 | 1.74E+00 |
| U-234 | River Mile 118.8 | 1 | 2.01E-01 | 1.67E-01 |
| | River Mile 141.5 | 1 | 4.15E-01 | 3.81E-01 |
| | River Mile 150.0 | 1 | 3.58E-01 | 3.69E-01 |
| | River Mile 150.4 | 1 | 9.37E-01 | 4.47E-01 |
| | River Mile 160.0 | 1 | -3.91E-01 | 2.91E-01 |
| U-235 | River Mile 118.8 | 1 | 2.02E-01 | 1.73E-01 |
| | River Mile 141.5 | 1 | 4.84E-01 | 4.43E-01 |
| | River Mile 150.0 | 1 | 6.33E-01 | 4.53E-01 |
| | River Mile 150.4 | 1 | 7.93E-01 | 4.92E-01 |
| | River Mile 160.0 | 1 | -4.03E-01 | 3.24E-01 |

## Table 2.3.3-3 (cont.) Radioactivity in Savannah River Water in 2003

| Radionuclide | Location | Number of samples | Sample mean (pCi/l) | Standard Deviation (pCi/l) |
|---|---|---|---|---|
| U-238 | River Mile 118.8 | 1 | 1.18E-01 | 1.55E-01 |
| | River Mile 141.5 | 1 | 6.74E-01 | 3.71E-01 |
| | River Mile 150.0 | 1 | -4.49E-01 | 2.40E-01 |
| | River Mile 150.4 | 1 | 7.79E-02 | 3.21E-01 |
| | River Mile 160.0 | 1 | 2.40E-01 | 3.19E-01 |
| Pu-238 | River Mile 118.8 | 1 | -2.08E-02 | 4.63E-02 |
| | River Mile 141.5 | 1 | -7.17E-02 | 5.34E-02 |
| | River Mile 150.0 | 1 | -5.08E-02 | 7.65E-02 |
| | River Mile 150.4 | 1 | -7.38E-04 | 7.36E-02 |
| | River Mile 160.0 | 1 | 3.41E-01 | 1.39E-01 |
| Pu-239 | River Mile 118.8 | 1 | 7.28E-03 | 1.56E-02 |
| | River Mile 141.5 | 1 | 1.52E-01 | 9.32E-02 |
| | River Mile 150.0 | 1 | 3.79E-01 | 1.40E-01 |
| | River Mile 150.4 | 1 | 2.18E-01 | 1.05E-01 |
| | River Mile 160.0 | 1 | -3.59E-02 | 3.76E-02 |
| Am-241 | River Mile 118.8 | 1 | -7.87E-02 | 3.15E-02 |
| | River Mile 141.5 | 1 | 1.67E-01 | 1.65E-01 |
| | River Mile 150.0 | 1 | 1.58E-01 | 1.41E-01 |
| | River Mile 150.4 | 1 | -2.10E-02 | 9.53E-02 |
| | River Mile 160.0 | 1 | 3.13E-02 | 1.16E-01 |
| Cm-244 | River Mile 118.8 | 1 | 4.51E-02 | 4.52E-02 |
| | River Mile 141.5 | 1 | 5.94E-02 | 5.96E-02 |
| | River Mile 150.0 | 1 | 5.24E-02 | 5.26E-02 |
| | River Mile 150.4 | 1 | -3.14E-02 | 3.14E-02 |
| | River Mile 160.0 | 1 | 0.00E+00 | 2.17E+01 |
| Gross beta | River Mile 118.8 | 52 | 2.28E+00 | 8.91E-02 |
| | River Mile 141.5 | 52 | 2.30E+00 | 8.02E-02 |
| | River Mile 150.0 | 52 | 2.14E+00 | 9.97E-02 |
| | River Mile 150.4 | 52 | 2.51E+00 | 1.13E-01 |
| | River Mile 160.0 | 52 | 2.08E+00 | 1.04E-01 |
| Gross alpha | River Mile 118.8 | 52 | 3.52E-01 | 7.22E-02 |
| | River Mile 141.5 | 52 | 3.36E-01 | 4.99E-02 |
| | River Mile 150.0 | 52 | 3.59E-01 | 6.50E-02 |
| | River Mile 150.4 | 52 | 5.59E-01 | 7.64E-02 |
| | River Mile 160.0 | 52 | 1.47E-01 | 5.19E-02 |

Source. **Mamatey 2004**

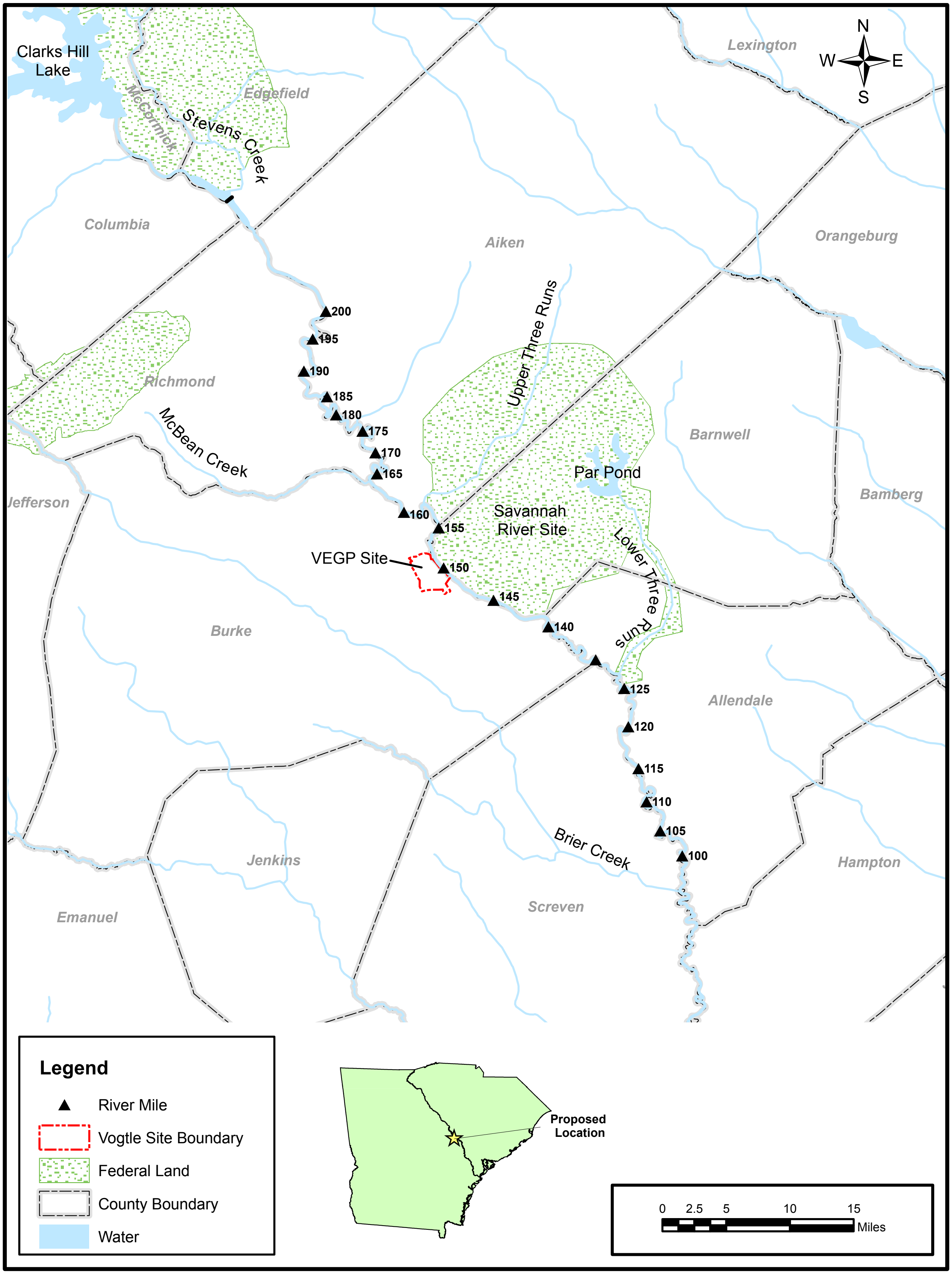


**Figure 2.3.3-1 Middle Savannah River**

## Section 2.3.3 References

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## 2.4 Ecology

This section presents the ecological resources that have the potential to be impacted by the construction and operation of new nuclear units on the VEGP site. This section addresses resources for the two ecological environments, terrestrial and aquatic.

SNC has begun informal discussions with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, Georgia Natural Heritage Program, and South Carolina Heritage Trust Program that will continue throughout the application review process (see Appendix A).

### 2.4.1 Terrestrial Ecology

This section describes the terrestrial ecology of the VEGP site and transmission corridors.

#### 2.4.1.1 Site Habitats and Communities

The VEGP site is located in the Georgia Upper Coastal Plain about 30 miles below the fall line. Land use surrounding the VEGP site is an irregular patchwork of pasture or farmland, pine plantations, abandoned (old) fields and second growth forests of hardwoods and mixed pine-hardwoods.

Current land-use at the VEGP site is presented in Section 2.2. Approximately 800 acres of the VEGP site consists of generation and maintenance facilities, parking lots, roads, cleared areas, and mowed grass (termed “facilities” in Figure 2.4-1). No other preexisting stresses or stressors to wildlife are known.

Pine forests (including slash pine plantations) and hardwood forests occur in areas that were not previously cleared for construction or operation of VEGP Units 1 and 2. Vegetation communities at the VEGP site consist of approximately 1,634 acres of pine forests, 612 acres of hardwood forests, and 96 acres of open areas such as mowed grass and old fields. Low areas along the river and streams support bottomland hardwood forests. Upland areas support pine forests (longleaf, loblolly and planted slash pine), hardwood forests, and some areas that could be classified as mixed pine-hardwood stands.

The longleaf and loblolly pine forests and slash pine plantations are of diverse ages, and vary from a nearly closed canopy with very little understory, to areas that more resemble old fields with only scattered pines. Herbaceous ground cover in the pine forests is dominated by bracken fern, while in the more open areas, dog fennel, broomsedge, and blackberry are common. **(TRC 2006)**

Some mixed pine-hardwood stands are found in undisturbed uplands of the VEGP site. These stands are a mix of a xeric longleaf pine-scrub oak community and a slightly more mesic oak-hickory community; the ridge tops and south and west slopes are more xeric while the north and east slopes support the more mesic oak-hickory. Longleaf pine, turkey oak, and bluejack oak form the canopy along with blackjack oak and scattered dogwood and hawthorns. The shrub layer is composed of sparkleberry, dwarf huckleberry, and yellow jessamine. The density and diversity of the herbaceous ground cover varies with the degree of canopy closure. In areas of dense shade, slender wood oats are dominant. In more open areas, gopher weed, jointweed, tread-softly, and reindeer lichen are common. The oak-hickory community canopy is composed of white oak, white ash, mockernut hickory, and dogwood, and to a lesser extent, turkey oak and shortleaf pine. **(TRC 2006)**

Canopy species in the lower, wetter areas along the Savannah River are primarily bald cypress and tupelo gum, while sycamore, boxelder, sugarberry, and swamp chestnut oak occupy the slightly higher ground in the bottomland hardwoods. American holly, ironwood, water locust, cane, and buttonbush form the understory. Ground cover is sparse and limited to those species that can survive inundation and dense shade; these include richweed, lizard tail, sensitive fern, and Virginia dayflower. **(TRC 2006)**

A steep, east-facing bluff lies just west of the bottomland hardwoods along the river. The bluff is completely forested by tree species such as white oak, southern red oak, mockernut hickory, tulip poplar, sweet gum, American elm, basswood, and sugar maple. There is also well developed understory of smaller trees, shrubs and vines along the steep bluff. The most common understory species are pawpaw, hop hornbeam, muscadine, American beautyberry, crossvine, and poison ivy. The herbaceous ground cover varies with soil moisture, varying from dry areas near the top of the slope to wet seeps at the foot of the slope. On the upper slope, Christmas fern, white snakeroot, and several species of aster are common. On the lower slopes and around seeps, mottled trillium, wild ginger, false nettle, and jewelweed are common. **(TRC 2006)**

Two small drainages traverse the VEGP site. A small unnamed stream drains Mallard Pond and flows north and east into the Savannah River (Figures 2.1-1 and 3.1-3). The stream is approximately 2 to 4 feet wide and less than 1 foot deep, except where beavers have created dams and ponds. The second drainage includes two streams that drain into Beaverdam Creek, which flows east out of Telfair Pond and enters the Savannah River approximately two miles downstream of the existing intake structure (Figure 2.1-3). Although Beaverdam Creek is outside the VEGP site, the two small steams mentioned above are within the site. One of these streams is located in the southeastern portion of the VEGP site and drains south through Debris Basin Pond # 1, and the other stream is in the southwestern portion of the site and flows south through the Debris Basin Pond #2 (Figures 2.1-1 and 3.1-3). Two large beaver ponds exist on the western stream.

Dominant tree species in the wetlands associated with the stream draining Mallard Pond and along the two streams that flow into Beaverdam Creek are water oak, red maple, and black gum. The relatively dense understory of vines and shrubs is composed primarily of cane, trumpet creeper, muscadine, and American holly. The herbaceous ground cover is dominated by cinnamon fern and royal fern. **(TRC 2006)**

Man-made ponds at the VEGP site consist of open water and mudflats with heavily vegetated fringes. Dominant species surrounding the open water are broadleaf cattail, sugarcane plume grass, wool grass, bushy bluestem, and black willow. **(TRC 2006)**

The topography of the site consists of low rolling hills with elevations ranging from 80 ft to 280 ft above mean sea level. All streams in the area ultimately drain into the Savannah River.

Wildlife species found in the forested portions of the VEGP site are those typically found in forests of eastern Georgia. Mammals such as the white-tailed deer, raccoon, opossum, gray squirrel, Eastern cottontail, coyotes, and gray fox occur at the site, as do smaller mammals such as moles, shrews, and a variety of mice and voles. Various reptiles and amphibians (e.g., snakes, salamanders, lizards, toads) occur at the VEGP site. Common bird species at the VEGP site include the American crow, Northern bobwhite, blue jay, Carolina chickadee, mourning dove, black vulture, turkey vulture, song sparrow, white-throated sparrow, dark-eyed junco, Northern cardinal, tufted titmouse, red-bellied woodpecker, and Northern flicker. SNC has placed bluebird and wood duck nest boxes in suitable habitats at the VEGP site that are used for nesting by these birds.

The USFWS is responsible for designating areas of “critical habitat” for federally-listed endangered and threatened terrestrial species. Such areas are considered essential to the species’ conservation, and may require special management and protection. No areas designated by USFWS as critical habitat exist at or near the VEGP site. “Critical habitat” or similarly defined classifications do not exist for state-listed species in Georgia and South Carolina.

The 7,800 acre Yuchi WMA is immediately south of the VEGP site.

Surveys for federally- and state-listed species classified as threatened or endangered were conducted in Spring, Summer, and Autumn 2005 at VEGP to support license renewal and the ESP application (**TRC 2006;** Appendix B). The American alligator (*Alligator mississippiensis*) was the only Federally-listed animal species observed at the VEGP site during the 2005 surveys. One adult alligator was observed in Mallard Pond north of the Units 3 and 4 footprint during the Summer survey. The American alligator is common in the region, and thus, is not State-listed as a special status species. It is federally-listed as “threatened due to similarity in appearance” to the endangered American crocodile (*Crocodylus acutus*). No State-listed animals were observed on the VEGP site during the 2005 surveys.

No federally-listed plants were found on the VEGP site during the 2005 surveys. Bay star-vine (*Schisandra glabra*), state-listed as threatened in Georgia, was the only State-listed plant found. Habitat for this vine is rich forested areas, especially bottomlands and slopes. Bay star-vine was found at several locations along the wooded bluff bordering the Savannah River, and in a wooded wetland in the southern portion of the VEGP site.

Endangered, threatened, and other special-status species known to occur in Burke County are listed in Table 2.4-1. Special status-species indicated in Table 2.4-1 as occurring in Burke County (in which VEGP is located) were taken from county records maintained by USFWS (2004) and the Natural Heritage Program of the Georgia Department of Natural Resources **(GDNR 2004)**. However, SNC recognizes that the USFWS and GDNR databases reflect only recorded occurrences, and the possibility exists that other (unrecorded) special-status species might exist in Burke County. Similarly, although the alligator and bay star-vine were the only special-status species observed during the 2005 Spring, Summer, and Autumn surveys of the 3,169-acre VEGP-site, SNC recognizes that the VEGP site might provide refuge for special-status plants or animals that escaped detection during the surveys. This is true especially for animals, some of which are mobile, secretive, and rarely observed even when present. SNC biologists at VEGP are familiar with special-status species in eastern Georgia.

The proposed VEGP Units 3 and 4 footprint is a previously disturbed location on an existing industrial site, but it does include areas of young planted pines, and some open weedy and brushy areas. These areas are undoubtedly used by birds and mammals common to the vicinity, but use of the proposed footprint by these species is insignificant given the large amount of similar or better habitat in the vicinity.

No streams or wetlands are located within the proposed footprint (see Figure 2.1-1). Wetlands and bottomland hardwood stands are found on the floodplain adjacent to the Savannah River and in the stream drainages mentioned above.

“Important species” are defined in NUREG-1555 *Standard Review Plans for Environmental Reviews for Nuclear Plants,* 1999 (NUREG-1555) as those that are federally- or state- listed as threatened or endangered; proposed for listing as threatened or endangered; commercially or recreationally valuable; essential to the maintenance or survival of species that are rare or commercially or recreationally valuable; critical to the structure and function of the local terrestrial ecosystem; or that serve as biological indicators. Game species fall within the “commercially or recreationally valuable” species category. The primary game species at the VEGP site are deer, gray squirrel, Eastern cottontail, Northern bobwhite, mourning dove, and woodcock. No “travel corridors” for game species cross the VEGP site. The proposed footprint does not provide suitable habitat for the American alligator, and bay star-vine was not observed on the proposed footprint during the 2005 surveys. Similarly, because habitats within most of the project footprint (excluding the location of the new intake in bottomland hardwoods) consist of young pine plantations, weedy or brushy areas or industrial sites, the footprint does not provide habitat for threatened or endangered species, nor significant habitat for other commercially or recreationally valuable species.

NUREG-1555 defines important habitats as wildlife sanctuaries, refuges or preserves; habitats identified by state or federal agencies as unique, rare, or of priority for protection, wetlands, floodplains, or other resources specifically protected by federal or state regulations; or land areas identified as critical habitat for threatened or endangered species. With the exception of wetlands along the Savannah River floodplain and stream drainages, no "important habitats" as defined by NUREG-1555 exist on the proposed footprint or the larger VEGP site.

Although the VEGP site hosts ticks and mosquitoes, no vector-borne diseases have been reported at the site.

### 2.4.1.2 Transmission Corridor Habitats and Communities

Electric transmission corridors that originate at VEGP pass through forested and agricultural lands typical of eastern Georgia. Land use along the existing transmission corridors is presented in Table 2.2-1. No areas designated by the USFWS as critical habitat for endangered species exist within or adjacent to associated transmission corridors.

Surveys for federally- and state-listed species classified as threatened or endangered were conducted in Spring, Summer, and Autumn 2005 along VEGP-associated transmission lines **(TRC 2006)**. The wood stork (*Mycteria americana*) was the only federally-listed animal species observed along the transmission lines during the 2005 surveys. The wood stork is Federally- and state-listed as endangered. Wood storks were seen foraging in wetlands during the 2005 surveys at two locations on the VEGP-Scherer transmission corridor and at one location on the VEGP-Thalmann corridor **(TRC 2006)**. No nests of wood storks or other wading birds were observed in the adjacent swamps during any of the three seasonal surveys. Active burrows of the gopher tortoise (*Gopherus polyphemus*), state-listed as threatened in Georgia, were observed at three locations on the VEGP-Thalmann transmission corridor during the 2005 surveys. A single spotted turtle (*Clemmys guttata*), state-listed as threatened in Georgia, was observed on the VEGP-Thalmann corridor **(TRC 2006)**.

No federally-listed plants were found along the transmission lines during the 2005 surveys. Pond spice (*Litsea aestivalis*), state-listed as threatened in Georgia, was observed in one wetland on the VEGP-Thalmann corridor. Hooded pitcher plants (*Sarracenia minor*), state-listed as unusual in Georgia, were observed at six locations along the VEGP-Thalmann corridor **(TRC 2006)**.

Endangered, threatened, and other special-status species published as occuring in the counties crossed by existing transmission lines are listed in Table 2.4-1. Special status-species indicated in Table 2.4-1 as occurring in counties crossed by the transmission lines were taken from county records maintained by USFWS (2004), GDNR (2004), and the South Carolina Department of Natural Resources **(SCDNR 2006)**. However, SNC recognizes that the USFWS, GDNR, and SCDNR databases reflect only recorded occurrences, and the possibility exists that other (unrecorded) special-status species might exist in counties crossed by the transmission lines. Similarly, although few special-status species were observed during the 2005 Spring, Summer, and Autumn surveys of the transmission lines **(TRC 2006)**, SNC recognizes that the possibility of other special-status plants or animals along the transmission lines can never be totally ruled out. This is true especially for animals, some of which are mobile, secretive, and rarely observed even when present.

As discussed in Sections 3.7.2, the specific route of the proposed new transmission line has not been determined, but likely will cross Burke, Jefferson, Warren, and McDuffie counties. Special-status species in these four counties are listed in Table 2.4-2. Land use in the same four counties is presented in Table 2.2-2.

Transmission line corridors are maintained in accordance with established procedures to prevent woody growth from reaching the transmission lines. The removal of woody species can provide outstanding grassland and marsh habitat for many rare plant species dependent on open conditions.

GPC currently participates in a wildlife management program with the Georgia DNR on transmission line corridors. The “Wildlife Incentives for Non-Game and Game Species” (WINGS) program is designed to help land users convert GPC transmission corridors into productive habitat for wildlife. WINGS offers grant money and land management expertise to landowners, hunting clubs, and conservation organizations who commit to participating in the program for 3 years.

## 2.4.2 Aquatic Ecology

### 2.4.2.1 Onsite Waterbodies

Two small streams traverse the VEGP site. A small, unnamed stream drains Mallard Pond (see Figure 2.1-1) and flows into the Savannah River swamp upstream of the proposed river intake structure. Little is known about the aquatic biota of this stream, which is quite small and probably supports limited communities of aquatic macroinvertebrates and fish. Beaverdam Creek, a larger stream, flows out of Telfair Pond (see Figure 2.1-3) and moves east to the Savannah River approximately two miles downstream of the existing river intake structure. GPC conducted studies of fish **(Wiltz 1982)** and benthic macroinvertebrates **(Staats 1983)** in Beaverdam Creek in the 1970s to determine if construction of Units 1 and 2 had any effect on the stream’s aquatic communities.

GPC biologists sampled fish in Beaverdam Creek over a two-year period (1977-1978) to evaluate potential effects of siltation and sedimentation on resident fish populations. A total of 2,435 fish representing 39 species were collected during the study. Collections were dominated by minnows, sunfish, and darters. Dusky shiners (*Notropis cummingsae*), bluegill (*Lepomis macrochirus*), mosquitofish (*Gambusia affinis*), and blackbanded darter (*Percina nigrofasciata*) were the species most often collected **(Wiltz 1982)**. Collectively, these four species made up

68 percent of all fish collected during the study. To reduce turbidity in Beaverdam Creek from transmission line construction and logging (on adjacent private property), GPC planted grass in eroding areas and installed erosion control devices (silt fences, hay bales). As a result, turbidity was reduced and fish habitat enhanced. Beaverdam Creek supported a diverse fish community before and after these erosion control measures were implemented.

GPC conducted a study over the 1973-1978 period to determine if construction of VEGP and access roads affected abundance and/or diversity of benthic macroinvertebrates in Beaverdam Creek. The study demonstrated that number and diversity of benthic macroinvertebrates in stream segments down-gradient from construction areas were not significantly different from upstream segments. Construction of an access road did reduce number and diversity of benthic organisms, but the benthic community recovered quickly when construction ceased and disturbed areas adjacent to the roadbed were revegetated. The study also demonstrated that Beaverdam Creek supported a surprisingly diverse benthic community, including numerous representatives of taxa (Ephemeroptera, Trichoptera, Plecoptera) that are typically associated with good water quality.

Several detention ponds built on the southern part of the property during construction of the first units have become permanent ponds (Figure 2.1-1). The biota in these ponds and in various small drainages on the property have not been sampled.

### 2.4.2.2 Savannah River

#### 2.4.2.2.1 Plankton and Benthic Macroinvertebrates

The Academy of Natural Sciences of Philadelphia has monitored the aquatic communities of the middle Savannah River up- and downstream of the SRS (and coincidentally, the VEGP site) since 1951 **(Academy of Natural Sciences 2005)**. These studies, intended to assess impacts of contaminants and thermal discharges from SRS nuclear and industrial facilities, are a valuable source of information on the ecological health of the middle reaches of the Savannah River. These monitoring studies identify long-term trends in aquatic communities that might be confounded or obscured by normal year-to-year variability or by even longer-term occurrences, such as droughts, that can produce substantial change in aquatic communities.

The Academy of Natural Sciences' monitoring includes basic water chemistry and surveys of attached algae, aquatic macrophytes (aquatic vascular plants), aquatic macroinvertebrates, and fish. The study design includes four sampling stations: three exposed to SRS influence, and an unexposed reference station upstream. Multiple exposed stations are employed because of the complex pattern of SRS inputs along the river. Potential impacts are assessed by determining whether differences exist between the exposed and reference stations which are either greater or of a different character than would be expected if they were due merely to natural differences among sampling sites. **(Academy of Natural Sciences 2005)**

Diatoms have generally been the most abundant algal group, with two pollution-tolerant species (*Melosira varians* and *Gomphonema parvulum*) dominating collections **(Halverson et al. 1997)**. The dominant algae are species characteristic of moderate- to high-nutrient levels and typical of southeastern coastal plain rivers. Algae at sites downstream of SRS influence and upstream of SRS influence both showed evidence of organic pollution, apparently from an upstream (Augusta area) source. **(Halverson et al. 1997)**

Aquatic insect density and diversity are important indicators of water quality. The Academy of Natural Sciences' monitoring of aquatic insects in the Savannah River up- and downstream of SRS (and VEGP) shows a generally increasing abundance of aquatic insects after the mid-1980s **(Halverson et al. 1997)** and increased taxa richness **(Academy of Natural Sciences 2005)**. In 1995, a year in which between-station differences were analyzed, measures of biotic diversity were higher for downstream stations than an upstream (of SRS and VEGP) control station; conversely, measures of pollution tolerance were higher for an upstream station than downstream stations **(Halverson et al. 1997)**. These studies showed that water quality downstream of SRS and VEGP was better than water quality upstream, in the vicinity of the cities of Augusta and North Augusta.

Mollusks found in the vicinity of VEGP include fingernail clams, peaclams, the Asiatic clam (*Corbicula fluminea*), and native mussels. Mollusks are collected at five locations: one upstream of VEGP, one immediately downstream of the VEGP, and three further downstream of VEGP. Academy scientists collected 16 mussel species between 1951 and 2000, none of which was state- or federally-listed. Arnett summarizes changes in the mussel community of the middle Savannah River over the 1951-2000 period as follows: a generally decreasing abundance and diversity of native species, an increasing dominance of "hardier forms," and an increasing scarcity of juveniles of some species. These changes were attributed to increased competition over the last several decades with the non-native Asiatic clam and changes in the flow characteristics of the Savannah River associated with "the construction of dikes, upriver dams, and removal of meanders…" **(Arnett 2001)**.

#### 2.4.2.2.2 Ichthyofauna of the Middle Savannah River

Information on the fishes of the middle Savannah River can be found in hundreds of publications. Three documents are particularly comprehensive and informative: *The Fishes of the Savannah River Plant* **(Bennett and McFarlane1983)**, the eight-volume Comprehensive Cooling Water Study prepared by Du Pont (1987), and *Fishes of the Middle Savannah River Basin* **(Marcy et al. 2005)**.

The fishes of the Middle Savannah River include three groups: resident freshwater species, which are found in the area year-round, diadromous species, which are present during seasonal migrations, and marine/estuarine species, which are sometimes found in the middle Savannah River well upstream of the saltwater-freshwater interface. Resident fishes include a variety of minnows (family Cyprinidae), suckers (family Catastomidae), catfish (family Ictaluridae), sunfish (family Centrarchidae), and perch (family Percidae). Diadromous species include eels (family Anguillidae), shad and river herring (family Clupeidae), and striped bass (family Moronidae). Marine/estuarine species that are sometimes collected in the vicinity of VEGP include striped mullet, needlefish, and hogchoker. Relatively small numbers of these marine "strays" are collected, and they are of little commercial or recreational importance. As a consequence, they will not be discussed further in this environmental report.

