

Chapter 4 Environmental Impacts of Construction

Chapter 4 presents the potential impacts of construction of the new units at the Vogtle Electric Generating Plant (VEGP) site. In accordance with 10 CFR 51, impacts are analyzed, and a single significance level of potential impact to each resource (i.e., SMALL, MODERATE, or LARGE) is assigned consistent with the criteria that NRC established in 10 CFR 51, Appendix B, Table B-1, Footnote 3 as follows:

SMALL	Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the Commission has concluded that those impacts that do not exceed permissible levels in the Commission's regulations are considered small.
MODERATE	Environmental effects are sufficient to alter noticeably, but not to destabilize, any important attribute of the resource.
LARGE	Environmental effects are clearly noticeable and are sufficient to destabilize any important attributes of the resource.

This chapter is divided into seven sections:

- Land Use Impacts (Section 4.1)
- Water-Related Impacts (Section 4.2)
- Ecological Impacts (Section 4.3)
- Socioeconomic Impacts (Section 4.4)
- Radiation Exposure to Construction Workers (Section 4.5)
- Measures and Controls to Limit Adverse Impacts During Construction (Section 4.6)
- Non-radiological Health Impacts (Section 4.7)

The sections present potential ways to avoid, minimize, or mitigate adverse impacts to the maximum extent possible.

The following descriptions should help the reader understand the scope of the discussion:

- VEGP site – the 3,169-acre existing site as described in the Unit 1 and Unit 2 licenses
- New plant (VEGP Units 3 and 4) footprint – the approximately 500 acres within the existing VEGP site that will encompass the construction and operation of the new nuclear units
- Vicinity – the area within approximately the 6- to 10-mile (depending on the issue) radius around the VEGP site
- Region – the area within approximately the 50-mile radius around the VEGP site

Construction will occur in two phases:

- ESP site preparation activities are those activities which are allowed by the early site permit (ESP) Limited Work Authorization (LWA). Site preparation activities are predominately earth-work, development of construction support facilities, and construction of non-safety related structures.
- COL site construction activities will begin once the combined operating license (COL) is granted. Construction includes some earth-work but is predominately the construction or fabrication of the reactor buildings and associated and supporting facilities.

Section 3.9.2 describes site preparation, or pre-construction activities; those activities that could commence upon approval of the ESP permit. Section 3.9.3 describes construction activities.

4.1 Land-Use Impacts

The following sections describe the impacts of site preparation and construction to the Vogtle Electric Generating Plant (VEGP) site and the surrounding area. Section 4.1.1 describes impacts to the site and vicinity. Section 4.1.2 describes impacts that could occur along transmission lines, should the transmission system need upgrading as a result of the new units at VEGP. Section 4.1.3 describes impacts to historic and cultural resources at the site and along transmission lines. This section does not describe land uses attributable to increased tax revenues to Burke County. Those are addressed in Section 4.4.2.2.2.

4.1.1 The Site and Vicinity

4.1.1.1 The Site

VEGP Units 3 and 4 and supporting facilities will be located on the 3,169-acre VEGP site, adjacent to the existing nuclear units (Figure 3.1-3). Heavy equipment and reactor components will be barged up the Savannah River. A heavy haul road will be constructed from the barge slip on the Savannah River to the construction site. A construction access road will be constructed from River Road, near the rail spur crossing, to the construction site to provide access to the construction site without impeding traffic to the existing units. Another road will be constructed to the new intake structure. Approximately 310 acres of land will be dedicated permanently to the new units and their supporting facilities (Table 4.1-1). Temporary facilities and spoil storage will affect an additional 190 acres. Most of the land has been disturbed in the last 30 years and currently consists of planted pines and old fields. Less than 25 acres of mixed and bottom land hardwoods will be lost. One permitted landfill in the construction footprint (Landfill #3) will be relocated.

Areas for borrow pits were originally identified on the northern part of the VEGP site. This area is no longer planned for use as borrow. At this time, borrow will be obtained from areas of the site already disturbed by the Unit 1 and 2 construction activities. Since this area has no significant habitat value, no impact to area wildlife is expected. This land was not disturbed during previous construction and is characterized by pine forests with hardwood stands along the stream drainages (See Figure 2.4-1). The threatened and endangered species survey included this part of the VEGP site (**TRC 2006**). A survey of cultural resources completed in Fall, 2006 did not identify cultural resources in this area (**New South 2006**). To accommodate the anticipated new construction, several onsite activities likely will occur prior to commencement of site preparation activities. As described in Section 3.9.1, numerous existing facilities will be relocated prior to receiving the ESP. The Thalmann (McIntosh) transmission line will be rerouted onsite to avoid the footprint of the new units. The Augusta Newsprint, Goshen, and South Carolina Electric & Gas (SCE&G) lines may be raised over the heavy haul road route to enable reactor components and heavy equipment barged up the river to be moved to the construction site.

An existing onsite landfill will be relocated onsite or the materials removed and disposed in an offsite permitted disposal facility.

Impacts of these projects are considered in this environmental report, even though the work likely will