*Resident Fish of the Middle Savannah River*

The Savannah River and mouths of creeks draining into the Savannah River were sampled intensively between 1983-1985 by the SRS as part of the Comprehensive Cooling Water Study. In a 1983-1984 study of seasonal patterns of distribution and abundance, fish were collected in November, January, June, and August using electrofishing gear and hoop nets. Electrofishing collections were dominated by centrarchids, which made up almost 50 percent of all fish collected. Redbreast sunfish (*Lepomis auritus*), bluegill, and largemouth bass (*Micropterus salmoides*) appeared most frequently in electrofishing collections, representing 16.7, 14.1, and 8.9 percent, respectively of fish collected. They were followed by spotted sucker (*Mingtrema melanops*; 8.5 percent), spotted sunfish (*L. punctatus*; 7.9 percent), chain pickerel (*Esox niger*; 5 percent), and bowfin (*Amia calva*; 5 percent). Hoop net collections were numerically dominated by flat bullhead (*Ameiurus platycephalus*; 29.2 percent), channel catfish (*Ictalurus punctatus*; 21 percent), redbreast sunfish (9.7 percent), and white catfish (*A. catus*; 9 percent). **(DuPont 1987)**

These species are all commonly found in large southeastern Coastal Plain river systems in habitats ranging from sloughs and backwaters to oxbow lakes to small tributary streams to small impoundments on these tributary streams **(Lee at al. 1980; Manooch 1984)**. As such, they are considered habitat generalists that can avail themselves of a range of habitats. Research has shown that fish species with very specific habitat requirements (for spawning, for example) are more likely to go extinct than those with more general habitat requirements **(Angermeier 1995)**. It follows that these generalists are more likely to thrive in large river systems that are subject to periodic droughts and floods.

The 1983-1984 SRS study included separate surveys of "small fish." These surveys were intended to develop relative abundance estimates of small, schooling species that serve as forage for a variety of top-of-the-food-chain predators, including such recreationally important species as largemouth bass, black crappie (*Pomoxis nigromaculatus*), striped bass (*Morone saxatilis*), white bass (*Morone chrysops*) and hybrid bass (*M. saxatilis* X *M. chrysops*). Shiners (genus *Notropis*) made up 89 percent of all fish collected in the small fish surveys **(Du Pont 1987)**. Other species that appeared regularly in the small fish surveys were brook silversides (*Labidesthes sicculus*), lined topminnow (*Fundulus lineolatus*), golden shiner (*Notemigonus crysoleucas*), and mosquitofish (*Gambusia* spp.). All of these species are common residents of swamps, bayous, and streams in the southeastern U.S. The 1983-1984 study did not distinguish between the various species of *Notropis* collected. A follow-up survey of small, minnow-like fish in the Savannah River and its tributaries found that three Notropids made up more than two-thirds of minnows collected: coastal shiner (*Notropis petersoni*; 39.6 percent), dusky shiner (*N. cummingsae*; 17.4 percent), and spottail shiner (*N. hudsonius*; 10.4 percent). **(Du Pont 1987)**

Between 1980 and 1995, 61 fish species were collected by Academy of Natural Sciences scientists at three stations up and down-stream from SRS and VEGP **(Halverson et al. 1997)**. Three species, all sunfish, were collected in every year of the study: redbreast sunfish, bluegill, and redear sunfish (*L. microlophus*). Several other species were collected in most (12 or more) years: spottail shiner (*Notropis hudsonius*), taillight shiner (*N. maculatus*), spotted sucker, pirate perch (*Aphredoderus sayanus*), mosquitofish, brook silversides warmouth, (*L. gulosus*), and largemouth bass. These surveys showed the same species and species groups dominating the Savannah River fish community as were seen in the 1983-1985 study.

*Diadromous Fish of the Middle Savannah River*

*<u>Sturgeons (Acipenseridae)</u>*

The shortnose sturgeon (*Acipinser brevirostrum*) is an anadromous fish that spawns in large Atlantic coastal rivers from New Brunswick, Canada, to north Florida **(Scott and Crossman 1973)**. A species of commercial importance around the turn of the century, the shortnose sturgeon is now listed by the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service as an endangered species. The decline of the species has been attributed to the impoundment of rivers, water pollution, and overfishing; recruitment rates appear to be too low to replenish depleted populations.

Shortnose sturgeon grow slowly, reach sexual maturity late in life, and live as long as 30 years. Fish from southern populations can grow faster and mature earlier than those from northern populations. Spawning occurs in or adjacent to <u>deep areas of rivers</u> with significant currents during each spring when water temperatures warm to 9°-12°C degrees (48°-54°F) **(Jenkins and Burkhead 1994)**. This can happen as early as February in Georgia and South Carolina. Adults apparently return to natal streams to spawn at 2 to 5 year intervals. Eggs are heavier than water and adhese after fertilization, sinking quickly and adhering to sticks, stones, and gravel on the river bottom. The interaction of water temperature, current velocity, and substrate type determines suitability of spawning habitat and hatching success. Substrate in the vicinity of VEGP was characterized as “shifting sands” **(GPC 1972)**. Few larvae or juveniles have been collected, so little is known of their distribution and movement.

Before 1982, shortnose sturgeon were not known to occur in the middle reaches of the Savannah River. However, 12 shortnose sturgeon larvae were collected from the Savannah River near SRS in a four-year Department of Energy study (1982 through 1985) of ichthyplankton abundance and entrainment. Westinghouse Savannah River Company conducted a biological assessment to evaluate the potential impacts of SRS operations on shortnose sturgeon and concluded that "existing and proposed operations [specifically L-Reactor] of the Savannah River Plant will not affect the continued existence of the shortnose sturgeon in the Savannah River." This conclusion was based on the fact that (1) shortnose sturgeon spawned in the Savannah River up- and downriver of SRS, (2) passage up- and downstream was not blocked by thermal effluents, (3) entrainment was unlikely because shortnose sturgeon eggs are demersal, adhesive, and negatively buoyant, and (4) impingement of healthy juvenile and adult sturgeon on cooling water system screening devices is highly unlikely given their strong swimming ability. NMFS concurred with the DOE determination that SRS operations did not threaten the Savannah River population of shortnose sturgeon.

A South Carolina Wildlife and Marine Resources Division (now South Carolina Department of Natural Resources) study of seasonal movement and spawning habitat preferences of Savannah River shortnose sturgeon found two probable spawning sites, one upstream of VEGP at River Miles 171-173 and the other downstream of VEGP at River Miles 111-118 **(Lamprecht 1991)**. A companion radiotelemetry study indicated that spawning occurred between River Miles 111 and River Mile 142 at water temperatures of 9.8°- 16.5°C (50°- 62°F) **(Collins and Smith 1993)**. Plant Vogtle borders the Savannah River from approximately River Mile 150 to River Mile 151.7.

From 1984-1992, more than 97,000 shortnose sturgeon were stocked in the Savannah River as part of a state and federal recovery program **(Smith et al. 2001)**. Recaptures of marked fish after an average time of 7.2 years indicated that fish stocked as juveniles made up at least 38.7 percent of the adult population. Some of the stocked sturgeons did not imprint on the Savannah River and were later found in the Edisto River (SC), the Ogeechee River (GA), the Cooper River (SC), and Winyah Bay (SC).

Population estimates and catch-per-unit-effort data from 1997-2000 suggested that the adult population was larger in 2000 than 1990, but juveniles were still rare. This suggests that a recruitment bottleneck exists during early life stages. Water quality degradation in the nursery habitat is believed to be at least partially responsible for the poor recruitment in the Savannah River. **(Smith et al. 2001)**

A related species, the Atlantic sturgeon (*A. oxyrhynchus*), is also found from Canada (Labrador) to north Florida. Like the shortnose sturgeon, the Atlantic sturgeon is anadromous, ascending coastal rivers to spawn as early as February – March in Florida and as late as July in Canada **(Jenkins and Burkhead 1994)**. There is evidence, however, for fall spawning migrations in some South Carolina rivers **(Collins et al. 2000)**. There are also indications that Atlantic sturgeon in southeastern rivers, including the Savannah, spawn further downstream than shortnose sturgeon in the same rivers, but still "well above" the salt wedge.

*Shad and River Herring (Clupeidae)*

Three clupeids ascend the Savannah River to spawn in its middle reaches: the American shad (*Alosa sapidissima*), the hickory shad (*A. mediocris*), and the blueback herring (*A. aestivalis*). Two other clupeids, gizzard shad (*Dorosoma cepedianum*) and threadfin shad (*D. petenense*), are also found in the Savannah River, but do not move between the Savannah River and the open ocean, and thus are not anadromous in the strictest sense. Gizzard shad are found in brackish water, and have been referred to as a "semi-anadromous" species.

The American shad is the most important clupeid in terms of the commercial and recreational fishing opportunities it provides. American shad once provided an important commercial fishery in the lower Savannah River, but a decline in the population in the 1980s and 1990s reduced the number of commercial fishermen pursuing shad. This is illustrated by NMFS and Georgia DNR data on commercial landings in Georgia. From 1970 to 1975, commercial fishermen in Georgia landed from161,700 pounds to 531,500 pounds of American shad annually **(NMFS 2006)**. Over a recent five year period (1999-2004), however, landings ranged from 27,699 in 2002 to 58,081 pounds in 2000 **(GDNR 2005)**. The total value of American shad landed over the 1999-2004 period ranged from $22,682 in 2002 to $45,496 in 1999. Most, if not all, commercial shad fishermen have other full-time jobs and fish for extra money on days off or weekends during the spring run.

Clemson University researchers estimated the population size of American shad that reached the New Savannah River Bluff Lock and Dam to be 157,685 fish in 2001 and 217,077 in 2002. This suggests that substantial numbers of spawning American shad pass VEGP during their annual spawning run: New Savannah River Bluff Lock and Dam are at River Mile 187, approximately 35 river miles upstream of VEGP. **(Bailey, Isely, and Bridges 2004)**

Hickory shad are smaller and less numerous than American shad. They support a modest commercial and recreational fishery. Blueback herring are smaller still, but are netted by commercial operators who sell them for live bait. Blueback herring are the bait of choice for anglers who pursue striped and hybrid bass in Clarks Hill, Russell, and Hartwell reservoirs.

*Striped bass*

The striped bass is an anadromous species, but in the Savannah River the degree of anadromy is greatly reduced. Unlike striped bass in the northeast and middle Atlantic, which spend their adult lives in the Atlantic Ocean and ascend coastal rivers to spawn, Savannah River striped bass tend to spawn in the lower, tidally-influenced part of the river and move upstream to non-tidal portions of the river after spawning. Fish fitted with radio transmitters have traveled as far upstream as the New Savannah Bluff Lock and Dam (River Mile 187) after spawning. Dudley et al. (1977) theorized that "excessively warm coastal waters" in summer at the mouth of the Savannah River may have led to the development of this behavioral pattern in Savannah River striped bass; water temperatures along the Georgia coast may reach 86°F, exceeding those tolerated by striped bass. **(Dudley, Mullis and Terrell 1977)**

During the 1980s, Savannah River striped bass suffered a precipitous population decline. From 1980 to 1988, catch-per-unit-effort of large striped bass in the lower Savannah River declined by more than 90 percent **(Reinert et al. 2005)**. Not surprisingly, the decline in large adult striped bass was accompanied by a steep decline in egg production. The population decline was attributed to operation of a tide gate, installed in the lower estuary by the U.S. Army Corps of Engineers in 1977. The tide gate, which was intended to prevent sediment from accumulating in the harbor, had the unintended effect of increasing salinity upstream in important striped bass spawning areas and speeding the transport of eggs and larvae from upstream spawning sites to the harbor, where they encountered high salinities and industrial pollutants.

Because of the population decline, the states of Georgia and South Carolina declared moratoriums on the harvest of striped bass (from the mouth of the Savannah River to New Savannah Bluff Lock and Dam) in 1988 and 1990, respectively **(Reinert et al. 2005)**. In response to concerns about the impact of the tide gate on anadromous fisheries, the Corps of Engineers discontinued operation of the tide gate in 1991. A long-standing program of stocking striped bass in the estuary was modified in the early 1990s. Based on research findings, Georgia DNR began stocking larger fish further up-river and improved its transportation and handling methods to reduce stress responses in stocked fish. From 1990 to 2002, 1.6 million striped bass of various sizes and ages were stocked in the Savannah River. Electrofishing surveys were instituted in order to measure the effectiveness of the stocking programs.

Catch-per-unit-effort of adult striped bass in the Savannah River increased sharply in the 1990s in response to the stocking programs **(Reinert et al. 2005)**. The importance of the stocking program was demonstrated by the fact that more than 70 percent of striped bass collected were hatchery-bred fish. The success of the stocking program (and a preponderance of 2-and 3-year old fish) led Georgia DNR to suspend Savannah River stocking in 2003 and 2004.

Egg production has been slower to recover. Egg densities in 2000 were approximately 10 percent of densities recorded in the late 1970s **(Reinert et al. 2005)**. However, with the return of suitable spawning conditions and the increased abundance of large spawning females in the estuary, egg production is expected to increase as well.

Based on fishing reports, striped bass numbers up and downstream of VEGP have increased in response to downstream habitat restoration efforts and stocking programs, and a popular catch and release fishery has developed **(Babb 1999, 2005)**. In its 2005 “Fishing Prospects” newsletter, Georgia DNR notes that “the number of striped bass in the river has increased substantially in recent years. However, it is important for anglers to realize that most of the stripers they catch were stocked and the number of naturally-reproducing striped bass remains low” **(GDNR 2005)**. South Carolina DNR announced in July 2005 that Savannah River striped bass restoration efforts had been so successful that the harvest moratorium on Savannah River striped bass, in place since 1991, would end on October 1, 2005 **(Creel 2005)**. Although the population is currently dominated by hatchery-bred fish, the striped bass population of the Savannah River is obviously expanding and, if current trends continue, should return to levels seen in the 1960s and 1970s. Striped bass populations in river systems up and down the Atlantic coast have largely rebounded as a result of commercial and recreational harvest restrictions that followed enactment of the Atlantic Striped Bass Conservation Act (16 U.S.C. § 1851) in 1984.

*American eel (Anguilla rostrata)*

The American eel occurs in rivers and streams along the east coast of the U.S. from Maine to Florida. The American eel is catadromous, growing to sexual maturity in freshwater and migrating hundreds of miles into the Atlantic Ocean (the Sargasso Sea) to spawn. Adults do not return to freshwater after spawning. Eggs spawned in the Sargasso Sea drift westward and northward with ocean currents and develop into larvae, then nektonic glass eels, which swim west across the Continental Shelf and enter east coast estuaries, where they darken and become elvers (at about 65 mm in length). At about 100 mm, elvers become fully-pigmented juvenile (yellow) eels. Males, which tend to remain in estuarine areas, grow rapidly and mature into adults at age 3 to 10 years **(Jenkins and Burkhead 1994)**. Females tend to move inland, into tidal freshwater rivers and upriver tributaries, where they mature into adults at age 4 to 18 years.

American eel numbers along the Atlantic coast were relatively stable through the 1970s. Fisheries managers and commercial fishermen noticed a decline in numbers of eels ascending coastal streams in the 1980s and 1990s **(Haro et al. 2000)**. Responding to concerns of state and federal agency biologists, the Atlantic States Marine Fisheries Commission in April 2000, issued an Interstate Fishery Plan for American Eel that summarized and synthesized information on the population decline and proposed a range of measures that will ensure the species' recovery and continued viability.

The USFWS, on July 6, 2005 announced in a 90-day Finding that it was initiating a status review to determine if listing the American eel as a protected species was warranted. The Federal Register (FR) notice lists an array of threats to the species (e.g., commercial harvest, habitat loss and degradation, changes in oceanic conditions) and concludes that "…we find that the petition presents substantial scientific and commercial information indicating that listing the American eel may be warranted." In the discussion of population status, the FR points out that population declines have been most dramatic in Canada and New England and that populations may be stable in the southeastern U.S.

American eels in the Middle Savannah River Basin are fully pigmented juveniles (yellow eels) and are mostly females **(Marcy et al. 2005)**. McCord (2004) observed high densities of yellow eels in the Middle Savannah River in relatively shallow, non-navigable reaches offering pool-riffle habitats with rocks and submerged aquatic vegetation. In the vicinity of VEGP, eels are found in the Savannah River mainstem, in the Savannah River swamp, in tributary streams, and in small impoundments on these tributaries **(Marcy et al. 2005)**. There is scant information on current population trends in South Carolina and Georgia, but commercial landings of eels in Georgia declined more than 80 percent from 1983 to 1995 **(ASMFC 2000)**. Resource agency biologists in South Carolina and Georgia do not monitor eel population trends in the Savannah River, but anecdotal information suggests that eel numbers are lower now than in the 1970s and 1980s.

### 2.4.2.3 Sensitive Species

*Sensitive Aquatic Populations*

As discussed previously in this section, the Academy of Natural Sciences of Philadelphia has monitored the freshwater mussels of the middle Savannah River since 1951 as part of a larger monitoring program designed to assess potential impacts of the SRS on the general health of the river. Mussels are collected annually at five locations, one upstream of VEGP, one immediately downstream of the VEGP, and three further downstream of VEGP. Academy scientists collected 16 mussel species between 1951 and 2000, none of which was state- or federally listed **(Arnett 2001)**.

The only federally-listed fish species known to occur in the Savannah River in the vicinity of VEGP is the endangered shortnose sturgeon (*Acipenser brevirostrum*). This anadromous species, first documented in the middle Savannah River in the early 1980s by SRS researchers, is known to spawn up and downstream of VEGP **(DOE 1997)**. A related species, the Atlantic sturgeon (*Acipenser oxyrinchus*), which has been designated a Species of Concern by the NMFS **(NMFS 2004)**, also ascends the Savannah River to spawn in fresh water but little is known about its spawning habits in the Savannah River. The Atlantic sturgeon was considered for listing under the Endangered Species Act in 1998, but the NMFS ultimately determined that listing was not warranted.

The robust redhorse (*Moxostoma robustum*), a species thought to be extinct, was rediscovered by Georgia DNR biologists in 1991 in the Oconee River, near Toomsboro, Georgia **(USFWS 1998)**. Since 1991, remnant populations have also been found in portions of the Pee Dee River (NC-SC), the Savannah River (SC-GA), and Ocmulgee River (GA) **(RRCC 2003)**. This large sucker (up to 30 inches long and 17 pounds) has large molar-like pharyngeal teeth that its uses to crush and eat bivalves, both native mussels and non-native Asiatic clams (*Corbicula* sp.). Once common in Atlantic slope river systems from the Pee Dee to the Altamaha, the species' range has been severely reduced by dams, which blocked its movement, and by streamside erosion, which led to siltation of feeding and spawning areas. The robust redhorse has no federal status, but has been designated an endangered species by the State of Georgia. The decline of the species has been attributed to habitat loss (dams and impoundments on native streams) and habitat degradation (pollution, siltation from agricultural and silvicultural activity in watersheds). The non-native flathead catfish, introduced to many southeastern streams by fishermen, may also have contributed to the robust redhorse's decline as this large, aggressive catfish feeds on native catastomids and competes with them for food (crayfish and clams).

The robust redhorse was first documented in the middle Savannah River in 1997, when a single adult was collected near VEGP **(RRCC 1998; Barrett 2000)**. Since that time, robust redhorse have been found at several locations between the Augusta Shoals area and U.S. Highway 301, which is approximately 30 miles down-river from VEGP **(Barrett 2000; Hendricks 2002)**. Spawning has been documented in both the Augusta Shoals and New Savannah Bluff Lock and Dam areas **(Freeman and Freeman 2001; Hendricks 2002)**. The Robust Redhorse Conservation Committee, a multi-agency group, has worked on the recovery of the species since 1995, rearing young redhorse at hatcheries and stocking them in streams in Georgia and the Carolinas. This group was instrumental in stocking fingerling robust redhorse in the Broad River, a major tributary of the Savannah River that empties into Clarks Hill Reservoir. Fish from these stockings have been found as juveniles in both the Broad River and Clarks Hill Reservoir.

Records of the USFWS, Georgia DNR, and South Carolina DNR were reviewed for information on sensitive aquatic species in counties crossed by VEGP transmission lines. The Altamaha spinymussel (*Elliptio spinosa*), a candidate for federal listing, occurs in the Altamaha River and its tributaries in the coastal plain of Georgia. It is found in two counties (Long and McIntosh) crossed by the Vogtle-Thalmann transmission line. This large mussel has experienced a substantial decline in number (of sites occupied) in recent years that has been attributed to habitat degradation and competition with the non-native Asiatic clam, *Corbicula fluminea* **(Georgia Museum undated; Wisniewski, Krakow and Albanese 2005)**. Unauthorized collection of specimens of *E. spinosa* is also thought to have contributed factor to the species' decline.

## Table 2.4-1 Protected Species in Burke County or Counties Crossed by Existing Transmission Lines[1]

| Common Name | Scientific Name | Federal Status[2] | State Status[2] Georgia | State Status[2] South Carolina |
|---|---|---|---|---|
| **Mammals** | | | | |
| Rafinesque's big-eared bat | *Corynorhinus rafinesquii* | - | R | E |
| Northern right whale[3] | *Eubalaena glacialis* | E | E | - |
| Humpback whale[3] | *Megaptera novaeangliae* | E | E | - |
| Manatee[3] | *Trichechus manatus* | E | E | E |
| **Birds** | | | | |
| Bachman's sparrow | *Aimophila aestivalis* | - | R | - |
| Bald eagle[4] | *Haliaeetus leucocephalus* | T | E | E |
| Piping plover | *Charadrius melodus* | T | T | - |
| Wilson's plover | *Charadrius wilsonia* | - | R | T |
| Kirtland's warbler | *Dendroica kirtlandii* | E | E | - |
| American oystercatcher | *Haematopus palliatus* | - | R | - |
| Wood stork[4,5] | *Mycteria americana* | E | E | E |
| Bachman's sparrow | *Aimophila aestivalis* | - | R | - |
| Red-cockaded woodpecker[4] | *Picoides borealis* | E | E | E |
| Swallow-tailed kite | *Elanoides forficatus* | - | R | E |
| Least tern | *Sterna antillarum* | - | R | T |
| Gull-billed tern | *Sterna nilotica* | - | T | - |
| Bachman's warbler | *Vermivora bachmanii* | E | E | - |
| **Reptiles** | | | | |
| Loggerhead sea turtle | *Caretta caretta* | T | T | T |
| Green sea turtle | *Chelonia mydas* | T | T | - |
| Spotted turtle[5] | *Clemmys guttata* | - | U | T |
| Leatherback sea turtle | *Dermochelys coriacea* | E | E | - |
| Hawksbill sea turtle | *Eretmochelys imbricata* | E | E | - |
| American alligator[6,7] | *Alligator mississippiensis* | T(S/A) | - | - |
| Eastern indigo snake | *Drymarchon corais couperi* | T | T | - |
| Kemp's Ridley sea turtle | *Lepidochelys kempii* | E | E | - |
| Gopher tortoise[4,5] | *Gopherus polyphemus* | - | T | E |
| **Amphibians** | | | | |
| Gopher frog | *Rana capito* | - | - | E |
| Striped newt | *Notophthalmus perstriatus* | - | R | - |
| Flatwoods salamander[4] | *Ambystoma cingulatum* | T | T | E |

## Table 2.4-1 (cont.) Protected Species in Burke County or Counties Crossed by Existing Transmission Lines[1]

| Common name | Scientific name | Federal status[2] | State Status[2] Georgia | State Status[2] South Carolina |
|---|---|---|---|---|
| **Fish** | | | | |
| Shortnose sturgeon[4] | *Acipenser brevirostrum* | E | E | E |
| Altamaha shiner | *Cyprinella xaenura* | - | E | - |
| Goldstripe darter | *Etheostoma parvipinne* | - | R | - |
| Bluefin killifish | *Lucania goodei* | - | U | - |
| Robust redhorse | *Moxostoma robustum* | - | E | - |
| **Invertebrates** | | | | |
| Altamaha spinymussel | *Elliptio spinosa* | C | - | - |
| Atlantic pigtoe mussel[4] | *Fusconaia masoni* | - | E | - |
| **Plants** | | | | |
| Pool sprite | *Amphianthus pusillus* | T | T | T |
| Georgia aster | *Aster georgianus (=Symphyotrichum georgianum)* | C | - | - |
| Purple honeycomb head | *Balduina atropurpurea* | - | R | - |
| Velvet sedge | *Carex dasycarpa* | - | R | - |
| Rosemary[4] | *Ceratiola ericoides* | - | T | - |
| Atlantic white-cedar | *Chamaecyparis thyoides* | - | R | - |
| Harper's dodder | *Cuscuta harperi* | - | T | - |
| Pink ladyslipper | *Cypripedium acaule* | - | U | - |
| Smooth coneflower | *Echinacea laevigata* | E | E | E |
| Georgia plume[4] | *Elliottia racemosa* | - | T | - |
| Green fly orchid | *Epidendrum conopseum* | - | U | - |
| Dwarf witch-alder | *Fothergilla gardenii* | - | T | - |
| Shoals spiderlily | *Hymenocallis coronaria* | - | E | - |
| Mat-forming quillwort | *Isoetes tegetiformans* | E | E | - |
| Pondberry | *Lindera melissifolia* | E | E | E |
| Pondspice[5] | *Litsea aestivalis* | - | T | - |
| Pineland Barbara buttons | *Marshallia ramosa* | - | R | - |
| Trailing milkvine | *Matelea pubiflora* | - | R | - |
| Indian olive[4] | *Nestronia umbellula* | - | T | - |
| Canby's dropwort[d] | *Oxypolis canbyi* | E | E | E |

## Table 2.4-1 (cont.) Protected Species in Burke County or Counties Crossed by Existing Transmission Lines[1]

| Common name | Scientific name | Federal status[2] | State Status[2] | |
|---|---|---|---|---|
| | | | Georgia | South Carolina |
| Grit beardtongue | *Penstemon dissectus* | - | R | - |
| Tidal marsh obedient plant | *Physostegia leptophylla* | - | T | - |
| Harperella | *Ptilimnium nodosum* | E | E | E |
| Tiny-leaf (climbing) buckthorn | *Sageretia minutiflora* | - | T | - |
| Yellow flytrap | *Sarracenia flava* | - | U | - |
| Hooded pitcherplant[5] | *Sarracenia minor* | - | U | - |
| Parrot pitcherplant | *Sarracenia psittacina* | - | T | - |
| Sweet pitcherplant[3] | *Sarracenia rubra* | - | E | - |
| Bay star-vine[6] | *Schisandra glabra* | - | T | - |
| Chaffseed | *Schwalbea americana* | E | E | E |
| Ocmulgee skullcap[4] | *Scutellaria ocmulgee* | - | T | - |
| Swamp buckthorn | *Sideroxylon thornei* | - | E | - |
| Silky camellia | *Stewartia malacodendron* | - | R | - |
| Pickering's morning-glory | *Stylisma pickeringii pickeringii* | - | T | - |
| Ball-moss | *Tillandsia recurvata* | - | T | - |
| Relict trillium | *Trillium reliquum* | E | E | E |

1 Species has been recorded by **USFWS 2004** or **GDNR 2004** to occur in Georgia counties crossed by the transmission lines, or by **SCDNR 2006** to occur in Barnwell County, South Carolina. Shaded species were observed during 2005 survey.

2 E = Endangered, T = Threatened, C = Candidate for federal listing, T(S/A) = Threatened due to similarity of appearance, R = Rare (Georgia only), U = Unusual (Georgia only), - = not listed.

3 Included for completeness. Some VEGP transmission lines cross Georgia coastal counties that list these marine mammals as protected species.

4 Species has been recorded by **USFWS 2004** or **GDNR 2004** in Burke County, Georgia.

5 Species was observed along VEGP-associated transmission corridors during field surveys conducted in 2005.

6 Species was observed at VEGP site during field surveys conducted in 2005.

7 County occurrences for the American alligator are not maintained by **USFWS 2004**, **GDNR 2004**, or **SCDNR 2006**; this species is included in this table because it is known to occur at the VEGP site.

## Table 2.4-2 Protected Species in Counties Likely to be Crossed by the New VEGP Transmission Corridor[1]

| Common name | Scientific name | Federal status[2] | Georgia status[2] |
|---|---|---|---|
| **Birds** | | | |
| Bald eagle | *Haliaeetus leucocephalus* | T | E |
| Wood stork | *Mycteria americana* | E | E |
| Red-cockaded woodpecker | *Picoides borealis* | E | E |
| **Reptiles** | | | |
| Spotted turtle | *Clemmys guttata* | - | U |
| Gopher tortoise | *Gopherus polyphemus* | - | T |
| **Amphibians** | | | |
| Flatwoods salamander | *Ambystoma cingulatum* | T | T |
| **Fish** | | | |
| Shortnose sturgeon | *Acipenser brevirostrum* | E | E |
| Sandbar shiner | *Notropis scepticus* | - | R |
| **Invertebrates** | | | |
| Atlantic pigtoe mussel | *Fusconaia masoni* | - | E |
| **Plants** | | | |
| Georgia aster | *Aster georgianus (=Symphyotrichum georgianum)* | C | - |
| Rosemary | *Ceratiola ericoides* | - | T |
| Georgia plume | *Elliottia racemosa* | - | T |
| Indian olive | *Nestronia umbellula* | - | T |
| Canby's dropwort | *Oxypolis canbyi* | E | E |
| Grit beardtongue | *Penstemon dissectus* | - | R |
| Hooded pitcherplant | *Sarracenia minor* | - | U |
| Sweet pitcherplant | *Sarracenia rubra* | - | E |
| Ocmulgee skullcap | *Scutellaria ocmulgee* | - | T |
| Granite stonecrop | *Sedum pusillum* | - | T |
| Silky camellia | *Stewartia malacodendron* | - | R |

1 Source of County Occurrence: **USFWS 2004, GDNR 2004**.

2 E = Endangered, T = Threatened, C = Candidate for federal listing, R = Rare, U = Unusual, - = not listed.

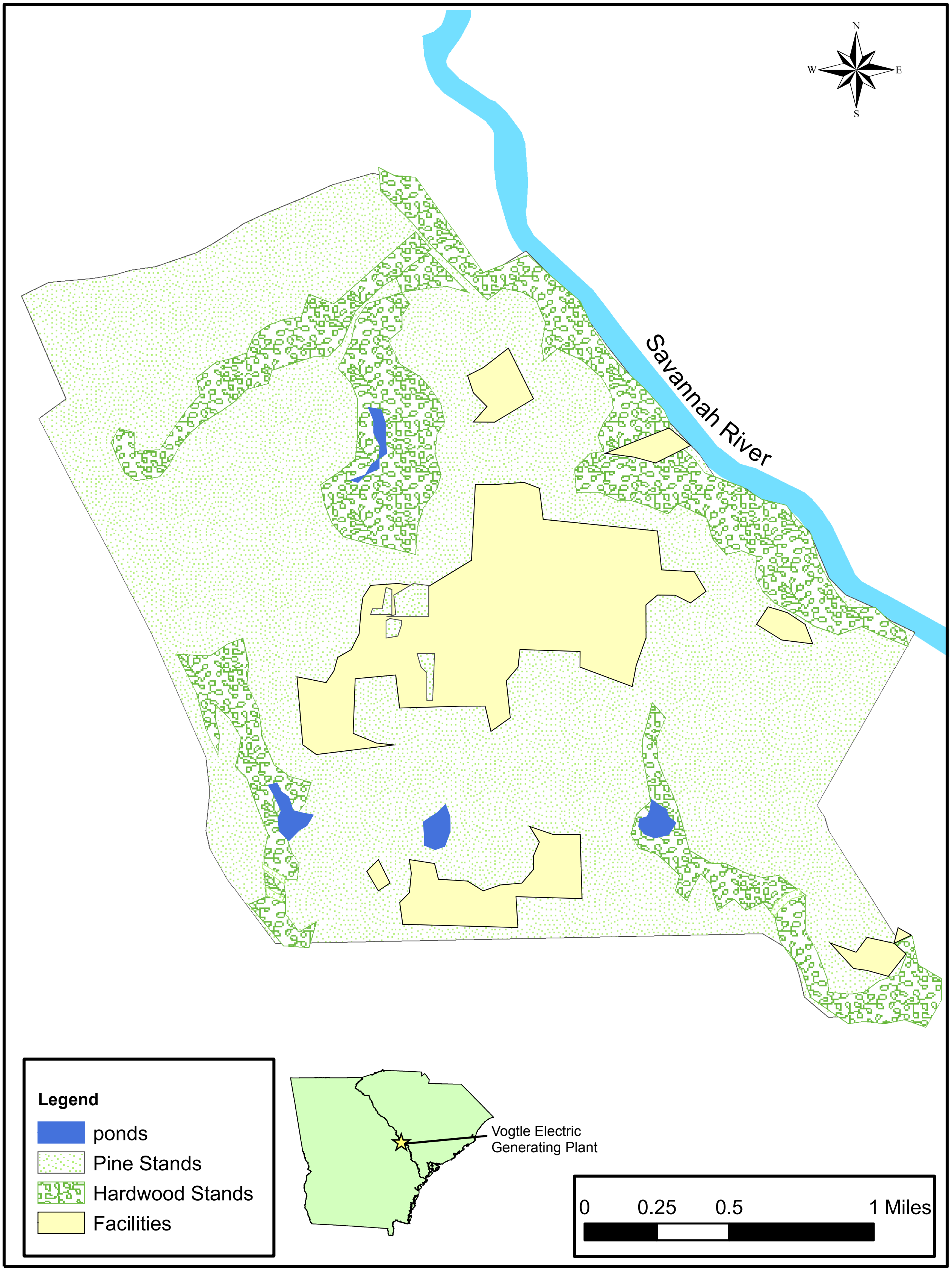


**Figure 2.4-1  Vegetation Communities on the VEGP Site**

## Section 2.4 References

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## 2.5 Socioeconomics

This section presents the socioeconomic resources that have the potential to be impacted by the construction, operation, and decommissioning of new nuclear units on the VEGP site. The section is divided into four sections: demographics, community characteristics, historic properties, and environmental justice. These sections include discussions of spatial (e.g., regional, vicinity, and site) and temporal (e.g., 10-year increments of population growth) considerations, where appropriate.

For purposes of socioeconomic analysis, SNC has assumed that the residential distribution of the new units' construction and operational workforces would resemble the residential distribution of VEGP's current workforce. Approximately 79 percent of current VEGP employees reside within three counties: Burke (20 percent), Richmond (26 percent), and Columbia (34 percent). The remaining 20 percent are distributed across 24 other counties, with numbers ranging from 1 to 58 (0.1 to 6.7 percent of the existing VEGP workforce) employees per county. The socioeconomic effects would be most evident in Burke, Richmond or Columbia counties so socioeconomic characteristics are analyzed only for those counties.

### 2.5.1 Demography

Within this section, demographic characteristics are presented in four major sections: population data by sector; population density; population data by political jurisdiction; and transient and migrant populations.

*Population Data by Sector*

SNC used 1980 and 2000 census data from the U.S. Census Bureau (USCB) website and geographic information system (GIS) software (ArcView®) to determine demographic characteristics in the vicinity of the proposed project and 50-mile region.

Figure 2.5.1-1 shows a 10-mile radius sector chart superimposed over a VEGP site vicinity map. On this map, the power block for the existing facilities is at the center, surrounded by concentric circles representing radii of 1, 2, 3, 4, 5 and 10 miles. The radius is divided into 16° emergency planning zones sectors with each sector centered on one of the 16 compass points (e.g., N, NNE, NE, E, etc.). The new plant footprint would be approximately 1,000 feet due west and 200 feet south of the existing units. SNC chose to use the center of the existing power block as the basis for the demographic analysis of the new units, because SNC is developing a complete and integrated emergency plan for all four units based on the current emergency plan and site maps for analysis of the new units. Figure 2.5.1-2 is the 50-mile radius sector chart, divided into 10-mile radii. Each radius is divided into sectors as described for the vicinity radii.

The sector radii population estimates (based on the most recent USCB decennial census data) were used to determine the population distribution surrounding the VEGP site.

SNC used SECPOP 2000, a computer code that calculates population by emergency planning zone sectors, to determine the year 2000 resident population by sector. The 1980 and 2000 county census data were used to develop an annualized growth rate for each county that fell, either completely or partially, in the area covered by the grid sector. For each grid sector, the percentage of each county's land area that fell, either completely or partially, within that sector, was calculated using ArcView 3.1. SNC prepared a calculation package supporting this analysis.

Population projections for the years 2020, 2030, 2040, 2050, 2060, 2070, 2080, and 2090 were estimated for each sector using the following methodology:

1. The 2000 population of the part of a county in a particular grid sector was estimated by multiplying the sector population, as determined by SECPOP 2000, by the percent of the county land area that fell within that sector, as determined by ArcView 3.1. Thus, if a county occupied 30 percent of the land area of a specific sector, the assumption was made that 30 percent of the sector's population resided in that county, and would be subject to the growth rate of that county.
2. The population of a particular sector residing in a particular county, as determined in Step 1, was multiplied by that county's annualized growth rate, as derived from 1980 to 2000 US census data growth rates, to estimate the future populations.
3. The population projections for each county in a sector were summed to get the total estimate of the sector's future populations.

Table 2.5.1-1 presents the population information for each sector. Although it is unlikely, SNC could hold the ESP permit for 20 years before initiating construction. Assuming 3 years from submitted to approval. 20 years before construction, 5 years for construction, 40 years of operation under the initial licenses and 20 years of continued operation under renewed licenses, VEGP Units 3 and 4 could produce electricity beyond 2090. Population projections for the 0 to 10 miles radii include residents and transients. Transient data were obtained from the Vogtle Electric Generating Plant Emergency Plan, Rev. 43. The population projections for radii of more than 10 miles include only residents.

*Population Data by Political Jurisdiction*

The area defined by a 50-mile radius from the center of the existing power block (Figure 2.5.1-2) includes all or part of 28 counties in Georgia and South Carolina (Table 2.5.1-2) and one major city in Georgia.

The nearest population center (i.e., more than 25,000 residents) is Augusta, Georgia, approximately 26 air miles northwest of the site. Augusta's 2000 population was 195,182 **(USCB 2000a)**. Other municipalities in the 50-mile region, their 2000 population, and location relative to VEGP, are presented in Table 2.5.1-3.

The 50-mile vicinity includes, in its entirety, the Augusta-Richmond County, GA-SC metropolitan statistical area (MSA). Burke, Richmond, and Columbia Counties are all included in the Augusta-Richmond County, GA-SC MSA. The Augusta-Richmond County, GA-SC MSA is characterized by urban, suburban, and rural areas, and a 2000 population of 499,684 **(USCB 2003)**. The Augusta-Richmond County, GA-SC MSA is the 89th largest in the U.S. From 1990 to 2000, the MSA grew 14.7 percent **(USCB 2003)**.

Table 2.5.1-4 presents historic and projected population growth rate data for the three counties of interest. Population data from 1970 to 2000 is provided by the U.S. Census Bureau **(USCB 1995, 2000a)**. From 1990 to 2000, Columbia County grew at an average annual growth rate of 3.1 percent. Burke and Richmond Counties grew 0.8 and 0.5 percent, respectively. For the same period, Georgia grew at an average annual rate of 2.4 percent.

Population projections are provided by the State of Georgia's Office of Planning and Budget **(Georgia 2005)**. The 2010-2015 population projections for the three counties were developed using the cohort-survival model (also known as the cohort-component model). The method uses the following demographic equation:

$$\text{Population}_1 = \text{Population}_0 + \text{Births} - \text{Deaths} + \text{Net Migration}$$

Existing population projections were updated with the most recent census data and the actual birth and death data for 1990 through 2003. Additionally, a comparison was made to the USCB 2003 population estimates, which include the most recent migration data. **(Georgia 2005)**. The socioeconomic data available for this analysis do not project beyond 2015.

Between 2000 and 2015 Burke County's population annual growth rate is projected to remain approximately steady at 1.0 percent. Columbia County's rate is expected to slow to 2.6 percent annually by 2015. Richmond County is projected to decrease in population at the rate of -0.3 to -0.2 percent annually.

Table 2.5.1-5 lists the age distributions in Burke, Richmond, and Columbia Counties in 2000 and compares them to the age distribution in the State of Georgia.

*Population Density for Socioeconomic Analyses*

To provide a basis for the socioeconomic analyses in this report, SNC reviewed the population characterization technique used in NUREG-1437, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants 1996* (NUREG-1437) (GEIS) and determined it was an appropriate methodology for characterizing the population around the VEGP site.

NUREG-1437 characterizes populations based on two factors: "sparseness" and "proximity". "Sparseness" describes population density and city size within 20 miles of a site as follows:

**Demographic Categories Based on Sparseness**

| | | Category |
|---|---|---|
| Most sparse | 1. | Less than 40 persons per square mile and no community with 25,000 or more persons within 20 miles |
| | 2. | 40 to 60 persons per square mile and no community with 25,000 or more persons within 20 miles |
| | 3. | 60 to 120 persons per square mile or less than 60 persons per square mile with at least one community with 25,000 or more persons within 20 miles |
| Least sparse | 4. | Greater than or equal to 120 persons per square mile within 20 miles |

Source: NUREG-1437

"Proximity" describes population density and city size within 50 miles as follows:

**Demographic Categories Based on Proximity**

| | | Category |
|---|---|---|
| Not in close proximity | 1. | No city with 100,000 or more persons and less than 50 persons per square mile within 50 miles |
| | 2. | No city with 100,000 or more persons and between 50 and 190 persons per square mile within 50 miles |
| | 3. | One or more cities with 100,000 or more persons and less than 190 persons per square mile within 50 miles |
| In close proximity | 4. | Greater than or equal to 190 persons per square mile within 50 miles |

Source: NUREG-1437

NUREG-1437 then uses the following matrix to rank the population category as low, medium, or high.

**GEIS Sparseness and Proximity Matrix**

**Proximity**

| **Sparseness** | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| | 1 | 1.1 | 1.2 | 1.3 | 1.4 |
| | 2 | 2.1 | 2.2 | 2.3 | 2.4 |
| | 3 | 3.1 | 3.2 | 3.3 | 3.4 |
| | 4 | 4.1 | 4.2 | 4.3 | 4.4 |

Low Population Area — Medium Population Area — High Population Area

Source: NUREG-1437

SNC used 2000 census data **(USCB 2000b, 2000c)** and GIS software (ArcView®) to characterize the population within 50 miles of the VEGP site. SNC prepared a calculation package supporting this analysis.

Based on the 2000 Census Bureau information, 43,857 people lived within 20 miles of the VEGP site resulting in a population density of 46 persons per square mile within 20 miles and therefore falling into a more sparse category, Category 2 (40 to 60 persons per square mile and no community with 25,000 or more persons within 20 miles). (The SRS land area was excluded from this analysis because no one resides on SRS and at 310 square miles, it is a significant part of the area within 50 miles of the VEGP site).

Based on the 2000 Census Bureau information, approximately 670,000 people live within 50 miles of the VEGP site resulting in a population density of 89 persons per square mile within 50 miles. The VEGP site proximity uses Category 3 (one or more cities with 100,000 or more persons and less than 190 persons per square mile within 50 miles). Therefore, with sparseness Category 2 and proximity Category 3, the VEGP is in a medium population area.

*Transient Populations*

The VEGP Emergency Plan provides a quantitative estimate of the transient population to 10 miles from the site. These transients are included in Table 2.5.1-1. This discussion focuses on transients between the 10- and 50-mile radii and is qualitative.

Transients include people in workplaces, schools, hospitals and nursing homes, correctional facilities, hotels and motels, and at recreational areas or special events. The area within 10 miles of the VEGP site is rural and characterized by wooded tracts of land and farms. The transient employment population commutes out of the area closest to VEGP, to workplaces more distant.

With the exception of the SRS, no significant industrial or commercial facilities occur in the 10-mile radius. The SRS employs approximately 11,000 people, most of whom reside within 50 miles of the SRS. The SRS maintains its own emergency plan which would be invoked in case of an emergency at VEGP; therefore, SRS employees are not considered transients in this analysis.

Fort Gordon, in Richmond County, Georgia, has about 18,000 to 19,000 personnel on post at any one time. No other military facilities are within the 50-mile radius.

Hospitals in the region are discussed in Section 2.5.2.6. Seventy-three nursing homes or personal care homes are listed in the Augusta regional telephone directory. Schools, including colleges and universities are discussed in Section 2.5.2.7. Eleven correctional facilities are within the 50-mile radius, seven in Georgia **(GDC 2004)** and four in South Carolina **(SCDC No Date)**. Numerous hotels and motels occur in the 50-mile radius; most are located in population centers such as Augusta, Aiken, or Statesboro, Georgia. Recreation facilities and major special events are described in Section 2.5.2.5.

Magnolia Springs, the state park nearest VEGP had 120,500 visitors in 2004. Redcliffe Plantation, the next closest state park, had 2,500 visitors in 2004. No visitor data are available for the Georgia Wildlife Management Areas (WMAs). During the 2004 hunting season, 3,100 hunters visited Crackerneck WMA on the SRS.

## 2.5.2 Community Characteristics

This section addresses the following community characteristics for the three counties: economy, transportation, taxes, land use, aesthetics and recreation, housing, community infrastructure and public services, and education.

### 2.5.2.1 Economy

The principle economic centers include Augusta (Richmond County), Martinez (Columbia County), Evans (Columbia County), and Waynesboro (Burke County). In these counties the service industry employs the greatest number of workers (28.5 percent of employment). Other important sectors of employment include government (24.4 percent); retail trade (18 percent); manufacturing (10.3 percent), and construction (5.9 percent) **(BEA 2005a)**. From 1990 to 2000, the transportation and utilities (4.7 percent) and service (3.4 percent) industries had the largest growth rates. Mining (-3.9 percent), wholesale trade (-1.5 percent), farming (-1.4 percent), and construction (-1.3 percent) experienced declines. Table 2.5.2-1 details the employment by industry in the three counties.

The three-county area has a diversified, expanding industry base. Manufacturing firms in the three counties produce a variety of products from disposal diapers to golf carts. The area has two natural resource assets – wood and kaolin. The 50-mile region is a large supplier of kaolin for ceramics and fillers. Forestry companies manufacture wood products ranging from paper products and pulpwood to furniture and flooring. Textile firms manufacture fabrics and apparel. Medical supplies, services (including hospitals and physicians), and technology are also important to the area. Medical companies produce pharmaceuticals, medical supplies, and diagnostic equipment **(Columbia County 2000)**. The top ten employers in the Augusta-Richmond County, GA-SC MSA, are listed in Table 2.5.2-2 **(GDOL 2004)**. Although taken together the many manufacturing firms are a large employment sector, no single manufacturing firm ranks among the top 10 employers.

Two of the largest employers in the area are the U.S. Army's Fort Gordon and the Department of Energy's SRS. Fort Gordon, in Richmond County, houses the U.S. Army's Signal Corps and employs over 12,000 military and 5,000 civilian workers. Fort Gordon has an annual income impact of $1.2 billion on the local economy. Income impact includes direct salary dollars, local procurement, and salaries of jobs created as a result of direct jobs and procurement **(CSRA AFG 2003)**. The SRS, in South Carolina, is a nuclear defense facility. SRS employs approximately 11,000 workers and its annual budget is approximately $1.6 billion. Approximately 3,200 of those workers reside in the three Georgia counties of interest **(WSRC 2004)**. With 888 (Table 2.9-1) employees, VEGP is one of the largest employers in Burke County.

Table 2.5.2-3 details employment trends in the three counties. In 2004, the labor force was 141,068, increasing at an average annual rate of 0.9 percent between 1995 and 2004. The labor force in the State of Georgia increased at an average annual rate of 2.0 percent over the same time period **(BLS 2005)**.

In 2004, employment was 133,269 people in the three counties, or 3.2 percent of state employment **(BLS 2005)**. Employment increased at an average annual rate of 1.0 percent between 1995 and 2004. Total employment increased at a slightly faster pace than the labor force. Employment in Georgia increased at an average annual rate of 1.9 percent over the same time period **(BLS 2005)**.

In 2004, a total of 7,799 people in the three counties were unemployed. From 1995 to 2004, the three counties unemployment decreased from 6.6 to 5.5 percent. In Georgia, the number of unemployed workers increased over the same period, but the unemployment rate declined from 4.8 to 4.6 percent (Table 2.5.2-4). This is attributed to the 2.0 percent annual increase in the labor force over the same period **(BLS 2005)**.

Per capita personal income ranged from a high of $31,562 in Columbia County to a low of $19,215 in Burke County in 2003 (Table 2.5.2-4). The Georgia average was $29,000 **(BEA 2005b)**. From 1990 to 2003, Burke County's per capita personal income increased at an average annual rate of 3.8 percent. Columbia and Richmond Counties' per capita personal income average annual growth rates were 3.7 and 2.8 percent respectively. Georgia's rate increased 3.9 percent for the same period.

### 2.5.2.2 Transportation

The VEGP site is served by a transportation network of interstate and state highway access to main east-west and north-south routes, two primary freight rail carriers (CSX in South Carolina and Georgia and Norfolk Southern in Georgia), and 16 regional airports. Only one airport supports commercial service. Figures 2.5.2-1 and 2.5.2-2 present the road and highway transportation system in the three county areas. Figure 2.5.2-3 presents the airports and rail system in the 50-mile region.

*Roads*

Within the three counties of interest, there is one interstate highway; I-20, which runs east-west through Georgia and South Carolina connecting Atlanta to Columbia, and includes the I-520 connector being constructed around Augusta. A number of US and State Routes intersect I-20 and connect to the towns within the counties, providing outlying areas access to the interstate system. For example, US Route 221 runs north from I-20 to Appling, the Columbia County seat, and US Route 25 runs south from I-20 to Waynesboro, the Burke County seat.

Workers commuting to VEGP take one of three routes. Workers living in Columbia County take US or State Routes to I-20 east. From I-20, workers follow I-520 south around Augusta to State Route 56 (also known as Old Savannah Road or Mike Padgett Highway). After crossing into Burke County they take the east fork of State Route 56, which is called the 56 Spur and becomes County Road 59, also known as River Road. The VEGP entrance road is off River Road.

Roadways in Richmond County avoid Fort Gordon, a 56,000-acre army installation that covers much of the western part of the county. Richmond County workers commuting from west and north of Fort Gordon use the same route as Columbia County workers. Workers living within the Augusta city limits use I-520 and State Route 56 to River Road and the VEGP. Workers living southeast of Fort Gordon either connect directly to State Route 56 from one of the county roads, or use US Route 25, which runs parallel to State Route 56, until they reach a county road that connects US Route 25 to State Route 56. From there, they follow the same route south and east to the VEGP.

Workers commuting from within Burke County to the VEGP can use a number of State Routes, depending on their location. Commuters living west of Waynesboro can use State Route 56 northeast, State Route 24 east, or State Route 80 east, all of which merge to become State Route 80 east. State Route 80 east runs through Waynesboro, connecting first to State Route 23 and then to River Road. Workers commuting from east of Waynesboro take either State Route 24, which intersects with State Route 80 (following the above route to the VEGP), or State Route 23 northeast to the local Ebenezer Church Road, which connects to River Road. They can also take State Route 23 directly to River Road.

*Road and Highway Mileage within Columbia, Burke and Richmond Counties*

Table 2.5.2-5 shows the highway mileage in the three-counties of interest for 2004. Of a total of 2,916 miles of road, 16 percent are state routes, 80 percent are county roads, and 4 percent are city streets. In the counties, 20 percent of the total mileage is unpaved. Richmond County is the only county to have more than 90 percent of the roads paved. Columbia County has more than 80 percent of the roads paved. More than 40 percent of Burke County's roads are unpaved.

*Traffic Conditions*

Table 2.5.2-6 lists the roadways VEGP workers living in Burke, Columbia or Richmond counties use, the Georgia Department of Transportation (GDOT) road classifications for each road, number of lanes, and the 2004 average annual daily traffic (AADT) counts at the traffic count sections (TCS) of the road. Figures 2.5.2-1 and 2.5.2-2 locate the TCSs. There are no Transportation Research Board "Level of Service" determinations for these Georgia roads.

The majority of roadways in both Columbia and Richmond counties are urban. Columbia County also has rural roads, which feed into the urban roads. All roads in Burke County are rural roads.

Vehicle volume on the roads, as measured by AADT counts, reflects the urban and rural character of the counties. In west Columbia County, which is more rural, AADT counts, such as at TCS 147 on State Route 104, and TCS 238 on County Road 575, are small: 7,456 and 5,005, respectively. As traffic progresses east toward the main population centers, Martinez and Augusta, and on the main interstate, I-20, AADT counts increase. For example, from I-20, at TCS 194 in Columbia County to I-520 TCS 221 in Richmond County, near the I-20/I-520 interchange, the AADT count increases from 41,538 to 74,696. East of the I-20/I-520 interchange on I-20, the AADT counts decrease as traffic leaves the interstate for smaller state routes and county roads.

State Route 56, which becomes the 56 Spur/County Road 59/River Road in Burke County and is one of the main roads to the VEGP, shows a decrease in traffic from Richmond to Burke County. At TCS 143, in Richmond County, the AADT count is 25,249. On River Road, in Burke County, at TCS 269, the closest TCS point to the VEGP, the AADT count is 1,277.

State routes and county roads in Burke County that support commutes to the VEGP have much smaller AADT counts than Columbia or Richmond County roads. The highest AADT counts are on US Route 25, which goes through Waynesboro, the Burke County seat (TCS 211; AADT of 8,332) and State Route 56, northeast of Waynesboro (TCS 171; AADT of 8,303).

*Atlantic Coast Hurricane Evacuation Routes*

In Burke County, US Route 25 and State Route 24 are Atlantic Coast Hurricane Evacuation Routes **(GDOT 2003a)**. In Richmond County, US Route 1 south of Augusta is an evacuation route.

*Rail*

There is no passenger rail service in Burke, Columbia or Richmond counties. Two primary freight rail carriers service the three counties of interest, CSX and Norfolk Southern. From Augusta, CSX has three lines leading to Atlanta, Greenwood, SC, and Savannah, GA (through South Carolina). Each line runs approximately 12-20 freight trains a day. Also from Augusta, Norfolk Southern has a rail line that goes through Waynesboro to points south and west, running approximately 12-20 freight trains a day. Both rail lines have the capacity to run additional trains.

An approximately 20-mile rail spur runs from VEGP to the Norfolk and Southern line, connecting north of Waynesboro. According to recent Georgia Department of Transportation (GDOT) rail maps, the spur is “out-of-service” however SNC recently upgraded the spur to support the transfer of some heavy equipment to VEGP. Figure 2.5.2-3 presents the rail system.

*Waterway*

The VEGP site is located on the Savannah River near River Mile 151. The Savannah River is part of the U. S. Inland Waterway System and an authorized navigation channel exists from the mouth of the Savannah River to Augusta, Georgia. All of the major large components for the existing VEGP Units 1 and 2 were delivered to the site by barge utilizing the Savannah River navigation channel. A barge slip was installed approximately 100 yards downstream of the VEGP Units 1 and 2 intake structure to support unloading major equipment. SNC plans to utilize the Savannah River navigation channel to support delivery of large components and modules for construction of Units 3 and 4. The advanced reactor construction is based around installation of large modules fabricated at a dedicated fabrication facility and delivered to the site.

The Savannah River navigation channel is operated and maintained by the Savannah District Corps of Engineers (the Corps). The Savannah River navigation channel has not had significant use in many years. Close coordination with the Corps will be necessary. SNC has contacted the Corps and will be working with them to develop a strategic plan to support the required shipments for VEGP Units 3 and 4. The plan will include a schedule of shipments, identify maintenance needs and navigation aids, and identify contingencies, where appropriate.

*Airports*

There are 16 public airports within 50 miles of the VEGP site; 9 in Georgia and 7 in South Carolina. (Table 2.5.2-7 and Figure 2.5.2-3) The GDOT classifies airports by runway lengths and the types of planes (from single engine to commercial jet). The South Carolina Department of Commerce, Aeronautics Division, classifies airports as public, public (privately owned), or restricted (for a number of reasons). Restricted airports are not included in Table 2.5.2-7 or Figure 2.5.2-3.

### 2.5.2.3 Taxes

Several tax revenue categories would be affected by the construction and operation of new nuclear units. These include income taxes on wages, salaries and corporate profits, sales and use taxes on construction- and operation-related purchases and on the purchases of project-related workers; property taxes related to the construction and operation of new nuclear units; and property taxes on owned real property.

The following sections describe each type of tax.

*Personal and Corporate Income Taxes*

Georgia has an individual income tax, a graduated tax based on a taxpayer's federal adjusted gross income with a maximum rate of six percent. Employees in Georgia pay income taxes to Georgia if (1) their residences are in Georgia, (2) they are nonresidents working in Georgia and filing a federal return which would include income from sources in Georgia that exceeds five percent of income from all sources, or (3) they have income that is subject to Georgia tax that is not subject to federal income tax. **(GDOR 2005a)**

Corporate income tax is a non-graduated percentage based on a corporation's federal taxable net income. Corporations that own property or do business in Georgia are subject to corporate income tax. The rate of taxation is six percent of a corporation's taxable net income attributable to business done in Georgia **(GDOR 2005a)**.

*Sales and Use Taxes*

Georgia assesses a state sales tax on the retail sales price of tangible personal property. Also, certain types of services are subject to a state sales tax. Service providers who transfer tangible personal property to customers as part of the service they provide incur a state sales tax on the tangible personal property transferred. Therefore, businesses that buy, sell, or use tangible personal property in Georgia are subject to a state sales tax liability of four percent. **(CCH 2005)**

In order to avoid losing tax revenues on sales transactions taking place outside of the state, Georgia also imposes a four percent use tax. The use tax is assessed against all persons who store, use, or otherwise consume tangible personal property in Georgia that was purchased out-of-state. **(CCH 2005)**

Counties' and municipalities' ability to generate revenues is determined by specific revenue-raising authorities granted to them under the Georgia Constitution and state law (Hudson 2004). In addition to the state sales and use taxes of four percent, counties and municipalities may elect to add additional sales taxes to generate revenue to meet local budget requirements. Four different local-option sales and use taxes may be levied by local governments on the purchase, sale, rental, storage, use, or consumption of tangible personal property and related services. All local-option sales and use taxes must be approved by the voters in the jurisdiction. Under each type of local-option sales and use tax, counties and cities are subject to a 2 percent cap on the amount they may levy. **(GHC 2004)**

Joint county and municipal local-option sales and use taxes (LOST) are disbursed on the basis of a percentage negotiated by the county and city governments within that county. Proceeds of this tax must be used to reduce the millage rate (for an explanation of millage rates, see the next section, *Property Taxes)*. All counties and municipalities must renegotiate the distribution of this tax every ten years. **(GHC 2004)**

Counties that do not levy a LOST are authorized to impose the homestead-option sales tax (HOST). This tax must be imposed in conjunction with an additional homestead exemption. Both the tax and the exemption must be approved by the voters. Proceeds of this tax must be used to fund capital projects and services equal to the revenue lost to the homestead exemption. Any excess revenues must be used to adjust the millage rate. **(GHC 2004)**

Although the special purpose local-option sales and use tax (SPLOST) is a county tax, counties must include city projects in their referendum if requested by the city. State law specifies the types of capital projects that this tax may fund: roads, streets, and bridges; courthouse, civic center, hospital, jail, library, or coliseum; cultural, recreational, or historic facility; water or sewer project; the retirement of existing debt; and public-safety or airport facilities. The referendum must specify the purpose of the tax, the length of time it will be imposed, and the amount of revenue it will raise. This tax can be levied for five years or until it produces the amount of revenues specified on the ballot. **(GHC 2004)**

Sales taxes for educational purposes (STEP) are levied by boards of education; the revenues are not distributed to county government. The board of education of a county school district (or if there are independent city school districts, the county school board jointly with the independent boards of education) may impose a 1 percent sales tax for educational purposes. In the case of a joint county-city tax, the proceeds are distributed proportionally between county and independent school districts according to enrollment. Proceeds must be expended for capital projects for educational purposes or retirement of the system's existing general-obligation debt. Excess proceeds must be used to retire school-system debt, or if there is none, to reduce the millage rate. This tax is not subject to the two percent cap on local sales taxes. **(GHC 2004)**

Burke County's sales and use tax, which includes both state and local portions, is six percent. Richmond and Columbia Counties' sales and use taxes are both seven percent. Some foods for home consumption are taxed at lower rates in all three counties and the rates vary from 2 to 3 percent. **(GDOR 2005b)**

*Other Sales and Use-Related Taxes*

Cities are authorized to impose franchise taxes on electric, gas, telephone, cable television, and any other public utilities within their boundaries, but counties are permitted to levy franchise taxes only on cable-television systems in their unincorporated areas. The amount of franchise fees is generally negotiated between the local government and the franchisee. **(GHC 2004)**

Georgia cities and counties may also levy excise taxes on alcoholic beverages, mixed drinks, insurance premiums, hotel-motel rooms, and rental motor vehicles. **(GHC 2004)**

*Property Taxes*

Counties and municipalities are authorized by the state constitution to levy and collect a general ad valorem ("according to value") property tax within their jurisdictions. Property taxes are levied on real property such as land and buildings; personal property, including cars, boats, machinery, and the inventoried goods of a business; and on intangible property, including long-term real estate notes such as mortgages and deeds to secure debt and the transfer tax imposed on the sale of real property. **(GHC 2004)**

Georgia law generally requires that tangible real and personal property be assessed at 40 percent of its fair market value. Exceptions apply to special types of property such as historic property, conservation use property, some agricultural use property, and standing timber. The tax rate is stated in terms of "mills," with ten mills equal to 1 percent of a property's assessed value. The amount of taxes due from an individual property owner is the tax rate multiplied by the assessed value of the property. County and city governing authorities set the property tax (millage) rate by dividing the amount of money the local government needs from property taxes by the amount of the digest, which is the value of all property in the jurisdiction. **(GHC 2004)**

Exemptions from the property tax include public property, places of worship, institution of public charity, household furniture, personal clothing, and items of tangible personal property (except motor vehicles, trailers, and mobile homes) with a value of less than $500. Georgia also has a residential homestead exemption. **(GHC 2004)**

GPC and VEGP co-owners pay annual property taxes to Burke County. Table 2.5.2-8 presents information on the total property taxes VEGP pays to Burke County, the total property taxes collected, the percent of the total property taxes that are paid by VEGP, and the portion of Burke County's tax revenues that is disbursed to the Burke County School District.

The VEGP annual property tax payments to Burke County for the 5-year period, 2000 to 2004**,** ranged from 79.8 to 82.2 percent of the total property taxes collected. In Georgia, electric power generation continues to be regulated.

### 2.5.2.4 Land Use

Counties with the greatest potential to be impacted socio-economically are Burke County, where the site is located and 20 percent of the VEGP employees reside, and Richmond and Columbia Counties, where 59 percent of the VEGP employees reside. Therefore, this discussion on land use focuses on those three counties.

*Burke County*

The Burke County Comprehensive Plan **(Burke County 1991)** identifies five land use issues:

- Burke County is the second largest Georgia county in land area
- More than 97 percent of the county is in agriculture or forestry
- Nearly 15 percent of the total county acreage is classified as preferential agriculture, meaning it must remain agricultural for a specific number of years
- Waynesboro has a comprehensive zoning ordinance
- The county has a land development code which sets forth minimum development standards for various land uses.

The plan also identifies four goals:

- Provide for an efficient distribution of land use so that non-residential activities do not adversely impact residential activities
- Identify and acquire a site for a landfill
- Discourage development which would be detrimental to environmentally sensitive and historic areas of the county
- Encourage development in areas which are already served by community services and roads.

Burke County is developing a zoning plan, but currently has no zoning.

*Richmond County*

Richmond County includes the City of Augusta, the second oldest city in Georgia. Augusta's development has been influenced by history, the economy, advancements in transportation and communication systems, improved building practices, and trends in urban growth. Land use patterns have been influenced by climate and geography, the location of natural features, disasters, the timing and location of major federal and state facilities, extension of public utilities, and local development regulations. In recent decades Augusta has experienced urban sprawl. The following issues were identified in the Comprehensive Plan **(ARC 2004)**:

- Traffic congestion
- Loss of downtown retailers to the suburbs, lack of investment in downtown and consequent urban blight
- Demands on public facilities and services
- Adverse impacts on natural environments
- Disagreement on the definition of “good” quality of life

The plan also identified activities the county would like to encourage:

- Infill development and downtown redevelopment
- Neighborhood revitalization
- Commercial center redevelopment
- Smart growth and growth management initiatives

*Columbia County*

Columbia County was fairly undeveloped until relatively recently. Growth in the last 30 years is the result of people moving into the area and seeking new homes in close proximity to good schools. Commercial growth is a function of increased accessibility by car. Industrial development has occurred along the major transportation routes. Growth is moving west, along the main thoroughfares. Constraints to growth identified in the Columbia County Growth Management Plan **(Columbia County 2000)** include:

- Significant floodplain acreage
- Challenge to provide public services at a pace to keep up with new growth
- Clark’s Hill lakefront is controlled by the U.S. Army Corps of Engineers

The county also identified guiding land use principles:

- Protect, support and maintain the county’s existing neighborhoods
- Respect and maintain prevailing land use patterns
- Place higher density housing near commercial centers or integrate into mixed use developments
- Encourage a higher level of livability in future multi-family communities while reducing their impact on the county
- Encourage mixed-use development
- Encourage traditional neighborhood development

- Encourage redevelopment of obsolete or economically deteriorating areas
- Emphasize redevelopment over expansion of commercial uses in unforeseen areas
- Encourage industrial development opportunities for employment-oriented basic economy uses in appropriate locations
- Protect the capacity of major thoroughfares through nodal development techniques
- Protect environmentally sensitive areas

#### 2.5.2.5 Aesthetics and Recreation

This section characterizes the aesthetics and recreational opportunities in the 50-mile region.

The VEGP site is located in rural Burke County in the Coastal Plain, about 25 miles east of the Piedmont Province. The topography of the area consists of low rolling hills with elevations ranging from 200 feet to 280 feet above mean sea level. Undeveloped areas are characterized by upland forests, forested wetlands, pine plantations, agriculture, and grasslands. The region has a temperate climate with mild winters and long summers.

Table 2.5.2-9 lists state parks and wildlife management areas within 50 miles of VEGP. The Yuchi WMA is a 7,800-acre site adjacent to VEGP. Crackerneck WMA is a 10,470 acre site on the South Carolina side of the Savannah River, adjacent to the west boundary of the Savannah River Site. Both are within a 6 mile radius of the VEGP site, although Crackerneck is approximately 50 miles from VEGP by road. Mead Farm WMA is about 8 miles from VEGP and Alexander WMA is about 12 miles from VEGP. The closest state parks are Magnolia Springs, in Jenkins County, Georgia (approximately 20 miles from VEGP), and Redcliffe Plantation State Park in Aiken County, South Carolina (approximately 20 air miles from VEGP). J. Strom Thurmond Dam and Clarks Hill Lake are within 50 miles of VEGP. The lake is a major recreation area for the Central Savannah River Area.

Festivals and sporting events throughout the region bring in tourists for several days to a week. Major sporting events in the Augusta area are the Masters Golf Tournament, the Cutting Horse Futurity, the Invitational Rowing Regatta, the Southern National Boat Races, and the Aiken Triple Crown. Redcliffe Plantation hosts annual Heritage Days. Burke County hosts the Redbreast Festival and the Georgia Bird Dog Field Trials.

VEGP Units 1 and 2 have natural draft cooling towers, similar in appearance to those that will be constructed for the new units at VEGP. These are the tallest structures at the site. Georgia Highway 56, River Road, and the Savannah River are the closest points from which the public can glimpse the plant or the cooling towers. Trees and terrain provide barriers to viewing the containment, turbine buildings, and support structures from the road or river. The only structures fully visible from the river are the intake canal, intake structure, and pumphouse. The discharge is a submerged structure. At several points on the river, the top of the existing containment, and the tops of the existing cooling towers are visible. In the same reach of river are three intake canals and a barge facility for the SRS.

The terrain on both sides of the Savannah River slopes to the river, allowing the plumes and in a few cases, the towers to be visible from the vicinity of Highway 125 in Allendale and Barnwell Counties, S.C., the southern outskirts of Aiken, S.C., some parts of I-520 in South Carolina and Georgia, and from some locations in Burke County, Ga. The plumes resemble cumulus clouds.

#### 2.5.2.6 Housing

Approximately 79 percent of current VEGP employees reside in 3 counties in Georgia: Burke (20 percent), Richmond (26 percent), and Columbia (34 percent). The remaining 20 percent are distributed across 24 other counties, with 1 to 58 employees per county.

Within the 50-mile radius, residential areas are found in cities, towns, and smaller communities with farms scattered throughout the area. Rental property is scarce in the rural areas, but is available in the larger municipalities such as Waynesboro, Augusta, Martinez, and Evans. In the vicinity of the VEGP site, residents are generally isolated, older single-family homes or mobile homes. New residential developments are primarily associated with the cities or towns in the region.

Table 2.5.2-10 provides the number of housing units and housing unit vacancies for the three county area for 1990 and 2000. In 2000, there were 124,475 housing units for Burke, Richmond, and Columbia Counties. Of that total, 38,547 were renter-occupied (31 percent). Nine percent were vacant (11,501 units). **(USCB 1990, 2000e)**

The counties with larger populations (Richmond and Columbia) have more available housing (Table 2.5.2-10). Between 1990 and 2000, both Burke (-3.5 percent) and Richmond County (-0.3 percent) experienced declines in vacant housing, and Columbia County (1.5 percent) experienced an increase **(USCB 1990, 2000e)**. Of 908 vacant housing units in Burke County in 2000, 167 were for rent and 77 were for sale. Of 8,392 vacant housing units in Richmond County, 3,739 were for rent and 1,160 were for sale. Of 2,201 vacant housing units in Columbia County, 560 units were available for rent and 760 were for sale **(USCB 2000e)**. A total of 6,463 vacant housing units were available for sale or rent in the three counties.

Table 2.5.2-11 presents detailed 2000 Census data on vacant housing in communities closest to VEGP: Waynesboro, Millen, and Sylvania. Of 244 vacant housing units in Waynesboro, 83 were for rent. Of 246 vacant housing units in Millen, 85 were for rent. Of 197 vacant housing units in Sylvania, 38 were for rent **(USCB 2000f)**.

#### 2.5.2.7 Community Infrastructure and Public Services

Public services and community infrastructure consist of public water and waste water treatment systems, police and fire departments, medical facilities, social services, and schools. They are typically located within municipalities or near population centers. Schools are described in Section 2.5.2.8. The other services are described below.

*Public Water Supplies and Waste Water Treatment Systems*

Because VEGP is located in Burke County and most of the current VEGP employees reside in Burke, Richmond, or Columbia Counties, the discussion of public water supply systems will be limited to those three counties.

VEGP averages 1.052 million gallons of potable water per day from three onsite groundwater wells. In general, one well supplies all necessary water for normal plant operation, leaving two wells in standby. VEGP is permitted to withdraw an average of 5.5 million gallons per day (MGD) total.

In the Central Savannah River Area, water sources can be surface water, such as rivers, lakes, and streams, or groundwater. The land north of the Fall Line (approximately north of I-20) is characterized by a limited groundwater supply due to the dense, crystalline rock underlying the area. Most of the large municipal systems above the Fall Line obtain water from the Savannah River or one of its impoundments. However, some of the smaller municipalities above the Fall Line have wells that adequately meet water demands. Columbia County lies north of the Fall Line. **(CSRARDC 2005)**

In the Coastal Plains of Georgia and South Carolina, south of the Fall Line, there are two major regional aquifer systems (see Section 2.3). The lower regimen is referred to as the Cretaceous aquifer system and consists primarily of the sands, gravels, and clays of the Tuscaloosa Formation. It is a highly transmissive aquifer system yielding large quantities of good quality groundwater (estimated 5 billion gallons per day throughout its known extent). The upper regimen is variously referred to as the water table aquifer, the Tertiary aquifer system, the principal artesian aquifer, the limestone aquifer, or the Floridan aquifer. It consists primarily of the limestones and permeable sands of the Lisbon formation or stratigraphic equivalents. The yields from these systems could support systems requiring nearly 3,000,000 gallons per day. Consequently, most counties in the Coastal Plain obtain their water from groundwater. The majority of Richmond and Burke County water suppliers obtain their water from aquifers. Some municipalities use the Savannah River to supplement deep wells. Table 2.5.2-12 details water suppliers in the three counties, their permitted capacities, and their average daily production. **(CSRARDC 2005)** VEGP withdraws groundwater primarily from the Cretaceous aquifer for potable and service water.

According to local planning officials, water supply in the three counties is not a concern. Local communities are adequately served by the existing water supplies and planners estimate that the counties have adequate supply at least through the current planning periods. The only concern is protection of the aquifers from chemical and radiological pollutants, erosion, and sedimentary contamination. **(CSRARDC 2005)**

Waste water treatment is provided by local jurisdictions. Each municipality decides which treatment method to use based on the municipality's needs and the technology and funds available. The most common types of treatment facilities are primary, and secondary treatments, and oxidation ponds. Currently, municipalities in the three counties are able to meet waste water treatment needs **(CSRARDC 2005)**. Table 2.5.2-13 details public waste water treatment systems, their permitted capacities, and their average daily production. The rural areas of each county are on septic systems.

*Police, Fire, and Medical Services*

Table 2.5.2-14 provides year 2001 police and fire protection data for the three counties. Local planning officials consider police protection adequate but future expansions and facility upgrades may be needed to accommodate future population growth **(CSRARDC 2005)**.

Fire protection in the three counties is characterized by "persons-per-firefighter" ratios and ISO fire insurance ratings. Table 2.5.2-14 lists the "persons-per-firefighter" ratios by county. Regional planners report the following ISO fire ratings by county: Burke County, 5 and 9; Richmond County, 2, 5, and 7; and Columbia County, 4 and 7. In all three counties multiple ratings indicate that there are different levels of protection with each county.

Richmond County is a regional medical hub and has the highest hospital bed capacity of the three counties and of any county in the 50-mile region. Richmond County's hospitals include: four general hospitals, one military hospital, one mental and psychiatric hospital, one rehabilitation hospital, and two federal hospitals. More than 25,000 people are employed in medical industry in Richmond County. In addition to the hospitals, state and regional medical centers include the Poison Control Center, the Regional Radiation Therapy Center, a Regional Trauma Center, and the Kidney Dialysis Referral Center which also provides transplant surgery **(CSRARDC 2005)**. Burke County has one general hospital and Columbia County has no hospitals **(CSRARDC 2005)**. Table 2.5.2-15 presents hospital and medical practitioner data by county.

All three counties have health departments, which are available to residents regardless of their ability to pay. Some of the services offered by health departments include: child and adolescent health programs, women's health programs, immunizations, laboratory services, teen pregnancy prevention programs, scoliosis screening, parasite screening, diabetic screening, health education and counseling, homemaker services to the elderly, prenatal services, and sexually transmitted disease prevention and education. Some public schools in the region do not have a school nurse; many rely on the Health Department for nursing support. **(CSRARDC 2005)**

*Social Services*

Social services in Georgia are overseen by the Department of Human Resources (DHR). DHR serves Georgia citizens through five main divisions: family and children services; public health, and mental health; developmental disabilities; and addictive diseases; and aging services **(GDHR 2004)**.

### 2.5.2.8 Education

*Public Schools – Pre-Kindergarten through 12*

The public school systems in Burke, Richmond, and Columbia counties are organized by county. Columbia and Richmond counties provide greater public school resources for much larger populations than does Burke County. Table 2.5.2-16 provides information on the number and types of school in each county.

All publicly-funded Georgia pre-kindergarten through grade 12 schools are required to meet Georgia Department of Education (GDOE) mandated student-teachers ratios. Ratios vary depending on the grade level, subject taught, and presence or absence of a paraprofessional. A full listing of the ratios is provided on the GDOE website: http://www.doe.k12.ga.us/ **(GDOE 2004)**. The school districts in all three counties either meet or are below the state mandated student-teacher ratios. In the past, when a district began exceeding the ratios, the Board of Education acquired the necessary funding to either build new schools or renovate older schools to increase facility capacity. The specific methods that each county school district chose to follow are detailed below. All three school districts have some capacity for additional students.

*Burke County*

Burke County had a pre-K through 12 public school student population of 4,425 in 2004. The county has six schools and no plans to build additional schools. All of the county's schools were built within the last 20 years, and provide students with the educational facilities and resources that would normally be available in a more urban county. Because all the schools are relatively new, there are no modules on any of the school grounds. Student-teacher ratios are below state mandated levels. All the county schools have some capacity for additional students, but the middle and high schools are closest to capacity. Any need for additional space in these two schools would be met by additions/renovations to the current schools.

The Burke County Board of Education has been able to meet its annual budget and long-term school construction and renovation needs from the county residential and commercial property taxes, with the tax revenues generated by VEGP providing the necessary funding for new school construction and renovations. With its funding needs already met, the Burke County Board of Education does not have a SPLOST fund dedicated to the school system.

*Richmond County*

Richmond County (2004 student population of 33,432) has 58 schools and plans to build two new elementary schools and one technology and career magnet high school by 2007. Between 2002 and 2004, the county opened a new elementary school every year to meet the Georgia

Department of Education mandated student-teacher ratios **(GDOE 2004)**. The Richmond County Board of Education also has completed extensive additions and renovations on a number of middle and high schools, adding collectively 100 classrooms to the infrastructure. Modules are available to provide additional space at elementary, middle and high schools as needed.

With a sizeable commercial, business, retail and residential base, the Richmond County Board of Education has been able to meet its renovation and new construction needs from property taxes and the SPLOST. Additionally, because of the popularity of the three magnet schools – one K through 8 traditional magnet school, one 6 through 12 fine arts school, and one 9 through 12 health science and engineering high school – families from the surrounding counties are moving into Richmond County so their children can attend these schools.

*Columbia County*

Columbia County (19,674 students in 2004) has 27 schools and plans to build one elementary, two middle schools and a high school. One new elementary school opened in the school year 2004 and another elementary school opened for the 2005 school year. With these two new elementary schools, Columbia County is below the Georgia mandated student/teacher ratios for pre-K through 5th grade.

The addition of middle schools in 2001 and 2003 allowed Columbia County to meet the middle school student/teacher ratio. Two additional middle schools are planned; one will replace an older middle school, and provide approximately 20 percent more capacity than the old school. The replacement school is scheduled to open in 2006/2007. A second new middle school is scheduled to open in 2008/2009.

With modules at middle schools and at all high schools, new school construction is a high priority for the Columbia County Board of Education. Columbia County currently meets its student/teacher ratio for high school students, but there is a need for a new high school. The Columbia County Board of Education has not settled on a location, and the school is not expected to open for another 3 to 4 years. Finding new construction funding is problematic. Property taxes have not been raised in 7 to 8 years. While the residential and retail base has increased in the last few years as more people moved into Columbia County, the revenues that the Board of Education receives from the SPLOST have been used to pay down the Board's debt. The Board must apply to the GDOE every year for funds for new school construction.

*Colleges*

There are six 4-year colleges and seven 2-year colleges within a 50-mile radius of VEGP (Table 2.5.2-17). All are public except for Paine College and Voorhees College. Paine College, Voorhees College, and Denmark Technical College are Historically Black Colleges.

### 2.5.3 Historic Properties

SNC has begun informal discussions with the Georgia and South Carolina State Historic Preservation Officers (SHPO) that will continue throughout the ESP application review process (see Appendix A). In 2005, SNC contracted with New South Associates (NSA) to perform a cultural resource survey of areas of the VEGP site and associated transmission lines to support the ESP application and license renewal **(NSA 2006)**.

SNC has determined that the northern part of the site (generally above the Sherer transmission line) has appropriate backfill material to support the construction of the new units, however, the exact locations and extent of the borrow areas have not yet been determined. Once the areas are identified, NSA will survey those areas. The area designated for borrow is not included in this discussion.

Prehistoric Overview

The following discussion is from NSA (2006). The cultural prehistory of the Savannah River Basin is currently under debate. The University of South Carolina has reported a possible pre-Clovis (>12,000 B.C.) assemblage at a site near the Savannah River in Allendale County, South Carolina. Their excavations into Pleistocene sands yielded several chert artifacts, and an area of abundant charcoal that could be a hearth. The carbon was dated to approximately 50,000 Radiocarbon Years Before Present. If the dates are correct, and are associated with artifacts from human occupations, then the site provides evidence that calls into question the common belief that humans did not inhabit this part of North America prior to 13,000 years Before Present. The debate has not been resolved.

Few Early or Middle Paleoindian sites have been excavated in the Savannah River drainage.

During the Archaic Period (7800 B.C. – 1050 B.C.) early inhabitants developed into mobile groups united by common traditions. The groups traveled seasonally throughout the region, including along rivers. By the late Archaic, populations were more sedentary, and were exploiting local resources, including rivers. Some archaeologists suspect that the intense use of riverine resources (coupled with climate changes) lead to massive depletions of those resources, and forced settlements to move to smaller, upland tributaries. This period is marked by the development of fiber-tempered pottery and shell middens.

In the Woodland Period (1050 B.C. – 800 A.D.) the inhabitants developed agriculture, food preservation and storage, which allowed the populations of single settlements to increase.

The Mississippian Period (800 A.D. – 1450 A.D.) is known for agricultural-based subsistence, permanent occupations, and ceremonial mounds, indications of cultural development.

From A.D. 1450 to A.D. 1540, chiefdoms dissolved for whatever reason and most Native American groups wandered and left little trace of their presence.

The Historic Indian Period (A.D. 1540 – A.D.1700) was characterized by the decline of earlier chiefdoms, and increased heterogeneity among Native Americans as a result of intermarriage with white and black settlers.

Historic Overview

The Central Savannah River Area (those parts of Georgia and South Carolina that border the middle reach of the Savannah River) is one of the oldest and most historically rich areas of the state. Native Americans and early settlers used the Savannah River as a major transportation route between the Coast and the Piedmont.

James Oglethorpe settled Savannah in 1733 and Augusta in 1736. Oglethorpe viewed the Georgia colony as a Utopia – a haven from conflict where the honest but indigent or persecuted religious could begin a new life. He tried to keep the bad influences of the South Carolina colony, including liquor, slavery, and the rice agriculture that spawned large plantations, out of Georgia. Georgia was to be a colony of small yeoman farmers. Unfortunately without slaves or indentured servants, clearing and settling the land was almost impossible, and the tail-male law prohibiting females and all but the eldest son from inheriting property provided little incentive to improve the land. After slavery was introduced, the tail-male law was rescinded, and the liquor prohibition was lifted, all about 1750, Georgia began to flourish and numerous towns were created.

Burke County is one of Georgia's eight original counties. It was formed in 1777 from St. George Parish and was named for Edmund Burke, an English spokesman for American liberty. In 1796 the state capital was in Louisville, which at the time was in Burke County, but in that year the county was divided to form Jefferson County, and Louisville became part of Jefferson County. In 1793 part of Burke County was taken to form Screven County, and in 1905 another part became Jenkins County. Waynesborough was established as the county seat in 1783. Cotton controlled the economy until the Civil War. Burke County south of Waynesboro was heavily damaged during the War, and did not recover, though farming is still a major part of the economy.

The largest landowner in the vicinity of VEGP was Edward Telfair, a Georgia governor from 1786 to 1791. The 1830 census lists no Telfair landowners but many Utl[e]ys. The first Utley was apparently an overseer for Mr. Telfair. There are still Utleys in the area, and features on the VEGP property bore the name Utley.

In the early 20th century there were several properties between Hancock Landing and Beaverdam Creek, the area now known as VEGP.

### 2.5.3.1 Historic or Archaeological Sites in the Vicinity of the VEGP Site

The environmental report (ER) prepared for the original VEGP units describes the known historic resources in the area in 1972. Shell Bluff Landing is approximately 7 miles north northwest of the VEGP site. It has both historic and archaeological significance. It was the site of the original grave of Dr. Lyman Hall, a signer of the Declaration of Independence. His body was later reinterred in Augusta. The original ER also reports that Shell Bluff Landing was important during the era of steamboat river traffic and was fortified during the War Between the States. Shell Bluff takes its name from a large bed of fossils of the giant oyster (*Crassostrea gigantissima*) found there. This bed likely was formed during the Eocene when the Coastal Plain of Georgia was under the Atlantic Ocean. The site of an Indian village with artifacts dating from 4,000 years ago, is located between Shell Bluff and Boggy Gut Creek, approximately 7.5 miles upstream of VEGP. **(GPC 1972)**

Seven historical sites in Burke County are on the National Register of Historic Places (Table 2.5.3 1). One National Register listed building, the Sapp Plantation, is within 10 miles of the VEGP site. The Savannah River Site, the only other historical site within 10 miles determined to be eligible for listing, is directly across the Savannah River from VEGP, in South Carolina.

Twenty-two archaeological sites within 10 miles of VEGP have been determined eligible for listing. All of them are on the SRS.

### 2.5.3.2 Historic or Archaeological Sites on the VEGP Site or Associated Transmission Lines

In 1973 an archaeological survey of the VEGP site was performed under the direction of the Georgia State Archaeologist and the Georgia Historical Commission and submitted to the U.S. Atomic Energy Commission (the predecessor agency to the NRC). The survey identified seven archaeological sites **(NSA 2006)**. Four sites are along the river bluff, south of the existing barge canal and will not be affected by the proposed construction (Figure 2.5.3-1). One, 9BK21, was destroyed during construction of the existing barge slip. This site is the location of the Brown Cabin, which apparently also was destroyed during construction. The remaining two sites are shown to be on the plateau west of Mallard Pond on the maps in the 1973 report, however, the UTM coordinates for these two sites do not place them in the location shown on the report map **(NSA 2006)**. Based on the 1973 study the State Archaeologist considered that the archaeological resources at the VEGP site had been sufficiently characterized **(GPC 1972)**.

The 2005 NSA survey, which was restricted to areas on VEGP property that will be disturbed by the construction of new units, identified 10 archaeological sites (3 historic and 7 prehistoric) and 7 isolated finds (Figure 2.5.3-1). None of the seven sites identified in the original survey were located during the 2005 survey. Two of the new sites are eligible and two are potentially eligible for inclusion on the National Register of Historic Places. The rest are recommended ineligible. Table 2.5.3-2 provides brief descriptions of the sites.

It is likely that a new transmission line would be constructed from VEGP to an existing substation northwest of the site. Although the specific route of the corridor has not been determined, it would pass through Burke, Jefferson, McDuffie and Warren Counties.

Table 2.5.3-3 lists the National Register historic sites or sites eligible to be listed in those counties.

In 1983, during construction of the original units, the fossil of a 40-million-year-old previously unknown whale species was uncovered in the Blue Bluff marl approximately 30 feet below ground surface. The skeleton of the whale, now known as *Georgiacetus vogtlensis*, is housed at the Georgia Southern University Museum in Statesboro, Georgia. **(Reuters Limited 1998)**

Geomorphological investigations done in conjunction with the 2005 archaeological survey determined that the Blue Bluff marl in which the whale was found does not occur on the bluff north of the existing intake structure. Therefore, construction of the new intake, access road and water line will not encounter the whale-bearing horizon **(NSA 2006)**.

#### 2.5.3.3 Native American Cultural Resources and Concerns

No Federally-recognized tribes reside in the state of Georgia. Through OCGA 44-12-300, the State of Georgia officially recognized the following tribes of Georgia as legitimate American Indian tribes **(500 Nations 2005)**:

- The Georgia Tribe of Eastern Cherokee, P.O. Box 1015, Cummings, Georgia 30028
- The Lower Muscogee Creek Tribe, Route. 2, Box 370, Whigham, Georgia 31797
- The Cherokee of Georgia, Saint George, Georgia 31646

Native Americans that settled in the Burke County area include a ban of Chickasaw that "lived near Augusta from about 1723 to the opening of the American Revolution: (Georgia Indian Tribes 2005) and a Shawnee band "which settled near Augusta" (Georgia Indian Tribes 2005). The Muskogee were the dominant tribe on either side of the Savannah River before the Europeans settled in North America **(Sturtevant 1996)**.

### 2.5.4 Environmental Justice

#### 2.5.4.1 Methodology

Environmental justice has been defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies **(EPA 2002)**. Concern that minority and/or low-income populations might be bearing a disproportionate share of adverse health and environmental impacts led President Clinton to issue an Executive Order (EO) 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," in 1994 to address these issues. The order directs federal agencies to make environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. The Council on Environmental Quality has provided guidance for addressing environmental justice

**(CEQ 1997).** SNC used guidance from the NRC Office of Nuclear Reactor Regulation **(NRC 2004)** in this analysis.

NRC previously concluded that a 50-mile radius could reasonably be expected to contain potential impact sites and that the state was appropriate as the geographic area for comparative analysis. NRC's methodology identifies minority and low-income populations within the 50-mile region and then determines if these populations could receive disproportionately high adverse impacts from the proposed action. SNC has adopted this approach for identifying the minority and low-income populations and associated impacts that could be affected by the proposed action. This section locates populations. Potential adverse impacts are identified and discussed in Chapters 4 and 5.

SNC used ArcView® GIS software and USCB 2000 census data to determine the minority and low-income characteristics by block group within 50 miles of the VEGP site. SNC included a block group if any part of its area was within 50 miles of the VEGP site. The 50-mile radius includes 491 block groups. SNC defines the geographic area for the VEGP site as Georgia and South Carolina, independently, for analysis of block groups in each of the two states. SNC prepared a calculation package supporting this analysis.

### 2.5.4.2 Minority Populations

The NRC Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues defines a "minority" population as: American Indian or Alaskan Native; Asian; Native Hawaiian or other Pacific Islander; or Black races; multiracial; and Hispanic ethnicity **(NRC 2004)**. Additionally, NRC's guidance requires that all other single minorities are to be treated as one population and analyzed (Other), and that the aggregate of all minority populations (Aggregate) is to be treated as one population and analyzed. The guidance indicates that a minority population exists if either of the following two conditions exists:

1. The minority population of the block group or environmental impact area exceeds 50 percent.
2. The minority population percentage of the environmental impact area is significantly greater (typically at least 20 percentage points) than the minority population percentage in the geographic area chosen for comparative analysis.

For each of the 491 block groups within the 50-mile radius, SNC calculated the percent of the block group's population represented by each minority. If any block group minority percentage exceeded 50 percent, then the block group was identified as containing a minority population. SNC selected the entire states of Georgia and South Carolina as the geographic areas for comparative analysis, and calculated the percentage of each minority category for each state. If any block group percentage exceeded its corresponding state percentage by more than 20 percent, then the block group was identified as having minority population.

Census data for Georgia **(USCB 2000b)** characterizes 28.7 percent of the population as Black races; 0.3 percent American Indian or Alaskan Native; 2.1 percent Asian; 0.1 percent Native Hawaiian or other Pacific Islander; 2.4 percent all other single minorities; 1.4 percent multi-racial; 34.9 percent aggregate of minority races; and 5.3 percent Hispanic ethnicity.

Census data for South Carolina **(USCB 2000b)** characterizes 29.5 percent of the population as Black races; 0.3 percent American Indian or Alaskan Native; 0.9 percent Asian; 0.04 percent Native Hawaiian or other Pacific Islander; 1.0 percent all other single minorities; 1.0 percent multi-racial; 32.8 percent aggregate of minority races; and 2.4 percent Hispanic ethnicity. Table 2.5.4-1 and Figures 2.5.4-1 through 2.5.4-3 present the results of the analysis.

One hundred and seventy-five census block groups within the 50-mile radius have Black races populations that exceed the state average by 20 percent or more (Figure 2.5.4-1). Of those 175 block groups, 171 have Black races populations of 50 percent or more.

One hundred and sixty-eight census block groups within the 50-mile radius have aggregate minority population percentages that exceed the state average by 20 percentage points or more. One hundred and eighty-three census block groups within the 50-mile radius have aggregate minority population percentages that exceed 50 percent (Figure 2.5.4-2). Because both Georgia and South Carolina have relatively large percentages of aggregate minority populations, 34.9 and 32.8 percent, respectively, adding 20 percentage points to these averages equates to 54.9 and 52.8 percent, respectively. Therefore, there are more census block groups that meet the "50 percent" threshold criteria than the "20 percentage points greater than the state average" thresholds.

One census block group within the 50-mile radius has Hispanic ethnicity populations that exceed the state average by 20 percent or more. No census block group within the 50-mile radius had an Hispanic ethnicity population that exceed and 50 percent.

Based on the "more than 20 percent" or the "exceeded 50 percent" criteria, no American Indian or Alaskan Native; Asian; Native Hawaiian or other Pacific Islander; or multi-racial minorities exist in the geographic area. In addition, no populations defined as "all other single minority races" exceed these criteria.

### 2.5.4.3 Low-Income Populations

NRC guidance defines low-income households based on statistical poverty thresholds **(NRC 2004)**. A block group is considered low-income if either of the following two conditions is met:

1. The low-income population in the census block group or the environmental impact site exceeds 50 percent.
2. The percentage of households below the poverty level in an environmental impact site is significantly greater (typically at least 20 percentage points) than the low-income population percentage in the geographic area chosen for comparative analysis.

SNC divided USCB low-income households in each census block group by the total households for that block group to obtain the percentage of low-income households per block group. Using the states of Georgia and South Carolina as the geographical areas chosen for comparative analysis, SNC determined that 12.6 percent of Georgia and 14.1 percent of South Carolina households are low-income **(USCB 2000c)**. Table 2.5.4-1 identifies and Figure 2.5.4-4 locates the low-income block groups.

Seventy-two census block groups within the 50-mile radius have low-income households that exceed the state averages by 20 percent or more. Of those 72 block groups, 14 have 50 percent or more low-income households.

### 2.5.4.4 Migrant Populations

Information on migrants is difficult to collect and evaluate. However, the 2002 Census of Agriculture collected information on migrant workers. Farm operators were asked whether any hired or contract workers were migrant workers, defined as a farm worker whose employment required travel that prevented the worker from returning to his permanent place of residence the same day. In general, the migrant population in the 50-mile radius is expected to be low. Migrants tend to work such short-duration, labor-intensive jobs as harvesting fruits and vegetables. Table 2.5.4-2 provides information on farms in the region that employ migrant labor. Table 2.5.4-3 provides general information on agriculture in the region.

## Table 2.5.1-1 Current Populations and Projections to 2090

| | | Radii Distances (miles) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sectors | | 0-1[1] | 1-2[2] | 2-3[2] | 3-4[2] | 4-5[2] | 5-10[2] | Total 0-10[2] | 10-20[2,3] | 20-30[2,3] | 30-40[3] | 40-50[3] | Total 0-50[1] |
| N | 2000 | 0 | 50 | 0 | 0 | 0 | 0 | 50 | 4,792 | 50,620 | 15,658 | 11,829 | 82,949 |
| | 2010 | 0 | 54 | 0 | 0 | 0 | 0 | 54 | 5,567 | 58,805 | 18,245 | 13,805 | 96,476 |
| | 2020 | 0 | 59 | 0 | 0 | 0 | 0 | 59 | 6,467 | 68,314 | 21,260 | 16,122 | 112,221 |
| | 2030 | 0 | 63 | 0 | 0 | 0 | 0 | 63 | 7,513 | 79,360 | 24,775 | 18,841 | 130,552 |
| | 2040 | 0 | 69 | 0 | 0 | 0 | 0 | 69 | 8,727 | 92,192 | 28,873 | 22,032 | 151,893 |
| | 2050 | 0 | 74 | 0 | 0 | 0 | 0 | 74 | 10,139 | 107,099 | 33,650 | 25,780 | 176,742 |
| | 2060 | 0 | 81 | 0 | 0 | 0 | 0 | 81 | 11,778 | 124,416 | 39,220 | 30,183 | 205,678 |
| | 2070 | 0 | 87 | 0 | 0 | 0 | 0 | 87 | 13,682 | 144,534 | 45,714 | 35,357 | 239,375 |
| | 2080 | 0 | 94 | 0 | 0 | 0 | 0 | 94 | 15,895 | 167,905 | 53,286 | 41,440 | 278,620 |
| | 2090 | 0 | 102 | 0 | 0 | 0 | 0 | 102 | 18,465 | 195,054 | 62,116 | 48,593 | 324,330 |
| NNE | 2000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,523 | 7,966 | 4,245 | 6,919 | 21,653 |
| | 2010 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,931 | 9,254 | 4,931 | 8,166 | 25,282 |
| | 2020 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,404 | 10,750 | 5,729 | 9,644 | 29,528 |
| | 2030 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,955 | 12,489 | 6,655 | 11,400 | 34,499 |
| | 2040 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4,594 | 14,508 | 7,731 | 13,488 | 40,321 |
| | 2050 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,337 | 16,854 | 8,981 | 15,971 | 47,143 |
| | 2060 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6,199 | 19,579 | 10,434 | 18,929 | 55,141 |
| | 2070 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7,201 | 22,745 | 12,121 | 22,455 | 64,522 |
| | 2080 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8,365 | 26,423 | 14,081 | 26,664 | 75,533 |
| | 2090 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,718 | 30,695 | 16,357 | 31,692 | 88,462 |
| NE | 2000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,997 | 3,590 | 6,904 | 16,491 |

## Table 2.5.1-1 (cont.) Current Populations and Projections to 2090

Radii Distances (miles)

| Sectors | | 0-1[1] | 1-2[2] | 2-3[2] | 3-4[2] | 4-5[2] | 5-10[2] | Total 0-10[2] | 10-20[2,3] | 20-30[2,3] | 30-40[3] | 40-50[3] | Total 0-50[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2010 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6,683 | 3,985 | 7,672 | 18,340 |
| | 2020 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7,456 | 4,431 | 8,558 | 20,445 |
| | 2030 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8,327 | 4,936 | 9,581 | 22,844 |
| | 2040 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,309 | 5,508 | 10,769 | 25,587 |
| | 2050 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10,419 | 6,158 | 12,151 | 28,728 |
| | 2060 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11,674 | 6,896 | 13,765 | 32,335 |
| | 2070 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13,094 | 7,735 | 15,656 | 36,485 |
| | 2080 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14,703 | 8,691 | 17,877 | 41,271 |
| | 2090 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16,528 | 9,782 | 20,493 | 46,802 |
| ENE | 2000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 554 | 9,612 | 11,414 | 10,641 | 32,221 |
| | 2010 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 602 | 10,449 | 11,633 | 10,928 | 33,612 |
| | 2020 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 655 | 11,359 | 11,901 | 11,243 | 35,157 |
| | 2030 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 712 | 12,348 | 12,221 | 11,587 | 36,867 |
| | 2040 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 774 | 13,423 | 12,596 | 11,961 | 38,753 |
| | 2050 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 841 | 14,591 | 13,029 | 12,367 | 40,828 |
| | 2060 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 914 | 15,862 | 13,525 | 12,805 | 43,106 |
| | 2070 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 994 | 17,242 | 14,087 | 13,278 | 45,601 |
| | 2080 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,080 | 18,744 | 14,721 | 13,786 | 48,330 |
| | 2090 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,174 | 20,376 | 15,431 | 14,331 | 51,311 |
| E | 2000 | 0 | 0 | 0 | 0 | 0 | 9 | 9 | 584 | 2,697 | 1,888 | 3,379 | 8,557 |
| | 2010 | 0 | 0 | 0 | 0 | 0 | 10 | 10 | 618 | 2,885 | 1,861 | 3,333 | 8,707 |

## Table 2.5.1-1 (cont.) Current Populations and Projections to 2090

| | | | | | | | Radii Distances (miles) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sectors | | 0-1[1] | 1-2[2] | 2-3[2] | 3-4[2] | 4-5[2] | 5-10[2] | Total 0-10[2] | 10-20[2,3] | 20-30[2,3] | 30-40[3] | 40-50[3] | Total 0-50[1] |
| | 2020 | 0 | 0 | 0 | 0 | 0 | 11 | 11 | 654 | 3,089 | 1,838 | 3,298 | 8,890 |
| | 2030 | 0 | 0 | 0 | 0 | 0 | 12 | 12 | 693 | 3,309 | 1,820 | 3,275 | 9,107 |
| | 2040 | 0 | 0 | 0 | 0 | 0 | 13 | 13 | 735 | 3,547 | 1,805 | 3,263 | 9,362 |
| | 2050 | 0 | 0 | 0 | 0 | 0 | 14 | 14 | 780 | 3,805 | 1,794 | 3,264 | 9,656 |
| | 2060 | 0 | 0 | 0 | 0 | 0 | 15 | 15 | 828 | 4,084 | 1,787 | 3,278 | 9,992 |
| | 2070 | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 881 | 4,386 | 1,785 | 3,305 | 10,373 |
| | 2080 | 0 | 0 | 0 | 0 | 0 | 18 | 18 | 937 | 4,713 | 1,787 | 3,348 | 10,802 |
| | 2090 | 0 | 0 | 0 | 0 | 0 | 19 | 19 | 998 | 5,067 | 1,793 | 3,406 | 11,283 |
| ESE | 2000 | 0 | 0 | 0 | 16 | 1 | 257 | 274 | 221 | 5,536 | 6,348 | 8,909 | 21,288 |
| | 2010 | 0 | 0 | 0 | 17 | 1 | 277 | 295 | 228 | 5,667 | 6,685 | 9,694 | 22,569 |
| | 2020 | 0 | 0 | 0 | 19 | 1 | 298 | 318 | 235 | 5,800 | 7,046 | 10,549 | 23,948 |
| | 2030 | 0 | 0 | 0 | 20 | 1 | 321 | 343 | 242 | 5,937 | 7,433 | 11,479 | 25,434 |
| | 2040 | 0 | 0 | 0 | 22 | 1 | 346 | 369 | 249 | 6,077 | 7,848 | 12,492 | 27,036 |
| | 2050 | 0 | 0 | 0 | 24 | 1 | 373 | 398 | 257 | 6,221 | 8,293 | 13,595 | 28,763 |
| | 2060 | 0 | 0 | 0 | 26 | 2 | 401 | 429 | 265 | 6,368 | 8,771 | 14,795 | 30,627 |
| | 2070 | 0 | 0 | 0 | 28 | 2 | 433 | 462 | 273 | 6,518 | 9,284 | 16,102 | 32,639 |
| | 2080 | 0 | 0 | 0 | 30 | 2 | 466 | 498 | 282 | 6,672 | 9,835 | 17,524 | 34,811 |
| | 2090 | 0 | 0 | 0 | 33 | 2 | 503 | 538 | 291 | 6,829 | 10,428 | 19,073 | 37,158 |
| SE | 2000 | 0 | 0 | 0 | 14 | 13 | 213 | 240 | 274 | 301 | 692 | 7,740 | 9,247 |
| | 2010 | 0 | 0 | 0 | 15 | 14 | 228 | 257 | 288 | 311 | 732 | 8,468 | 10,056 |
| | 2020 | 0 | 0 | 0 | 16 | 15 | 245 | 276 | 303 | 322 | 774 | 9,271 | 10,946 |
| | 2030 | 0 | 0 | 0 | 17 | 16 | 263 | 296 | 319 | 333 | 820 | 10,161 | 11,928 |

## Table 2.5.1-1 (cont.) Current Populations and Projections to 2090

| Sectors | | Radii Distances (miles) 0-1[1] | 1-2[2] | 2-3[2] | 3-4[2] | 4-5[2] | 5-10[2] | Total 0-10[2] | 10-20[2,3] | 20-30[2,3] | 30-40[3] | 40-50[3] | Total 0-50[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2040 | 0 | 0 | 0 | 19 | 17 | 281 | 317 | 336 | 344 | 869 | 11,149 | 13,015 |
| | 2050 | 0 | 0 | 0 | 20 | 18 | 302 | 340 | 353 | 356 | 921 | 12,249 | 14,219 |
| | 2060 | 0 | 0 | 0 | 21 | 20 | 324 | 365 | 372 | 368 | 978 | 13,476 | 15,558 |
| | 2070 | 0 | 0 | 0 | 23 | 21 | 347 | 391 | 391 | 380 | 1,039 | 14,851 | 17,052 |
| | 2080 | 0 | 0 | 0 | 24 | 23 | 372 | 419 | 412 | 393 | 1,104 | 16,399 | 18,727 |
| | 2090 | 0 | 0 | 0 | 26 | 24 | 399 | 449 | 434 | 407 | 1,174 | 18,148 | 20,612 |
| SSE | 2000 | 0 | 0 | 26 | 0 | 0 | 750 | 776 | 716 | 6,465 | 2,713 | 2,695 | 13,365 |
| | 2010 | 0 | 0 | 28 | 0 | 0 | 804 | 832 | 754 | 6,764 | 2,841 | 3,329 | 14,520 |
| | 2020 | 0 | 0 | 30 | 0 | 0 | 862 | 892 | 794 | 7,078 | 2,975 | 4,198 | 15,937 |
| | 2030 | 0 | 0 | 32 | 0 | 0 | 924 | 956 | 836 | 7,406 | 3,116 | 5,399 | 17,713 |
| | 2040 | 0 | 0 | 34 | 0 | 0 | 991 | 1,026 | 881 | 7,749 | 3,263 | 7,071 | 19,988 |
| | 2050 | 0 | 0 | 37 | 0 | 0 | 1,063 | 1,100 | 928 | 8,108 | 3,417 | 9,409 | 22,961 |
| | 2060 | 0 | 0 | 39 | 0 | 0 | 1,139 | 1,179 | 977 | 8,483 | 3,579 | 12,693 | 26,912 |
| | 2070 | 0 | 0 | 42 | 0 | 0 | 1,222 | 1,264 | 1,030 | 8,876 | 3,749 | 17,324 | 32,242 |
| | 2080 | 0 | 0 | 45 | 0 | 0 | 1,310 | 1,355 | 1,085 | 9,287 | 3,926 | 23,869 | 39,523 |
| | 2090 | 0 | 0 | 49 | 0 | 0 | 1,404 | 1,453 | 1,144 | 9,717 | 4,113 | 33,141 | 49,568 |
| S | 2000 | 0 | 0 | 0 | 0 | 19 | 238 | 257 | 1,942 | 1,660 | 2,695 | 29,356 | 35,910 |
| | 2010 | 0 | 0 | 0 | 0 | 20 | 255 | 276 | 2,028 | 1,725 | 2,973 | 36,351 | 43,352 |
| | 2020 | 0 | 0 | 0 | 0 | 22 | 274 | 295 | 2,119 | 1,792 | 3,302 | 45,084 | 52,594 |
| | 2030 | 0 | 0 | 0 | 0 | 23 | 293 | 317 | 2,217 | 1,864 | 3,695 | 55,989 | 64,082 |
| | 2040 | 0 | 0 | 0 | 0 | 25 | 315 | 340 | 2,322 | 1,938 | 4,168 | 69,610 | 78,377 |
| | 2050 | 0 | 0 | 0 | 0 | 27 | 337 | 364 | 2,433 | 2,016 | 4,738 | 86,627 | 96,178 |

## Table 2.5.1-1 (cont.) Current Populations and Projections to 2090

| Sectors | | Radii Distances (miles) 0-1[1] | 1-2[2] | 2-3[2] | 3-4[2] | 4-5[2] | 5-10[2] | Total 0-10[2] | 10-20[2,3] | 20-30[2,3] | 30-40[3] | 40-50[3] | Total 0-50[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2060 | 0 | 0 | 0 | 0 | 29 | 362 | 390 | 2,552 | 2,099 | 5,429 | 107,891 | 118,362 |
| | 2070 | 0 | 0 | 0 | 0 | 31 | 388 | 419 | 2,679 | 2,185 | 6,272 | 134,466 | 146,021 |
| | 2080 | 0 | 0 | 0 | 0 | 33 | 416 | 449 | 2,815 | 2,275 | 7,303 | 167,684 | 180,525 |
| | 2090 | 0 | 0 | 0 | 0 | 36 | 446 | 481 | 2,959 | 2,369 | 8,568 | 209,208 | 223,585 |
| SSW | 2000 | 0 | 0 | 0 | 0 | 2 | 44 | 46 | 557 | 5,673 | 2,325 | 5,965 | 14,566 |
| | 2010 | 0 | 0 | 0 | 0 | 2 | 47 | 49 | 568 | 5,587 | 2,382 | 6,700 | 15,287 |
| | 2020 | 0 | 0 | 0 | 0 | 2 | 51 | 53 | 581 | 5,502 | 2,459 | 7,577 | 16,173 |
| | 2030 | 0 | 0 | 0 | 0 | 2 | 54 | 57 | 594 | 5,419 | 2,561 | 8,629 | 17,260 |
| | 2040 | 0 | 0 | 0 | 0 | 3 | 58 | 61 | 609 | 5,337 | 2,694 | 9,893 | 18,594 |
| | 2050 | 0 | 0 | 0 | 0 | 3 | 62 | 65 | 626 | 5,256 | 2,865 | 11,419 | 20,231 |
| | 2060 | 0 | 0 | 0 | 0 | 3 | 67 | 70 | 644 | 5,176 | 3,083 | 13,267 | 22,241 |
| | 2070 | 0 | 0 | 0 | 0 | 3 | 72 | 75 | 664 | 5,098 | 3,362 | 15,510 | 24,709 |
| | 2080 | 0 | 0 | 0 | 0 | 3 | 77 | 80 | 686 | 5,021 | 3,714 | 18,241 | 27,743 |
| | 2090 | 0 | 0 | 0 | 0 | 4 | 82 | 86 | 710 | 4,944 | 4,160 | 21,574 | 31,475 |
| SW | 2000 | 0 | 5 | 0 | 5 | 1 | 146 | 157 | 660 | 686 | 1,781 | 6,905 | 10,189 |
| | 2010 | 0 | 5 | 0 | 5 | 1 | 157 | 168 | 705 | 697 | 1,833 | 7,074 | 10,476 |
| | 2020 | 0 | 6 | 0 | 6 | 1 | 168 | 180 | 753 | 708 | 1,887 | 7,247 | 10,776 |
| | 2030 | 0 | 6 | 0 | 6 | 1 | 180 | 194 | 804 | 722 | 1,945 | 7,425 | 11,089 |
| | 2040 | 0 | 7 | 0 | 7 | 1 | 193 | 207 | 859 | 737 | 2,006 | 7,607 | 11,416 |
| | 2050 | 0 | 7 | 0 | 7 | 1 | 207 | 222 | 918 | 753 | 2,071 | 7,793 | 11,758 |
| | 2060 | 0 | 8 | 0 | 8 | 2 | 222 | 239 | 982 | 771 | 2,139 | 7,984 | 12,115 |
| | 2070 | 0 | 8 | 0 | 8 | 2 | 238 | 256 | 1,050 | 791 | 2,211 | 8,180 | 12,488 |

## Table 2.5.1-1 (cont.) Current Populations and Projections to 2090

| | | Radii Distances (miles) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sectors | | 0-1[1] | 1-2[2] | 2-3[2] | 3-4[2] | 4-5[2] | 5-10[2] | Total 0-10[2] | 10-20[2,3] | 20-30[2,3] | 30-40[3] | 40-50[3] | Total 0-50[1] |
| | 2080 | 0 | 9 | 0 | 9 | 2 | 255 | 274 | 1,123 | 813 | 2,288 | 8,381 | 12,879 |
| | 2090 | 0 | 9 | 0 | 9 | 2 | 273 | 294 | 1,201 | 838 | 2,368 | 8,586 | 13,288 |
| WSW | 2000 | 0 | 0 | 14 | 60 | 17 | 577 | 668 | 6,970 | 603 | 5,480 | 5,697 | 19,418 |
| | 2010 | 0 | 0 | 15 | 64 | 18 | 619 | 716 | 7,473 | 647 | 5,492 | 5,642 | 19,970 |
| | 2020 | 0 | 0 | 16 | 69 | 20 | 663 | 768 | 8,013 | 693 | 5,518 | 5,595 | 20,586 |
| | 2030 | 0 | 0 | 17 | 74 | 21 | 711 | 823 | 8,591 | 743 | 5,556 | 5,556 | 21,269 |
| | 2040 | 0 | 0 | 19 | 79 | 22 | 763 | 883 | 9,211 | 797 | 5,609 | 5,525 | 22,024 |
| | 2050 | 0 | 0 | 20 | 85 | 24 | 818 | 947 | 9,876 | 854 | 5,675 | 5,503 | 22,855 |
| | 2060 | 0 | 0 | 21 | 91 | 26 | 877 | 1,015 | 10,589 | 916 | 5,758 | 5,489 | 23,766 |
| | 2070 | 0 | 0 | 23 | 98 | 28 | 940 | 1,088 | 11,353 | 982 | 5,856 | 5,484 | 24,763 |
| | 2080 | 0 | 0 | 24 | 105 | 30 | 1,008 | 1,167 | 12,173 | 1,053 | 5,971 | 5,488 | 25,851 |
| | 2090 | 0 | 0 | 26 | 112 | 32 | 1,080 | 1,251 | 13,051 | 1,129 | 6,103 | 5,502 | 27,036 |
| W | 2000 | 0 | 0 | 53 | 7 | 3 | 297 | 360 | 3,279 | 1,250 | 5,231 | 3,404 | 13,524 |
| | 2010 | 0 | 0 | 57 | 8 | 3 | 318 | 386 | 3,516 | 1,331 | 5,080 | 3,369 | 13,682 |
| | 2020 | 0 | 0 | 61 | 8 | 3 | 341 | 414 | 3,769 | 1,418 | 4,934 | 3,339 | 13,875 |
| | 2030 | 0 | 0 | 65 | 9 | 4 | 366 | 444 | 4,042 | 1,512 | 4,794 | 3,312 | 14,104 |
| | 2040 | 0 | 0 | 70 | 9 | 4 | 392 | 476 | 4,333 | 1,613 | 4,660 | 3,290 | 14,371 |
| | 2050 | 0 | 0 | 75 | 10 | 4 | 421 | 510 | 4,646 | 1,721 | 4,531 | 3,271 | 14,679 |
| | 2060 | 0 | 0 | 81 | 11 | 5 | 451 | 547 | 4,981 | 1,837 | 4,407 | 3,256 | 15,029 |
| | 2070 | 0 | 0 | 86 | 11 | 5 | 484 | 586 | 5,341 | 1,962 | 4,288 | 3,246 | 15,424 |
| | 2080 | 0 | 0 | 93 | 12 | 5 | 519 | 629 | 5,727 | 2,097 | 4,175 | 3,240 | 15,867 |
| | 2090 | 0 | 0 | 99 | 13 | 6 | 556 | 674 | 6,140 | 2,241 | 4,067 | 3,237 | 16,359 |

## Table 2.5.1-1 (cont.) Current Populations and Projections to 2090

| | | Radii Distances (miles) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sectors | | 0-1[1] | 1-2[2] | 2-3[2] | 3-4[2] | 4-5[2] | 5-10[2] | Total 0-10[2] | 10-20[2,3] | 20-30[2,3] | 30-40[3] | 40-50[3] | Total 0-50[1] |
| WNW | 2000 | 0 | 0 | 68 | 0 | 65 | 171 | 304 | 3,328 | 8,582 | 6,798 | 17,503 | 36,515 |
| | 2010 | 0 | 0 | 73 | 0 | 70 | 183 | 326 | 3,540 | 9,060 | 7,503 | 18,462 | 38,891 |
| | 2020 | 0 | 0 | 78 | 0 | 75 | 197 | 349 | 3,765 | 9,568 | 8,503 | 19,564 | 41,750 |
| | 2030 | 0 | 0 | 84 | 0 | 80 | 211 | 375 | 4,006 | 10,108 | 9,938 | 20,853 | 45,280 |
| | 2040 | 0 | 0 | 90 | 0 | 86 | 226 | 402 | 4,262 | 10,681 | 12,014 | 22,397 | 49,757 |
| | 2050 | 0 | 0 | 96 | 0 | 92 | 242 | 431 | 4,536 | 11,292 | 15,041 | 24,291 | 55,590 |
| | 2060 | 0 | 0 | 103 | 0 | 99 | 260 | 462 | 4,827 | 11,940 | 19,478 | 26,679 | 63,386 |
| | 2070 | 0 | 0 | 111 | 0 | 106 | 279 | 495 | 5,137 | 12,630 | 26,011 | 29,772 | 74,046 |
| | 2080 | 0 | 0 | 119 | 0 | 114 | 299 | 531 | 5,469 | 13,363 | 35,664 | 33,883 | 88,910 |
| | 2090 | 0 | 0 | 127 | 0 | 122 | 320 | 569 | 5,822 | 14,142 | 49,962 | 39,478 | 109,974 |
| NW | 2000 | 0 | 38 | 0 | 118 | 92 | 118 | 366 | 10,087 | 117,824 | 80,353 | 6,498 | 215,128 |
| | 2010 | 0 | 41 | 0 | 127 | 99 | 126 | 392 | 10,613 | 123,570 | 114,577 | 9,176 | 258,329 |
| | 2020 | 0 | 44 | 0 | 136 | 106 | 136 | 421 | 11,169 | 129,596 | 165,349 | 13,122 | 319,657 |
| | 2030 | 0 | 47 | 0 | 145 | 113 | 145 | 451 | 11,755 | 135,917 | 240,788 | 18,955 | 407,865 |
| | 2040 | 0 | 50 | 0 | 156 | 122 | 156 | 484 | 12,373 | 142,545 | 353,009 | 27,595 | 536,006 |
| | 2050 | 0 | 54 | 0 | 167 | 130 | 167 | 519 | 13,027 | 149,497 | 520,082 | 40,420 | 723,544 |
| | 2060 | 0 | 58 | 0 | 179 | 140 | 179 | 556 | 13,717 | 156,787 | 768,966 | 59,478 | 999,505 |
| | 2070 | 0 | 62 | 0 | 192 | 150 | 192 | 596 | 14,447 | 164,434 | 1,139,874 | 87,830 | 1,407,181 |
| | 2080 | 0 | 66 | 0 | 206 | 161 | 206 | 640 | 15,219 | 172,453 | 1,692,801 | 130,037 | 2,011,149 |
| | 2090 | 0 | 71 | 0 | 221 | 172 | 221 | 686 | 16,035 | 180,863 | 2,517,245 | 192,905 | 2,907,734 |
| NNW | 2000 | 0 | 0 | 0 | 0 | 0 | 53 | 53 | 2,809 | 87,042 | 27,670 | 5,506 | 123,080 |
| | 2010 | 0 | 0 | 0 | 0 | 0 | 61 | 61 | 3,219 | 97,706 | 33,239 | 6,469 | 140,692 |

## Table 2.5.1-1 (cont.) Current Populations and Projections to 2090

| Sectors | | | | | | | | Radii Distances (miles) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sectors | | 0-1[1] | 1-2[2] | 2-3[2] | 3-4[2] | 4-5[2] | 5-10[2] | Total 0-10[2] | 10-20[2,3] | 20-30[2,3] | 30-40[3] | 40-50[3] | Total 0-50[1] |
| | 2020 | 0 | 0 | 0 | 0 | 0 | 69 | 69 | 3,693 | 109,927 | 40,177 | 7,602 | 161,468 |
| | 2030 | 0 | 0 | 0 | 0 | 0 | 80 | 80 | 4,241 | 123,950 | 48,915 | 8,937 | 186,123 |
| | 2040 | 0 | 0 | 0 | 0 | 0 | 91 | 91 | 4,875 | 140,058 | 60,057 | 10,509 | 215,590 |
| | 2050 | 0 | 0 | 0 | 0 | 0 | 105 | 105 | 5,610 | 158,578 | 74,445 | 12,362 | 251,100 |
| | 2060 | 0 | 0 | 0 | 0 | 0 | 121 | 121 | 6,461 | 179,892 | 93,283 | 14,545 | 294,301 |
| | 2070 | 0 | 0 | 0 | 0 | 0 | 139 | 139 | 7,446 | 204,441 | 118,291 | 17,118 | 347,435 |
| | 2080 | 0 | 0 | 0 | 0 | 0 | 160 | 160 | 8,589 | 232,738 | 151,953 | 20,151 | 413,591 |
| | 2090 | 0 | 0 | 0 | 0 | 0 | 184 | 184 | 9,912 | 265,379 | 197,876 | 23,728 | 497,080 |
| TOTAL | 2000 | 0 | 93 | 161 | 220 | 213 | 2,873 | 3,560 | 39,296 | 312,514 | 178,881 | 139,851 | 674,102 |
| | 2010 | 0 | 100 | 173 | 236 | 228 | 3,086 | 3,823 | 42,648 | 341,140 | 223,992 | 158,638 | 770,243 |
| | 2020 | 0 | 108 | 185 | 253 | 245 | 3,314 | 4,105 | 46,373 | 373,373 | 288,085 | 182,014 | 893,950 |
| | 2030 | 0 | 116 | 198 | 272 | 263 | 3,560 | 4,409 | 50,518 | 409,741 | 379,969 | 211,379 | 1,056,017 |
| | 2040 | 0 | 126 | 213 | 292 | 282 | 3,825 | 4,736 | 55,140 | 450,854 | 512,709 | 248,651 | 1,272,090 |
| | 2050 | 0 | 135 | 228 | 313 | 302 | 4,110 | 5,088 | 60,305 | 497,419 | 705,692 | 296,471 | 1,564,975 |
| | 2060 | 0 | 146 | 245 | 336 | 324 | 4,417 | 5,467 | 66,087 | 550,252 | 987,732 | 358,514 | 1,968,052 |
| | 2070 | 0 | 157 | 262 | 360 | 347 | 4,748 | 5,875 | 72,570 | 610,298 | 1,401,679 | 439,935 | 2,530,356 |
| | 2080 | 0 | 170 | 281 | 386 | 372 | 5,105 | 6,314 | 79,855 | 678,652 | 2,011,300 | 548,011 | 3,324,131 |
| | 2090 | 0 | 183 | 301 | 415 | 399 | 5,489 | 6,787 | 88,054 | 756,579 | 2,911,543 | 693,094 | 4,456,057 |

1 Within the 10-mile radius, the transient population has been deleted from the west, 0-1 mile sector, as the data are not accurate for new units.
2 SRS population (all transients in sectors N,NNE, NE, ENE, E, ESE; see Figure 2.5.1-1) is not included because SRS has an emergency plan that would be activated in a Vogtle emergency, therefore that transient population is not considered in the VEGP emergency plan.
3 Does not include transient population.

## Table 2.5.1-2 Counties within 50 Miles of the VEGP Site

| Georgia Counties | South Carolina Counties |
|---|---|
| Bulloch | Aiken |
| Burke | Allendale |
| Candler | Bamberg |
| Columbia | Barnwell |
| Effingham | Colleton |
| Emanuel | Edgefield |
| Glascock | Hampton |
| Jefferson | Jasper |
| Jenkins | Lexington |
| Johnson | McCormick |
| Lincoln | Orangeburg |
| McDuffie | Saluda |
| Richmond | |
| Screven | |
| Warren | |
| Washington | |

## Table 2.5.1-3 Municipalities in the 50-Mile Region

| Municipality | 2000 Population | Distance from VEGP (miles) | Direction |
|---|---|---|---|
| **Georgia** | | | |
| Augusta | 195,182 | 26 | NNW |
| Evans | 17,727 | 34 | NW |
| Girard | 227 | 8 | SSE |
| Hephzibah | 3,880 | 25 | WNW |
| Louisville | 2,712 | 38 | WSW |
| Martinez | 27,749 | 31 | NW |
| Millen | 3,492 | 24 | SSW |
| Sardis | 1,171 | 11 | S |
| Statesboro | 22,698 | 46 | S |
| Swainsboro | 6,943 | 50 | SW |
| Sylvania | 2,675 | 27 | SSE |
| Thomson | 6,827 | 46 | WNW |
| Wadley | 2,088 | 40 | WSW |
| Waynesboro | 5,813 | 16 | WSW |
| **South Carolina** | | | |
| Aiken | 25,337 | 29 | N |
| Allendale | 4,052 | 28 | ESE |
| Barnwell | 5,035 | 25 | ENE |
| Blackville | 2,973 | 33 | ENE |
| Edgefield | 4,449 | 45 | NNW |
| Hampton | 3,857 | 36 | ESE |
| Jackson | 1,625 | 15 | N |
| New Ellenton | 2,250 | 20 | NNE |
| North Augusta | 17,574 | 26 | NNW |
| Williston | 3,307 | 28 | NE |

## Table 2.5.1-4 Population Growth in the Three Counties and the State of Georgia, 1970 to 2015

| | Burke | | Richmond | | Columbia | | Georgia | |
|---|---|---|---|---|---|---|---|---|
| | Population | Annual Percent Growth | Population | Annual Percent Growth | Population | Annual Percent Growth | Population | Annual Percent Growth |
| 1970[1] | 18,255 | N/A | 162,437 | N/A | 22,327 | N/A | 4,589,575 | N/A |
| 1980[1] | 19,349 | 0.6 | 181,629 | 1.1 | 40,118 | 6.0 | 5,463,105 | 1.8 |
| 1990[1] | 20,579 | 0.6 | 189,719 | 0.4 | 66,031 | 5.1 | 6,478,216 | 1.7 |
| 2000[2] | 22,243 | 0.8 | 199,775 | 0.5 | 89,288 | 3.1 | 8,186,453 | 2.4 |
| 2010[3] | 24,561 | 1.0 | 193,914 | -0.3 | 116,642 | 2.7 | 9,864,970 | 1.9 |
| 2015[3] | 25,765 | 1.0 | 191,563 | -0.2 | 132,303 | 2.6 | 10,813,573 | 1.9 |

1 **USCB 1995**
2 **USCB 2000a**
3 **Georgia 2005**

## Table 2.5.1-5 Age Distribution of Population in 2000 for the Three Counties and State of Georgia

| | Burke | | Richmond | | Columbia | | Georgia | |
|---|---|---|---|---|---|---|---|---|
| Age Group | Number | Percent of Population | Number | Percent of Population | Number | Percent of Population | Number | Percent of Population |
| Under 18 | 6,954 | 31.3 | 53,608 | 26.8 | 26,430 | 29.6 | 2,169,234 | 26.5 |
| 18 to 24 | 2,032 | 9.1 | 23,881 | 12.0 | 6,504 | 7.3 | 837,732 | 10.2 |
| 25 to 44 | 6,072 | 27.3 | 59,686 | 29.9 | 27,679 | 31.0 | 2,652,764 | 32.4 |
| 45 to 64 | 4,769 | 21.4 | 40,955 | 20.5 | 21,545 | 24.1 | 1,741,448 | 21.3 |
| 65 and over | 2,416 | 10.9 | 21,645 | 10.8 | 7,130 | 8.0 | 785,275 | 9.6 |
| Totals | 22,243 | 100.0 | 199,775 | 100.0 | 89,288 | 100.0 | 8,186,453 | 100.0 |

Source: **USCB 2000d**

## Table 2.5.2-1 Employment by Industry - 1990 and 2000

| County | Burke | | Richmond | | Columbia | | Total | | Avg. Annual Growth Percent (3 counties) |
|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1990** | **2000** | **1990** | **2000** | **1990** | **2000** | **1990** | **2000** | **1990-2000** |
| Total Employment | 8,313 | 9,086 | 129,509 | 135,974 | 18,859 | 32,489 | 156,681 | 177,549 | 1.3 |
| Wage and Salary Employment | 7,170 | 7,418 | 120,858 | 125,103 | 14,714 | 23,195 | 142,742 | 155,716 | 0.9 |
| Proprietors Employment | 1,143 | 1,668 | 8,651 | 10,871 | 4,145 | 9,294 | 13,939 | 21,833 | 4.6 |
| Farm | 759 | 592 | 178 | 167 | 259 | 285 | 1,196 | 1,044 | -1.4 |
| Agricultural Services, Forestry, Fishing and Other | 106 | 214 | 411 | 612 | 296 | (1) | 813 | 826 | 0.2 |
| Mining | (2) | (2) | 133 | 113 | 36 | (1) | 169 | 113 | -3.9 |
| Construction | 178 | (a) | 9,439 | 7,052 | 2,304 | 3,373 | 11,921 | 10,425 | -1.3 |
| Manufacturing | 1,473 | 1,523 | 14,016 | 13,436 | 2,700 | 3,333 | 18,189 | 18,292 | 0.1 |
| Transportation and Utilities | (1) | (1) | 3,320 | 5,132 | 445 | 840 | 3,765 | 5,972 | 4.7 |
| Wholesale Trade | 223 | 343 | 4,496 | 3,403 | 517 | 760 | 5,236 | 4,506 | -1.5 |
| Retail Trade | 1,037 | 1,203 | 22,979 | 23,861 | 3,028 | 6,825 | 27,044 | 31,889 | 1.7 |
| Finance, Insurance, and Real Estate | 220 | 279 | 5,789 | 5,148 | 1,665 | 2,993 | 7,674 | 8,420 | 0.9 |
| Services | (1) | 1,813 | 31,348 | 38,728 | 4,880 | 10,027 | 36,228 | 50,568 | 3.4 |
| Government | 1,471 | 1,584 | 37,400 | 38,322 | 2,729 | 3,434 | 41,600 | 43,340 | 0.4 |

Source: **BEA 2005a**

1 Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

2 Less than 10 jobs, but the estimates for this item are included in the totals.

## Table 2.5.2-2 Top 10 Employers Located in the Augusta, Georgia Area

| | |
|---|---|
| U.S. Army -- Fort Gordon | Augusta/Richmond County Government |
| Medical College of Georgia | Georgia Department of Human Resources |
| Richmond County Schools | U.S. Veterans Administration Services |
| University Health Services | Columbia County School System |
| MCG Health Incorporated | Wal-Mart Associates |

Source: **GDOL 2004**

Note: SRS is not included in this list because it is not physically located in Georgia. However, SRS is one of the largest employers in the Augusta-Richmond County, GA-SC MSA.

## Table 2.5.2-3 Employment Trends - 1995 - 2004

| | Burke | | | Richmond | | | Columbia | | | Total | | | Georgia | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1995** | **2004** | **Avg. Annual Change (percent)** | **1995** | **2004** | **Avg. Annual Change (percent)** | **1995** | **2004** | **Avg. Annual Change (percent)** | **1995** | **2004** | **Avg. Annual Change (percent)** | **1995** | **2004** | **Avg. Annual Change (percent)** |
| Labor Force | 8,709 | 9,337 | 0.8 | 81,641 | 84,940 | 0.4 | 40,211 | 46,791 | 1.7 | 130,561 | 141,068 | 0.9 | 3,699,727 | 4,390,395 | 2.0 |
| Employed | 7,516 | 8,401 | 1.2 | 75,814 | 79,695 | 0.6 | 38,567 | 45,173 | 1.8 | 121,897 | 133,269 | 1.0 | 3,522,905 | 4,188,271 | 1.9 |
| Unemployed | 1,193 | 936 | -2.7 | 5,827 | 5,245 | -1.2 | 1,644 | 1,618 | -0.2 | 8,664 | 7,799 | -1.2 | 176,822 | 202,124 | 1.5 |
| Unemployment Rate | 13.7% | 10.0% | | 7.1% | 6.2% | | 4.1% | 3.5% | | 6.6% | 5.5% | | 4.8% | 4.6% | |

Sources: **BLS 2005**

Southern Nuclear Operating Company
Early Site Permit Application
Part 3 – Environmental Report

## Table 2.5.2-4 Personal Income - 1990, 2000, and 2003

| | 1990 | 2000 | 2003 | Avg. Annual Growth percent (1990-2003) |
|---|---|---|---|---|
| Georgia | $17,603 | $27,989 | $29,000 | 3.9 |
| Burke County | $11,902 | $17,407 | $19,215 | 3.8 |
| Richmond County | $16,931 | $22,105 | $24,320 | 2.8 |
| Columbia County | $19,584 | $29,751 | $31,562 | 3.7 |

Source: **BEA 2005b**

## Table 2.5.2-5 Road and Highway Mileage within the Three Counties (2004)

| | | Mileage | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **County** | **Total Road Mileage** | **State Routes** | **County Roads** | **City Streets** | **Unpaved Mileage Total** | **Unpaved Mileage (Percent of Total)** | **Paved Mileage Total** | **Paved Mileage (Percent of Total)** |
| Burke | 1,063 | 204 | 810 | 49 | 437 | 41 | 626 | 59 |
| Columbia | 749 | 129 | 588 | 32 | 101 | 13 | 648 | 87 |
| Richmond | 1,104 | 135 | 947 | 22 | 33 | 3 | 1,071 | 97 |
| **Total:** | **2,916** | **468** | **2345** | **103** | **571** | **20** | **2,345** | **80** |

Source: **GDOT 2004a**.

## Table 2.5.2-6 Statistics for Most Likely Routes to the VEGP Site[1]

| | Roadway and Location | Number of Lanes | GDOT Road Classification | Traffic Count Marker | Average Annual Daily Traffic (AADT) for 2004 |
|---|---|---|---|---|---|
| | **Columbia County** | | | | |
| 1 | State Route 104 (between Evans and the SR 104/SR 232 interchange) | 4 | Urban Principal Arterial | 143[b] | 33,437 |
| 2 | State Route 104 (between Pollard's Corner and Evans, near Tubman Road) | 2 | Minor Arterial (R)[3] | 147 | 7,456 |
| 3 | Interstate 20 (between the US Route 221/Interstate 20 intersection and the SR 388/Interstate 20 intersection) | 4 | Interstate Principal Arterial (R and U) | 194 | 41,538 |
| 4 | Interstate 20 (between the SR 338/Interstate 20 intersection and the SR 383/Interstate 20 intersection) | 4 | Interstate Principal Arterial (U) | 196 | 52,957 |
| 5 | Interstate 20 (between the SR 383/Interstate 20 intersection and the SR 232/Interstate 20 intersection) | 4-6 | Interstate Principal Arterial (U) | 198 | 54,381 |
| 6 | County Road 176 (just south of Evans) | 2 | Minor Arterial Street (U) | 209 | 8,132 |
| 7 | State Road 383 (between Evans and the SR 383/SR 232 intersection) | 3-4 | Urban Principal Arterial | 223 | 18,833 |
| 8 | County Road 575 (between Harlem and Grovetown) | 2 | Major Collector (R)/ Minor Arterial Street (U) | 238 | 5,005 |
| 9 | State Road 388 (between Grovetown and the SR 388/Interstate 20 interchange) | 2 | Minor Arterial Street (U) | 258 | 10,664 |
| | **Richmond County** | | | | |
| 10 | State Route 56 (near Clark Road and Richmond/Burke County border) | 4 | Minor Arterial Street (U) | 132[b] | 8,889 |
| 11 | State Route 56 (north of Browns Road intersection) | 4 | Minor Arterial Street (U) | 138[b] | 13,139 |
| 12 | State Route 56 (south of Tobacco Road intersection) | 4 | Minor Arterial Street (U) | 141[b] | 18,311 |
| 13 | State Route 56 (just north of Phinizy Road intersection) | 4 | Urban Principal Arterial | 143[b] | 25,249 |
| 14 | US Route 25 (between the US Route 25/Interstate 520 intersection and the US Route 25/Rozier Road intersection) | 6 | Urban Principal Arterial | 196 | 30,346 |

## Table 2.5.2-6 (cont.) Statistics for Most Likely Routes to the VEGP Site[1]

| | Roadway and Location | Number of Lanes | GDOT Road Classification | Traffic Count Marker | Average Annual Daily Traffic (AADT) for 2004 |
|---|---|---|---|---|---|
| | **Richmond County (cont.)** | | | | |
| 15 | Interstate 20 (between the Interstate 20/Wheeler Road intersection and the Interstate 20/Interstate 520 intersection) | 4-6 | Interstate Principal Arterial (U) | 214[b] | 54,373 |
| 16 | Interstate 20 (between the Interstate 20/Interstate 520 intersection and the Interstate 20/State Route 28 intersection) | 4 | Interstate Principal Arterial (U) | 216 | 62,100 |
| 17 | Interstate 520 (just south of the Interstate 20/Interstate 520 intersection) | 5-6 | Interstate Principal Arterial (U) | 221 | 74,696 |
| 18 | Interstate 520 (between the Interstate 520/US Route 1 intersection and the Interstate 520/Richmond Road intersection) | 4 | Interstate Principal Arterial (U) | 228 | 58,996 |
| 19 | County Road 1504 (Hephzibah-McBean Road) (between Hephzibah and the CR 1504/US Route 25 intersection) | 2 | Minor Arterial Street (U) | 234 | 1,571 |
| 20 | County Road 1503 (Tobacco Road) (between the US Route 25/CR 1503 intersection and the SR 56/CR 1503 intersection) | 4 | Urban Principal Arterial | 272[b] | 7,778 |
| 21 | County Road 1514 (Browns Road) (between the CR 1514/Liberty Road intersection and the CR 1514/CR 1516 [Waynesboro Road] intersection) | 2 | Minor Arterial Street (U) | 289 | 3,322 |

## Table 2.5.2-6 (cont.) Statistics for Most Likely Routes to the VEGP Site[1]

| | Roadway and Location | Number of Lanes | GDOT Road Classification | Traffic Count Marker | Average Annual Daily Traffic (AADT) for 2004 | Maximum Capacity (passenger cars per hour) |
|---|---|---|---|---|---|---|
| | **Burke County** | | | | | |
| 22 | State Route 23 (outside Girard heading southeast) | 2 | Major Collector (R) | 117 | 1,735 | 3,200 |
| 23 | State Route 23 (outside Girard heading northwest) | 2 | Major Collector (R) | 121 | 2,473 | 3,200 |
| 24 | State Route 23 (between Girard and SR 23/SR 80 interchange, near Rouse Stone Road) | 2 | Major Collector (R) | 123 | 2,240 | 3,200 |
| 25 | State Route 23 (between SR 56/SR 23 interchange and SR 23/SR 80 interchange) | 2 | Major Collector (R) | 125 | 3,049 | 3,200 |
| 26 | State Route 24 (intersection of SR 56, SR 24 and SR 80) | 2 | Major Collector (R)<br>Minor Arterial (R) | 149 | 4,654 | 3,200 |
| 27 | State Route 56 (at McBean Club Road) | 2 | Minor Arterial (R) | 159 | 887 | 3,200 |
| 28 | State Route 80 (approximately 2 miles west of State Route 23) | 2 | Major Collector (R) | 187 | 927 | 3,200 |
| 29 | State Route 80 (approximately 3 miles east of State Route 23) | 2 | Major Collector (R) | 189 | 264 | 3,200 |
| 30 | State Route 56 (northeast of Waynesboro, near Thompson Road) | 2 | Minor Arterial (R) | 171 | 8,303 | 3,200 |
| 31 | US Route 25 (State Route 121) – from Augusta (near Hunnicutt Road) | 2 | Principal Arterial (R) | 211 | 8,332 | 3,200 |
| 32 | County Road 455 (Story Mill Road) – from Hephzibah (near CR 456) | 2 | Major Collector (R) | 267 | 804 | 3,200 |
| 33 | County Road 59 (River Road) (near CR 57 [Hatcher Road]) | 2 | Major Collector (R) | 269 | 1,277 | 3,200 |

## Table 2.5.2-6 (cont.) Statistics for Most Likely Routes to the VEGP Site[1]

| | Roadway and Location | Number of Lanes | GDOT Road Classification | Traffic Count Marker | Average Annual Daily Traffic (AADT) for 2004 | Maximum Capacity (passenger cars per hour) |
|---|---|---|---|---|---|---|
| | **Burke County (cont.)** | | | | | |
| 34 | County Road 57 (Hatcher Road) (west of SR 23 intersection) | 2 | Major Collector (R) | 279 | 534 | 3,200 |
| 35 | County Road 57 (Hatcher Road) (east of SR 23 intersection) | 2 | Local (R) | 279 | 534 | 3,200 |

Sources: **GDOT 1987a, 1987b, 1992, 1999, 2004b, NATRB 2000**.

1 See also Figures 2.5.2-1 and 2.5.2-2. The traffic counts are identified on the figures with numbers that correspond to the numbers on this table.

2 Traffic counts for both directions of route.

3 R= Rural; U = Urban. “R” or “U” designation is included if not apparent from definition of roadway.

## Table 2.5.2-7 Major Airports within 50 Miles of VEGP

| Airport Name | Closest City | Type of Airport |
|---|---|---|
| **Georgia** | | |
| Daniel Field | Augusta | General Aviation Airport |
| Bush Field | Augusta | Business Airport of Regional Impact and Commercial Service |
| Louisville Municipal Airport | Louisville | Business Airport of Regional Impact |
| Millen Airport | Millen | General Aviation Airport |
| Statesboro Municipal Airport | Statesboro | Business Airport of Regional Impact |
| Emmanuel County Airport | Swainsboro | Business Airport of Local Impact |
| Plantation Airport | Sylvania | Business Airport of Local Impact |
| Burke County Airport | Waynesboro | General Aviation Airport |
| Wrens Memorial Airport | Wrens | General Aviation Airport |
| **South Carolina** | | |
| Aiken Municipal Airport | Aiken | Public |
| Twin Lakes Airport | Graniteville | Public (Privately Owned) |
| Edgefield County Airport | Trenton | Public |
| Barnwell County Airport | Barnwell | Public |
| Allendale County Airport | Allendale | Public |
| Hampton-Varnville Airport | Hampton | Public |
| Bamburg County Airport | Bamberg | Public |

Source: **GDOT 2003b, SCDOC 2005**

## Table 2.5.2-8 Property Tax Information, 2000-2004

| Year | Total Burke County Property Tax Revenues ($) | Burke County Tax Revenues Disbursed to the Burke County School District ($) | Property Tax Paid by SNC ($) | Percent of Total Property Taxes |
|---|---|---|---|---|
| 2000 | 30,329,024 | 19,116,331 | 24,930,927 | 82.2 |
| 2001 | 30,758,563 | 18,691,850 | 25,276,404 | 82.2 |
| 2002 | 29,713,972 | 18,022,492 | 23,699,476 | 79.8 |
| 2003 | 30,029,880 | 18,160,393 | 24,341,247 | 81.1 |
| 2004 | 29,805,738 | 17,838,847 | 24,358,042 | 81.7 |

## Table 2.5.2-9 Recreation Areas Within 50-Miles of VEGP[1]

| Name | Acreage | Location | Annual Visitors | Overnight Facilities |
|---|---|---|---|---|
| **Wildlife Management Areas[1]** | | | | |
| | | **Georgia** | | |
| Phinizy Swamp | 1,500 | Richmond County | No information available | No overnight facilities at WMAs. |
| Alexander | 1,300 | Burke County | No information available | |
| DiLane | 8,100 | Burke County | No information available | |
| Yuchi | 7,800 | Burke County; less than 10 miles from VEGP | No information available | |
| Mead Farm | 200 | Burke County, less than 10 miles from VEGP | No information available | |
| Hiltonia Tract | 500 | Hiltonia, Screven County | No information available | |
| Tuckahoe | 15,100 | Sylvania, Screven County | No information available | |
| | | **South Carolina** | | |
| Crackerneck | 10,470 | Aiken County; less than 10 air miles from VEGP | 3,100 | |
| Gopher Tortoise Heritage Preserve | 1,395 | Aiken County | No information available | |

## Table 2.5.2-9 (cont.) Recreation Areas Within 50-Miles of VEGP[1]

| Name | Acreage | Location | Annual Visitors | Overnight Facilities |
|---|---|---|---|---|
| **State Parks** | | | | |
| | | **Georgia** | | |
| Magnolia Springs | 1,071 | Millen, Jenkins County | 120,500 | √ |
| George L. Smith | 1,634 | Twin City, Emanuel County | 44,136 | √ |
| Mistletoe State Park | 1,920 | Appling, Columbia County | 132,314 | √ |
| Wildwood Park | 975 | Columbia County | 141,751 | √ |
| | | **South Carolina** | | |
| Hamilton Branch | 731 | Plum Branch, McCormick County | 117,200 | √ |
| Aiken Natural Area | 1,067 | Windsor, Aiken County | 42,645 | √ |
| Redcliffe Plantation | 369 | Beech Island, Aiken County | 2,400 | |
| Barnwell | 300 | Blackville, Barnwell County | 76,845 | √ |
| Rivers Bridge | 390 | Ehrhardt, Bamberg County | 6,027 | |
| Lake Warren | 440 | Hampton, Hampton County | 49,962 | √ |

Sources: **GDNR 2004, Georgia Outdoor 2003, SCDNR 2005, SCDPRT 2005, Burke County 2004, SCDPRT 2005)**.

1 Visitor records not kept except for Crackerneck which is part of SRS land area.

## Table 2.5.2-10 Housing, 1990-2000

| | Burke | | | Richmond | | | Columbia | | | Three-County Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1990 | 2000 | Avg. Annual Change (percent) | 1990 | 2000 | Avg. Annual Change (percent) | 1990 | 2000 | Avg. Annual Change (percent) | 1990 | 2000 | Avg. Annual Change (percent) |
| Total Housing Units | 8,329 | 8,842 | 0.6 | 77,288 | 82,312 | 0.6 | 23,745 | 33,321 | 3.4 | 109,362 | 124,475 | 1.3 |
| Occupied | 7,037 | 7,934 | 1.2 | 68,675 | 73,920 | 0.7 | 21,841 | 31,120 | 3.6 | 97,553 | 112,974 | 1.5 |
| Owner-Occupied | 4,981 | 6,030 | 1.9 | 38,762 | 42,840 | 1.0 | 17,322 | 25,557 | 4.0 | 61,065 | 74,427 | 2.0 |
| Renter-Occupied | 2,056 | 1,904 | -0.8 | 29,913 | 31,080 | 0.4 | 4,519 | 5,563 | 2.1 | 36,488 | 38,547 | 0.6 |
| Vacant Units | 1,292 | 908 | -3.5 | 8,613 | 8,392 | -0.3 | 1,904 | 2,201 | 1.5 | 11,809 | 11,501 | -0.3 |

Sources: **USCB 1990; 2000e**

## Table 2.5.2-11 Housing in Communities Closest to VEGP, 1990-2000

| | Waynesboro | | | Millen | | | Sylvania | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1990 | 2000 | Avg. Annual Change (percent) | 1990 | 2000 | Avg. Annual Change (percent) | 1990 | 2000 | Avg. Annual Change (percent) |
| Total Housing Units | 2,223 | 2,395 | 0.7 | 1,496 | 1,567 | 0.5 | 1,237 | 1,285 | 0.4 |
| Occupied | 2,018 | 2,151 | 0.6 | 1,369 | 1,321 | -0.4 | 1,147 | 1,088 | -0.5 |
| Owner-Occupied | 1,176 | 1,177 | 0.0 | 896 | 849 | -0.5 | 711 | 683 | -0.4 |
| Renter-Occupied | 842 | 974 | 1.5 | 473 | 472 | 0.0 | 436 | 405 | -0.7 |
| Vacant Units | 205 | 244 | 1.8 | 127 | 246 | 6.8 | 90 | 197 | 8.1 |

Sources: **USCB 1990, 2000f**.

## Table 2.5.2-12 State-Regulated Public Water Systems in the Three County Area, 2005[1]

| System Name | Permitted *Annual* Average Withdrawal (MGD) | Reported *Annual* Average Withdrawal (MGD) | Population Served – Groundwater and Surface Water |
|---|---|---|---|
| **Groundwater** | | | |
| **Burke County** | | | |
| Waynesboro | 3.50 | 0.79 | 5,813 |
| Sardis | 0.40 | 0.07 | 1,152 |
| **Columbia County** | | | |
| Columbia County | 0.58 | 0.00 | 77,280 |
| Grovetown | 0.90 | 0.13 | 5,500 |
| Harlem | 0.25 | 0.02 | 4,290 |
| **Richmond County** | | | |
| Augusta-Richmond County Water System | 17.40 | 8.40 | 200,000 |
| Hephzibah | 1.20 | 0.34 | 3,011 |

| System Name | Permitted *Monthly* Average Withdrawal (MGD) | Reported *Monthly* Average Withdrawal – 12 Month Range (MGD) | Population Served – Groundwater and Surface Water |
|---|---|---|---|
| **Surface Water** | | | |
| **Burke County** | | | |
| Waynesboro | 1.00 | 0.10 – 0.19 | 5,813 |
| Sardis | N/A | N/A | 1,152 |
| **Columbia County** | | | |
| Columbia County – Permit # 036-0109-04 | 8.0 | 0.82 – 2.69 | 77,280 |
| Columbia County – Permit # 036-0110-01 | 31.00 | 7.53 – 15.09 | Included above |
| Grovetown | N/A | N/A | 5,500 |
| Harlem | N/A | N/A | 4,290 |
| **Richmond County** | | | |
| Augusta-Richmond County Water System – Permit # 121-0191-06 | 45.00 | 24.40 – 35.10 | 200,000 |
| Augusta-Richmond County Water System – Permit # 121-0191-09 | 15.00 | 0.00 – 9.24 | Included above |
| Hephzibah | N/A | N/A | 3,011 |

Sources: **EPA 2005**

N/A System does not use this type of water.

1 Systems using 100,000 or more gallons of water per day.

## Table 2.5.2-13 Largest Public Waste Water Treatment Systems in the Three County Area

| System Name | Average Daily Waste Water Processed (MGD) | Maximum Capacity (MGD) |
|---|---|---|
| **Burke County** | | |
| Waynesboro | 1.0 | 2.0 |
| Sardis[1] | 0.043 | 0.20 |
| **Columbia County** | | |
| Kiokee Creek [1] | 0.02 | 0.30 |
| Crawford Creek | 1.00 | 1.50 |
| Little River | 2.50 | 3.00 |
| Reed Creek | 3.30 | 4.60 |
| **Richmond County** | | |
| Augusta-Richmond-J. B. Messerly Plant | 31.00 | 46.20 |

1 Not included in the analysis of sufficient capacity in Chapter 4.

## Table 2.5.2-14 Police and Fire Protection, 2001

| County | Total Population[1] | Police | Ratio of Residents per Police Officer | Firefighters (full time and volunteer) | Ratio of Residents per Firefighter |
|---|---|---|---|---|---|
| Burke | 22,243 | 82 | 271:1 | 25 | 890 |
| Richmond | 199,775 | 200 | 998:1 | 300 | 666 |
| Columbia | 89,288 | 90 | 992:1 | 132 | 676:1 |

Source: **CSRARDC 2005**

1 **USCB 2000e**

## Table 2.5.2-15 Medical Facility and Personnel Data, 2000

| County | Hospital beds per 1,000 population | Physicians per 1,000 population |
|---|---|---|
| Burke | 1.7 | 0.6 |
| Richmond | 10.1 | 6.1 |
| Columbia | 0 | 0.5 |

Source: **GDCA 2002**

## Table 2.5.2-16 Number and Type of Public Grade Schools in Burke, Columbia and Richmond Counties

| County | Number and Types of Schools | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | Elementary | | Middle | | High School | | | |
| | Primary[1] | Current | Proposed | Current | Proposed | Current | Proposed | Alternative/ Magnet | |
| Burke | 1 | 2 | 0 | 1 | 0 | 1 | 0 | 1 | 6 |
| Columbia | 0 | 15 | 1 | 7 | 1 | 4 | 1 | 1 | 30 |
| Richmond | 0 | 34 | 2 | 10 | 0 | 8 | 0 | 7[2] | 60 |
| Subtotals: | 1 | 51 | 3 | 18 | 1 | 13 | 1 | 8 | 96 |

Source: **GSCI 2005**.

1 Burke County has primary schools for pre-kindergarten through second grade.

2 3 – alternatives, 3 – magnets, 1 – proposed magnet

## Table 2.5.2-17 Two-Year and Four-Year Colleges within 50-Miles of VEGP

| College | Total Enrollment[1] |
|---|---|
| **Georgia** | |
| **4-Year** | |
| Augusta State University, Augusta | 6,386 |
| Medical College of Georgia, Augusta | 2,115 |
| Paine College, Augusta | 882 |
| Georgia Southern University, Statesboro | 16,100 |
| **2-Year** | |
| Augusta Technical College, Augusta | 4,351 |
| Ogeechee Technical College, Statesboro | 2,081 (2003) |
| East Georgia College, Swainsboro | 1,420 (2003) |
| Swainsboro Technical College, Swainsboro | 662 (2003) |
| **South Carolina** | |
| **4-Year** | |
| University of South Carolina, Aiken | 3,382 |
| Voorhees College, Denmark | 662 |
| **2-Year** | |
| Aiken Technical College, Aiken | 2,503 (2003) |
| Denmark Technical College, Denmark | 1,464 (2003) |
| University of South Carolina - Salkehatchie, Allendale | 789 (2003) |

Sources: **NCES 2003, ASU 2005, MCG 2005, GSU 2005, Lunch-Money.com 2005, USCA 2005**

1 All enrollment for 2004 unless otherwise noted.

## Table 2.5.3-1 National Register of Historic Sites in Burke County, Georgia

| Resource Name | Address | City | Distance from VEGP |
|---|---|---|---|
| Burke County Courthouse | Courthouse Square | Waynesboro | 15 miles |
| Haven Memorial Methodist Episcopal Church | Barron St., South of Junction of Barron St. and 6th St. | Waynesboro | 15 miles |
| Hopeful Baptist Church | Winter Rd., East of Junction with Blythe Road | Keysville | 30 miles |
| John James Jones house | 525 Jones Ave. | Waynesboro | 15 miles |
| McCanaan Missionary Baptist Church and Cemetery | McCanaan Church Road | Sardis | 12 miles |
| Sapp Plantation | NW of Sardis on GA 24 | Sardis | 10 miles |
| Waynesboro Commercial Historic District | E. 6th, E. 7th, E. 8th, S. Liberty, and Myrick Streets | Waynesboro | 15 miles |

Source: **NPS 2005**.

### Table 2.5.3-2 Historic or Archaeological Sites Identified During a 2005 Survey of the Proposed New Units' Footprint

| Site Number / Location | Description | Eligibility |
|---|---|---|
| 9BK414; on plateau W of Mallard Pond | Homesite, likely the W. M. Buxton home | |
| 9BK415; just W of railroad cut and approximately 2000 ft E of the nearest site boundary | Homesite identified from a 1989 topographic map that noted a home and outbuilding | |
| 9BK416; on river bluff at location of Barge Option 2 | Large multicomponent prehistoric site | Eligible; Barge Option 2 not being pursued; proposed intake structure moved upstream to avoid as much of the site as possible |
| 9BK417; N of road to barge landing and intake | Liquor still | |
| 9BK418; overlooking headwaters of Mallard Pond; composed of dirt road and landfill pit | Undiagnostic lithic scatter | |
| 9BK419; under transmission line from existing switchyard to Plant Wilson [a] | Woodland prehistoric site | Potentially eligible |
| 9BK420; under transmission line to Plant Wilson on ridge overlooking Savannah River [a] | Undiagnostic lithic site | Potentially eligible |
| 9BK421; under SCE&G transmission line; bench of a ridge side overlooking Savannah River | Undiagnostic lithic scatter | |
| 9BK422; near the training center overlooking Beaverdam Creek | Small scatter of historic and prehistoric artifacts; disturbed by logging and clearcutting | |
| 9BK423; on a small bench above the floodplain in the vicinity of the proposed intake location | Multicomponent prehistoric campsite | Eligible |

[a] Surveyed because original plan was to reroute Thalmann line to this right-of-way. This right-of-way no longer subject to construction due to reroute.

## Table 2.5.3-3 National Register of Historic Sites in Burke, Jefferson, McDuffie, and Warren Counties, Georgia

| Resource Name | Address | City | Distance from VEGP |
|---|---|---|---|
| | **Burke County** | | |
| Burke County Courthouse | Courthouse Square | Waynesboro | 15 miles |
| Haven Memorial Methodist Episcopal Church (also known as Haven-Munnerlyn United Methodist Church) | Barron Street, South of Junction of Barron Street and 6th Street | Waynesboro | 15 miles |
| Hopeful Baptist Church | Winter Road, East of Junction with Blythe Road | Keysville | 30 miles |
| John James Jones House (also known as Jones-Cox House and The Shadows) | 525 Jones Avenue | Waynesboro | 15 miles |
| McCanaan Missionary Baptist Church and Cemetery (also known as First McCanaan Baptist Church) | McCanaan Church Road | Sardis | 12 miles |
| Sapp Plantation | NW of Sardis on GA 24 | Sardis | 10 miles |
| Waynesboro Commercial Historic District | E. 6th, E. 7th, E. 8th, S. Liberty, and Myrick Streets | Waynesboro | 15 miles |
| | **Jefferson County** | | |
| Cunningham-Coleman House | SE of Wadley | Wadley | |
| Jefferson County Courthouse | Courthouse Square | Louisville | |
| Louisville Commercial Historic District | Area surrounding Broad Street between Peachtree and Screven Streets, including parts of Walnut, Mulberry and Green Streets | Louisville | |
| Old Market (also known as Slave Market) | US 1 and GA 24 (designated by monument/marker) | Louisville | |
| Bridge over Rocky Comfort Creek[1] | Unavailable | Unavailable | |

## Table 2.5.3-3 (cont.) National Register of Historic Sites in Burke, Jefferson, McDuffie, and Warren Counties, Georgia

| Resource Name | Address | City | Distance from VEGP |
|---|---|---|---|
| | **McDuffie County** | | |
| Boneville Historic District | Junction of Boneville Road, and GA RR, approximately 5 miles SE of Thomson | Boneville | |
| Bowdre-Rees-Knox House (also known as Half Way House) | SW of Thomson on Old Wrightsboro Road | Thomas | |
| Carr, Thomas District | North of Thomson near Junction of GA 150 and I-20 | Thomson | |
| Hayes Line Historic District | Junction of Twin Oaks Road and GA 233 | Thomson | |
| Hickory Hill (also known as Thomas E. Watson House) | Hickory Hill Drive and Lee Street | Thomson | |
| Hillman-Bowden House (also known as Pylant Place) | 1348 Pyland Crossing Road | Thomson | |
| James L. Hardaway House | Old Mesena Road, West of Thomson | Thomson | |
| McNeill House | 220 Lee Street | Thomson | |
| Old Rock House | Northwest of Thomson on Old Rock House Road | Thomson | |
| Pine Top Farm (also known as John S. Watson Homeplace) | Junction of US 78 and US 278, 2 miles East of Thomson | Thomson | |
| Sweetwater Inn | Off GA 17 on Old Milledgeville Road | Thomson | |
| Thomson Commercial Historic District | Bounded by Journal, Greenway, Railroad, Hendricks, and Church Streets | Thomson | |
| Usry House | 211 Milledge Street | Thomson | |
| Wrightsboro Historic District (also known as Wrightsboro, Quaker Reserve, Wrightsboro Township) | Wrightsboro Road, East of Ridge Road | Wrightsboro | |
| New Waycross Historic District | Unavailable | Unavailable | |

**Table 2.5.3-3 (cont.) National Register of Historic Sites in Burke, Jefferson, McDuffie, and Warren Counties, Georgia**

| Resource Name | Address | City | Distance from VEGP |
|---|---|---|---|
| **Warren County** | | | |
| Jewell Historic District | GA 248 and GA 16 | Jewell | |
| Roberts-McGregor House | Depot Street | Warrenton | |
| Warren County Courthouse | Courthouse Square | Warrenton | |
| Warrenton Downtown Historic District | Entered at the Junction of Main and Depot Streets | Warrenton | |
| Warrenton Gymnasium-Auditorium | 304 South Gibson Street | Warrenton | |

Source: **NationalRegisterofHistoricPlaces.com. ND a,b,c,d**

[1] Determined eligible.

## Table 2.5.4-1 Minority and Low-Income Population Census Blocks within 50-Mile Radius of VEGP Site

**Block Groups Where Minorities and Low-Income Populations Exceed the State Averages by 20 Percent or More[1]**

| | | | Minority | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| State | County | Total Block Groups | Black Races | American Indian or Native Alaskan | Asian | Native Hawaiian or Other Pacific Islander | Other | Multi-Racial | Aggregate[2] | Hispanic | Low-Income (Households) |
| Georgia | Bulloch | 30 | 7 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 10 |
| Georgia | Burke | 18 | 11 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 7 |
| Georgia | Candler | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Georgia | Columbia | 30 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Georgia | Effingham | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Georgia | Emanuel | 12 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| Georgia | Glascock | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Georgia | Jefferson | 17 | 11 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 4 |
| Georgia | Jenkins | 8 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 |
| Georgia | Johnson | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Georgia | Lincoln | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Georgia | McDuffie | 19 | 7 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 |
| Georgia | Richmond | 125 | 63 | 0 | 0 | 0 | 0 | 0 | 61 | 0 | 30 |
| Georgia | Screven | 14 | 5 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 |
| Georgia | Warren | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Georgia | Washington | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| South Carolina | Aiken | 101 | 17 | 0 | 0 | 0 | 0 | 0 | 17 | 1 | 6 |
| South Carolina | Allendale | 11 | 10 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 5 |
| South Carolina | Bamberg | 17 | 9 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 3 |
| South Carolina | Barnwell | 19 | 8 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 1 |
| South Carolina | Colleton | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| South Carolina | Edgefield | 15 | 7 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 1 |

## Table 2.5.4-1 (cont.) Minority and Low-Income Population Census Blocks within 50-Mile Radius of VEGP Site

**Block Groups Where Minorities and Low-Income Populations Exceed the State Averages by 20 Percent or More[1]**

| | | | Minority | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| State | County | Total Block Groups | Black Races | American Indian or Native Alaskan | Asian | Native Hawaiian or Other Pacific Islander | Other | Multi-Racial | Aggregate[2] | Hispanic | Low-Income (Households) |
| South Carolina | Hampton | 13 | 6 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 1 |
| South Carolina | Jasper | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| South Carolina | Lexington | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| South Carolina | McCormick | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| South Carolina | Orangeburg | 13 | 4 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 |
| South Carolina | Saluda | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| Totals: | | 491 | 175 | 0 | 0 | 0 | 0 | 0 | 168 | 1 | 72 |
| Georgia | Bulloch | 30 | 7 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 3 |
| Georgia | Burke | 18 | 11 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 1 |
| Georgia | Candler | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Georgia | Columbia | 30 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Georgia | Effingham | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Georgia | Emanuel | 12 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| Georgia | Glascock | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Georgia | Jefferson | 17 | 10 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 |
| Georgia | Jenkins | 8 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| Georgia | Johnson | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Georgia | Lincoln | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Georgia | McDuffie | 19 | 6 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 |
| Georgia | Richmond | 125 | 62 | 0 | 0 | 0 | 0 | 0 | 68 | 0 | 9 |
| Georgia | Screven | 14 | 4 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 |

## Table 2.5.4-1 (cont.) Minority and Low-Income Population Census Blocks within 50-Mile Radius of VEGP Site

**Block Groups Where Minorities and Low-Income Populations Exceed the State Averages by 20 Percent or More[1]**

| | | | Minority | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| State | County | Total Block Groups | Black Races | American Indian or Native Alaskan | Asian | Native Hawaiian or Other Pacific Islander | Other | Multi-Racial | Aggregate[2] | Hispanic | Low-Income (Households) |
| Georgia | Warren | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Georgia | Washington | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| South Carolina | Aiken | 101 | 17 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | 1 |
| South Carolina | Allendale | 11 | 10 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 |
| South Carolina | Bamberg | 17 | 9 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 |
| South Carolina | Barnwell | 19 | 8 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 |
| South Carolina | Colleton | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| South Carolina | Edgefield | 15 | 7 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 |
| South Carolina | Hampton | 13 | 6 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 |
| South Carolina | Jasper | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| South Carolina | Lexington | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| South Carolina | McCormick | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| South Carolina | Orangeburg | 13 | 4 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 |
| South Carolina | Saluda | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| Totals: | | 491 | 171 | 0 | 0 | 0 | 0 | 0 | 183 | 0 | 14 |

## Table 2.5.4-1 (cont.) Minority and Low-Income Population Census Blocks within 50-Mile Radius of VEGP Site

**Block Groups Where Minorities and Low-Income Populations Exceed the State Averages by 20 Percent or More[1]**

**State Percentages[1]**

| | Minority | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **State** | **Black Races** | **American Indian or Native Alaskan** | **Asian** | **Native Hawaiian or Other Pacific Islander** | **Other** | **Multi-Racial** | **Aggregate[2]** | **Hispanic** | **Low-Income (Households)** |
| Georgia | 28.70 | 0.27 | 2.12 | 0.05 | 2.40 | 1.39 | 34.93 | 5.32 | 12.64 |
| South Carolina | 29.54 | 0.34 | 0.90 | 0.04 | 1.00 | 1.00 | 32.81 | 2.37 | 14.11 |

1 Shaded counties are completely within the 50-mile radius of VEGP.

2 Because both Georgia and South Carolina have relatively large percentages of aggregate minority populations, 34.9 and 32.8 percent, respectively, adding 20 percentage points to these averages equates to 54.9 and 52.8 percent, respectively. Therefore, there are more census block groups that meet the “50 percent” threshold criteria than the “20 percentage points greater than the state average” thresholds.

## Table 2.5.4-2 Farms that Employ Migrant Labor in the 50-Mile Region[1]

| County | Total Farms[2] | Farms with Migrant Labor[3] | Percent of Total Farms |
|---|---|---|---|
| **Georgia** | | | |
| Burke | 494 | 9 | 2 |
| Richmond | 140 | 0 | 0 |
| Columbia | 196 | 0 | 0 |
| Jenkins | 240 | 2 | <1 |
| Screven | 347 | 4 | 1 |
| Emanuel | 554 | 5 | 1 |
| Jefferson | 388 | 1 | <1 |
| McDuffie | 296 | 48 | 16 |
| **South Carolina** | | | |
| Aiken | 929 | 21 | 2 |
| Edgefield | 325 | 9 | 3 |
| Allendale | 156 | 6 | 4 |
| Barnwell | 370 | 16 | 4 |
| Bamberg | 340 | 13 | 4 |
| Hampton | 248 | 0 | 0 |

1 Includes counties with more than approximately half their area within the 50-mile radius.
2 From Table 1 **(USDA 2004a, 2004b)**
3 From Table 7 **(USDA 2004a, 2004b)**

## Table 2.5.4-3 Regional Agriculture Information, 2002

| County | Number of Farms | Land in Farms (acres) | % Cropland (% of Land in Farms) | Top Crop Items |
|---|---|---|---|---|
| | | **Georgia** | | |
| Burke | 494 | 218,954 | 47.79 | Cotton, Forage, Peanuts, Soybeans, Corn for grain |
| Richmond | 140 | 12,439 | 40.27 | Forage, Vegetables, Pecans, Oats, Corn for grain |
| Columbia | 196 | 23,296 | 21.41 | Forage, Nursery stock, Pecans, Corn for silage and grain |
| Jenkins | 240 | 94,632 | 41.00 | Cotton, Forage, Peanuts, Wheat for grain, Corn for grain |
| Screven | 347 | 184,170 | 47.49 | Cotton, Forage, Peanuts, Soybeans, Corn for grain |
| Emanuel | 554 | 159,723 | 35.17 | Cotton, Forage, Peanuts, Pecans, Corn for grain |
| Jefferson | 388 | 137,217 | 53.55 | Cotton, Forage, Soybeans, Wheat for grain, Corn for grain |
| McDuffie | 296 | 46,774 | 33.93 | Forage, Nursery stock, Pecans, Corn for silage, Cotton |
| | | **South Carolina** | | |
| Aiken | 929 | 143,942 | 39.51 | Cotton, Forage, Wheat for grain, Soybeans, Corn for grain |
| Allendale | 156 | 107,703 | 47.29 | Cotton, Forage, Soybeans, Wheat for grain, Corn for grain |
| Edgefield | 325 | 74,494 | 34.85 | Forage, Peaches, Soybeans, Oats, Rye for grain |
| Barnwell | 370 | 85,114 | 42.00 | Cotton, Forage, Peanuts, Soybeans, Corn for grain |

## Table 2.5.4-3 (cont.) Regional Agriculture Information, 2002

| County | Number of Farms | Land in Farms (acres) | % Cropland (% of Land in Farms) | Top Crop Items |
|---|---|---|---|---|
| **South Carolina (cont.)** | | | | |
| Bamberg | 340 | 105,277 | 45.23 | Forage, Vegetables, Soybeans, Cotton, Corn for grain |
| Hampton | 248 | 127,913 | 34.63 | Cotton, Forage, Soybeans, Corn for grain, Wheat for grain |

Source: **USDA 2002**

Forage – Land used for all hay and haylage, grass silage, and greenchop.

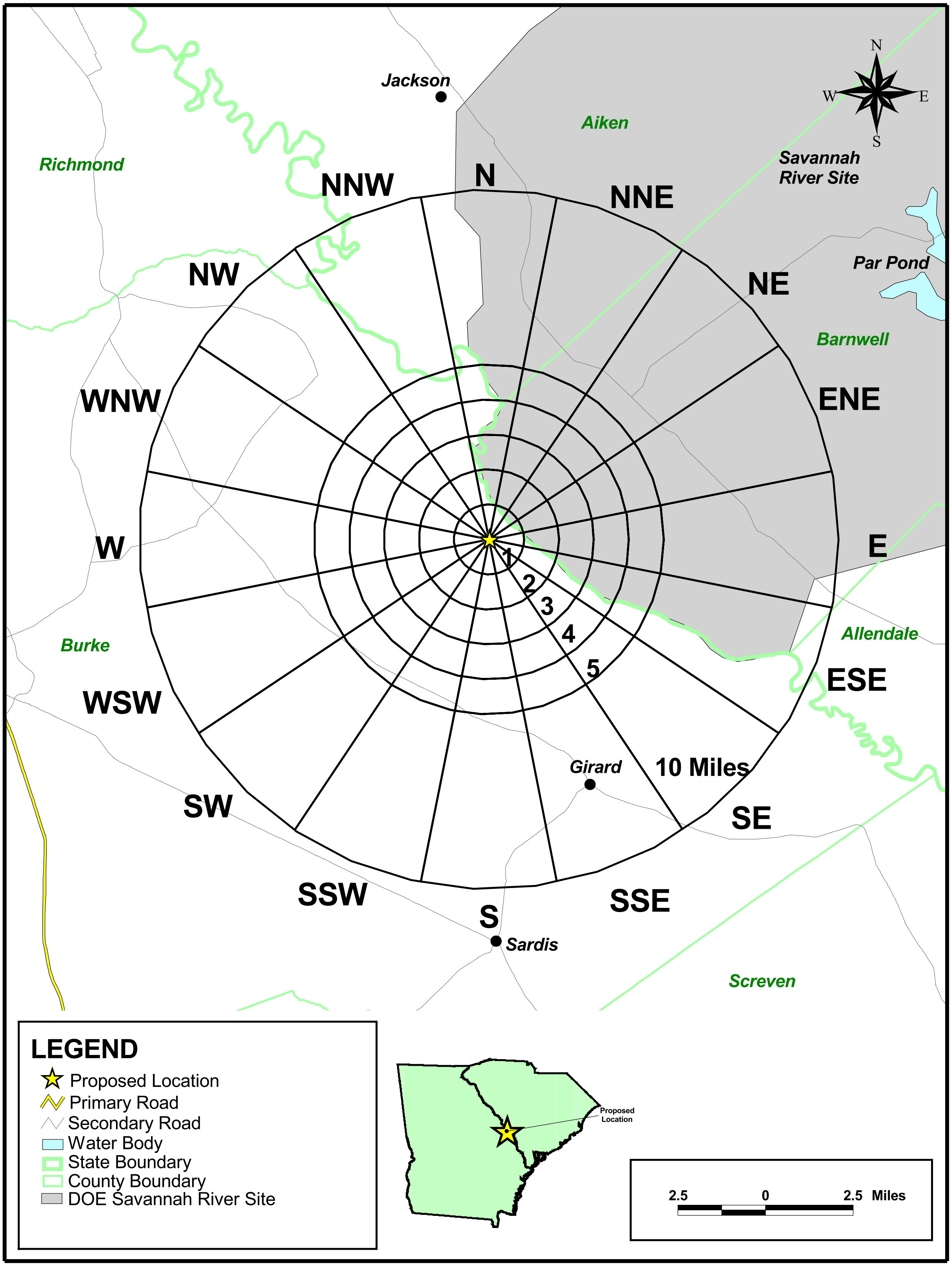


**Figure 2.5.1-1 10-Mile Vicinity with Direction Sectors Identified**

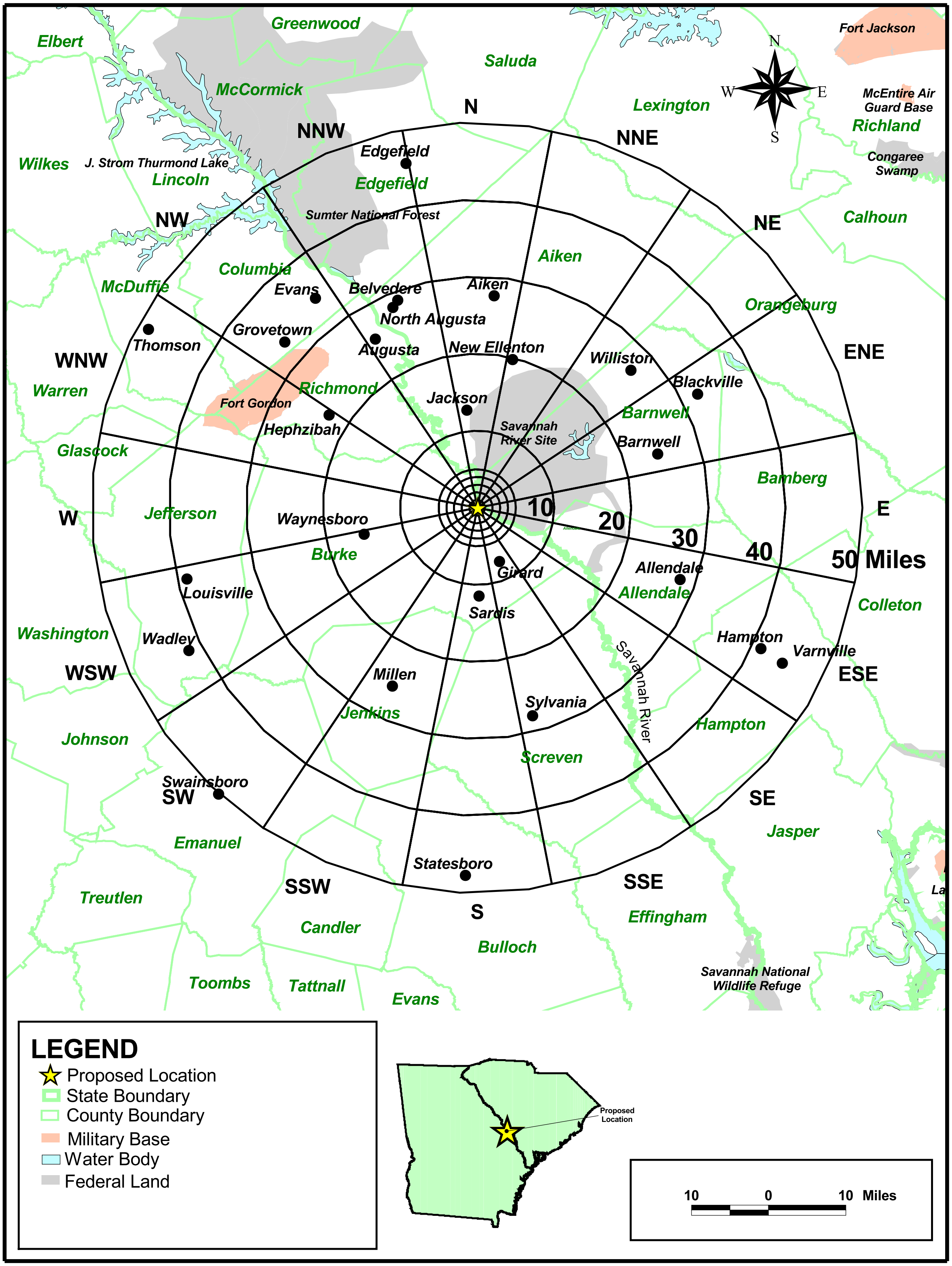


**Figure 2.5.1-2 50-Mile Region with Direction Sectors Identified**

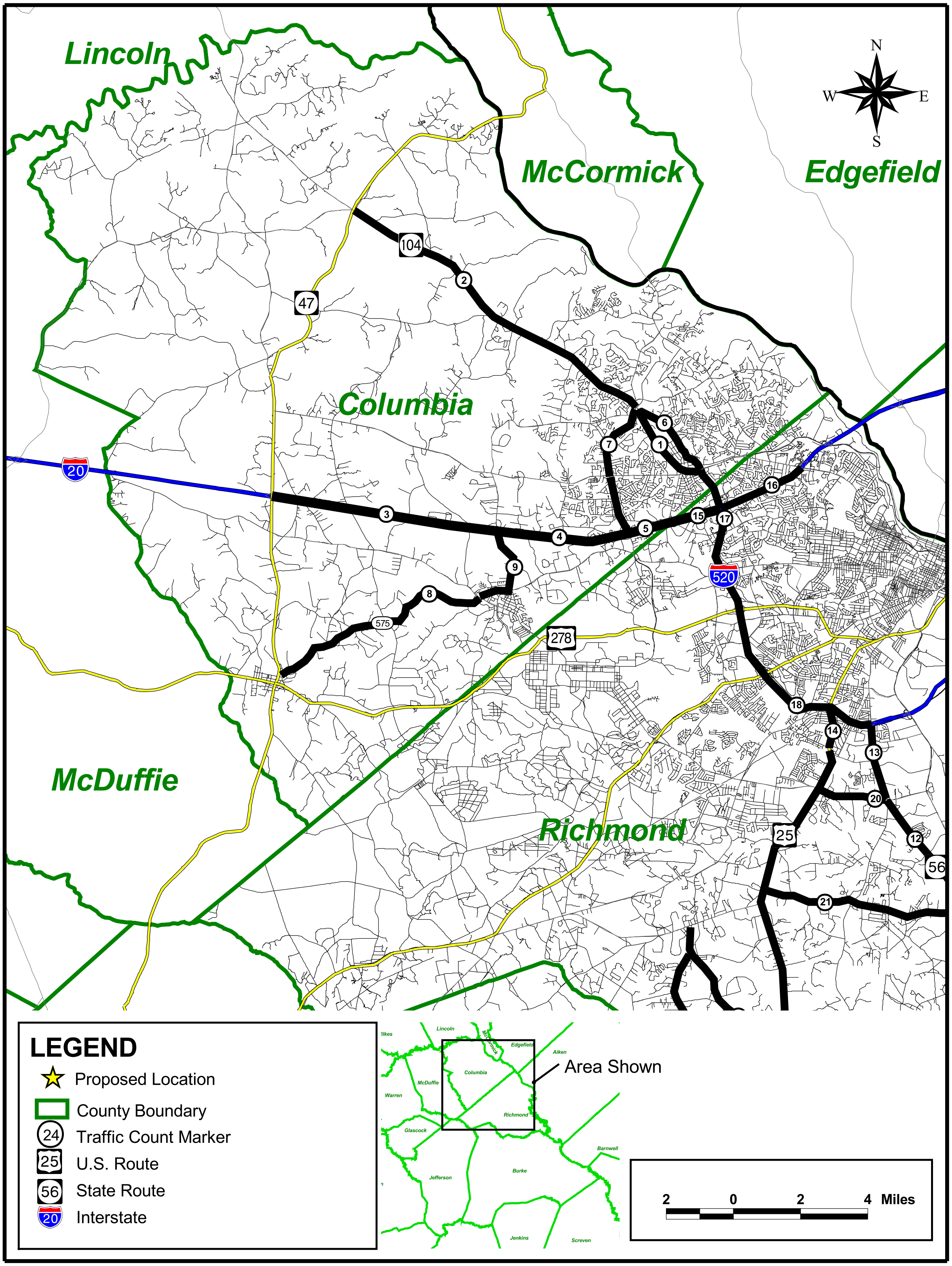


**Figure 2.5.2-1 Transportation System in Columbia and Richmond Counties**

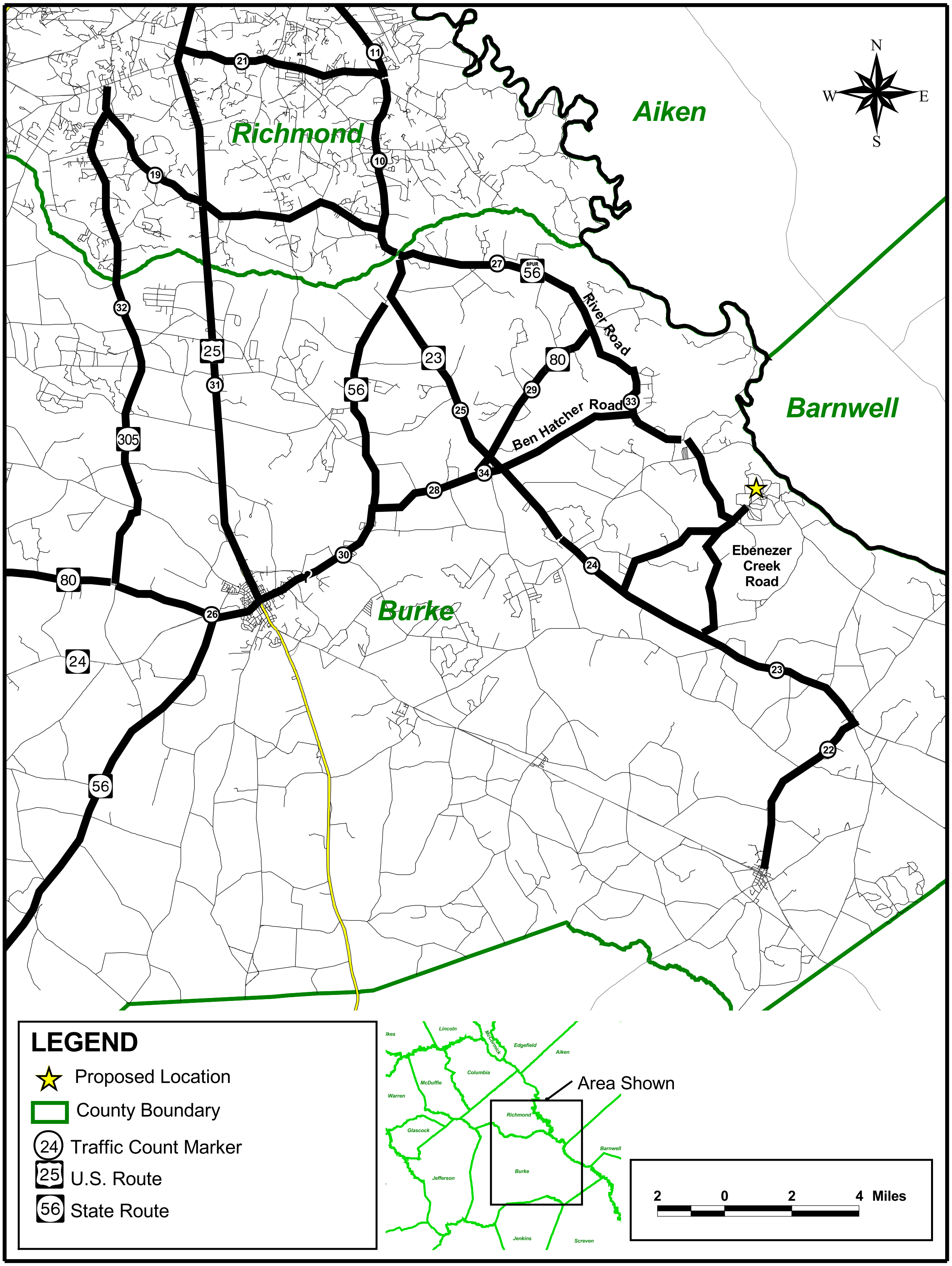


**Figure 2.5.2-2 Transportation System in Burke and Richmond Counties**

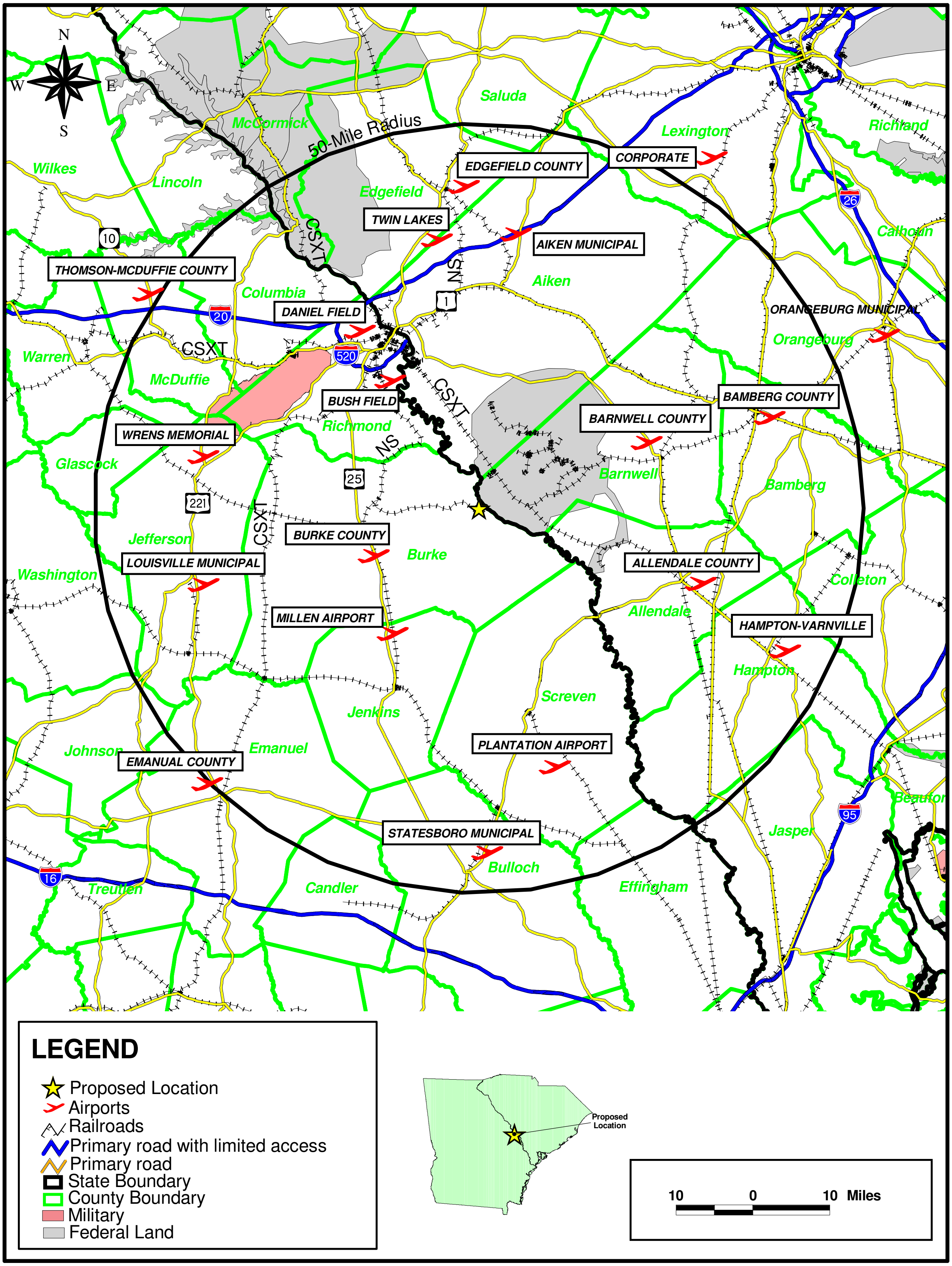


**Figure 2.5.2-3 Airports And Rail System in the 50-Mile Region**

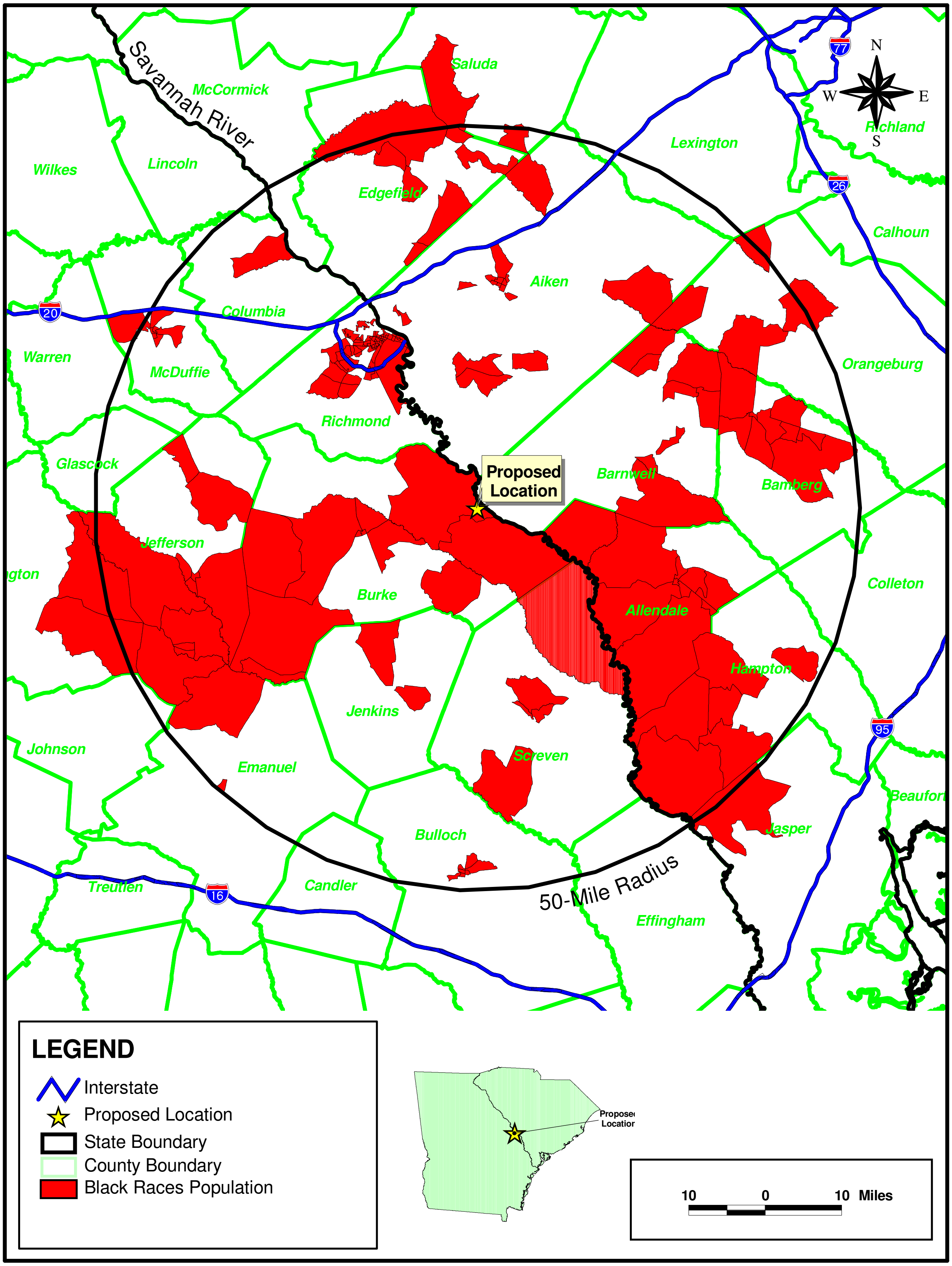


Figure 2.5.4-1 Black Races Block Groups within the 50-Mile Radius of VEGP

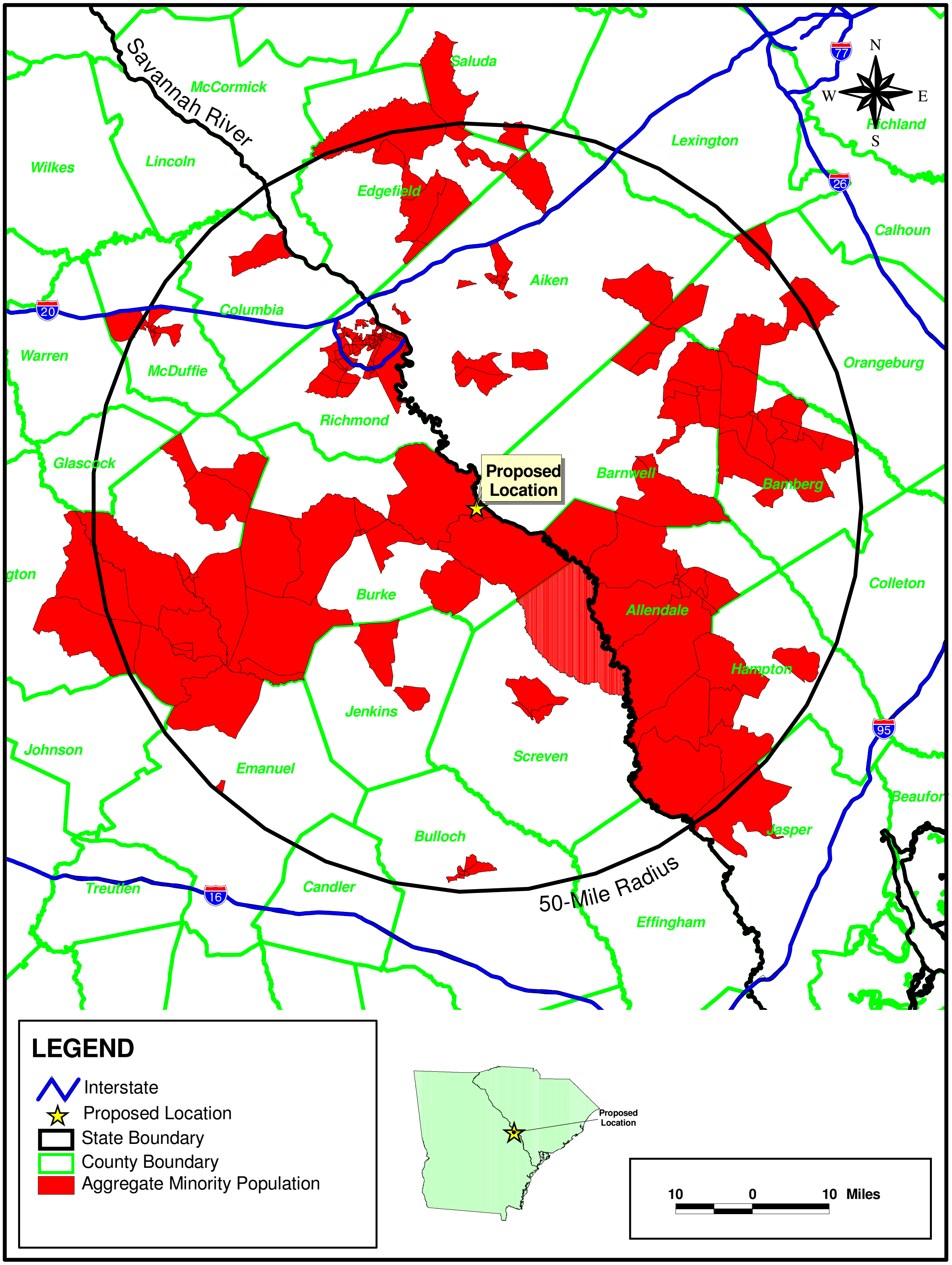


**Figure 2.5.4-2 Aggregate Minority Population Block Groups within the 50-Mile Radius**

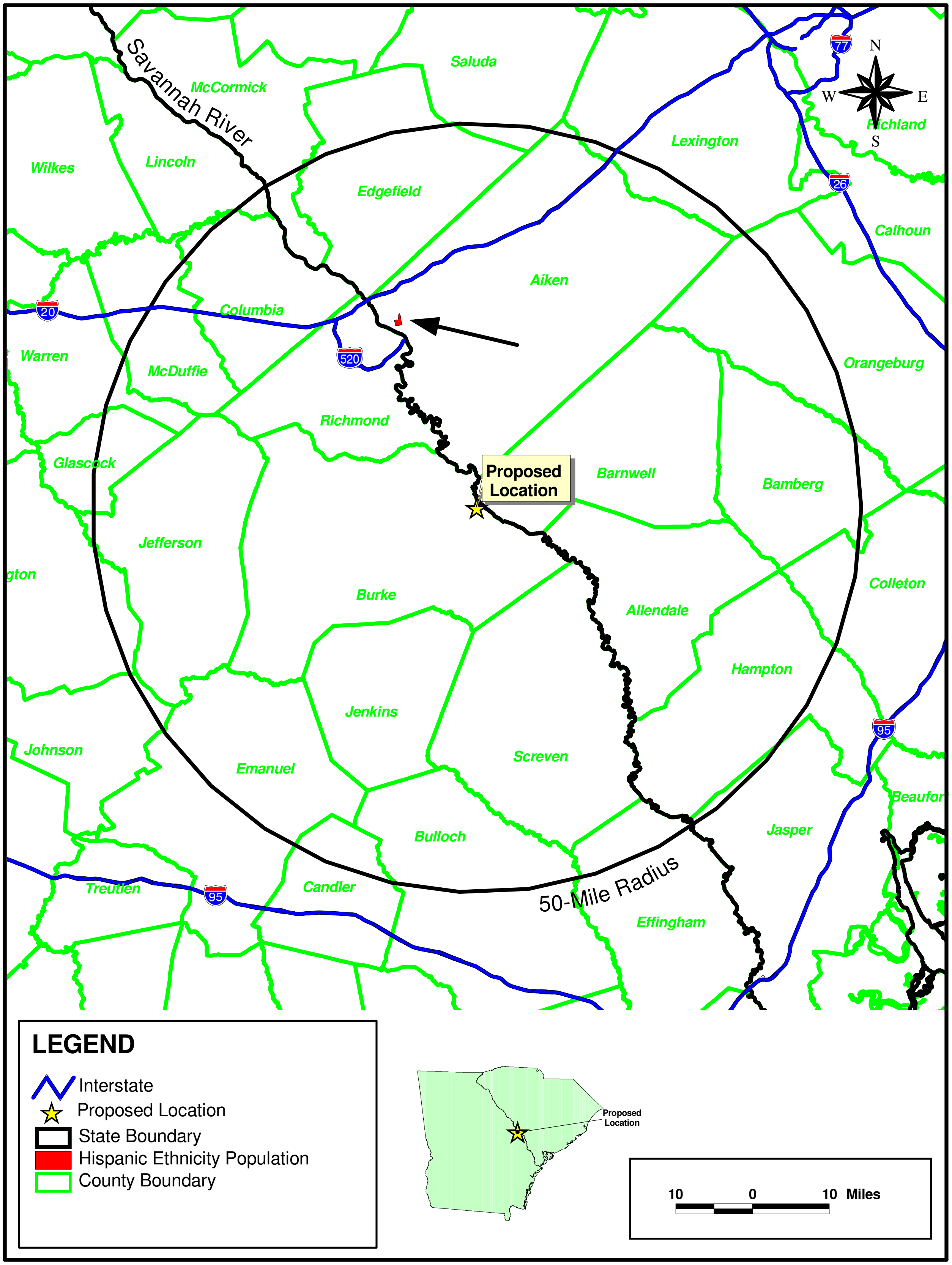


**Figure 2.5.4-3 Hispanic Ethnicity Block Groups within the 50-Mile Radius**

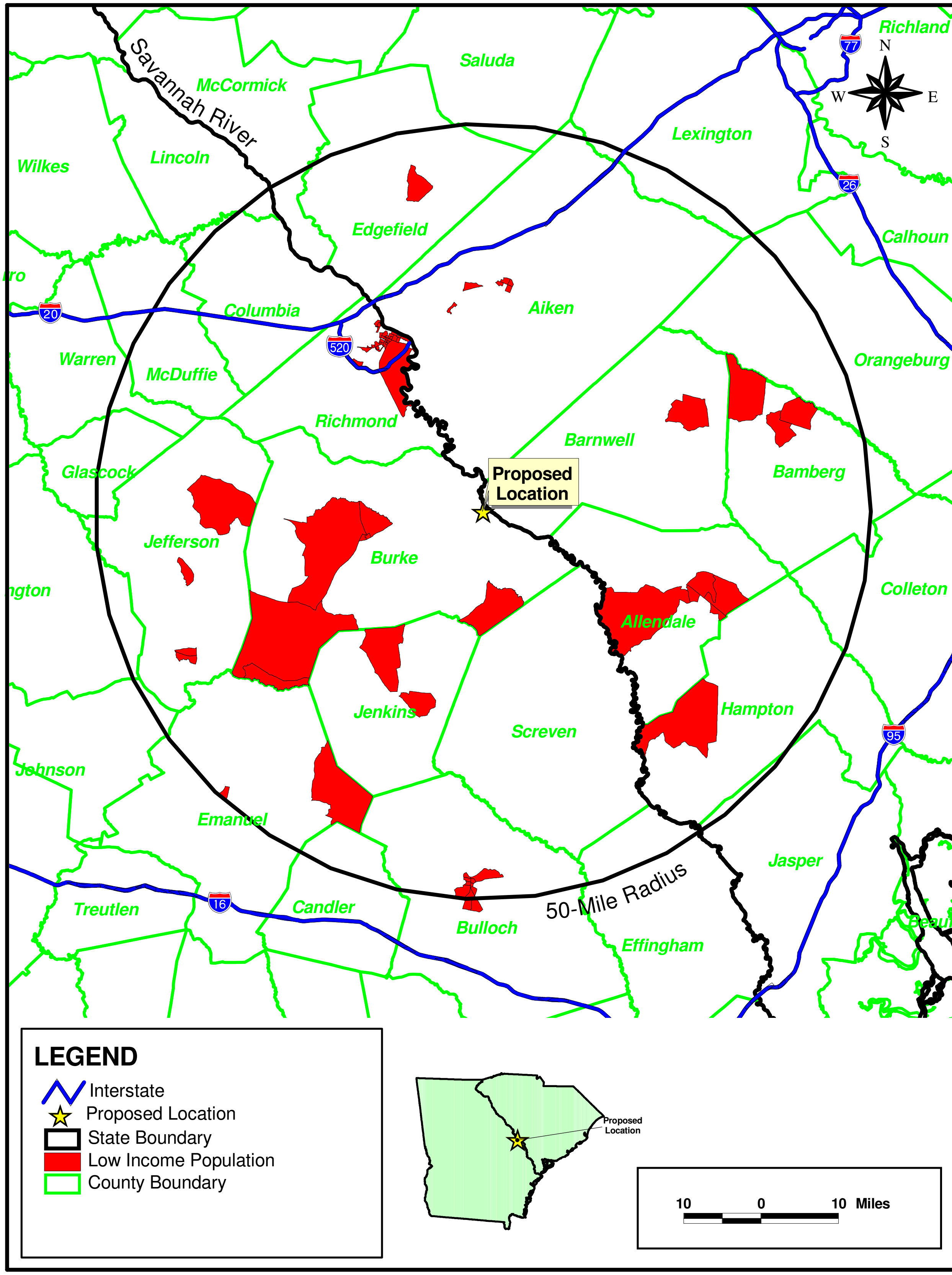


**Figure 2.5.4-4 Low-Income Population Block Groups within the 50-Mile Radius**

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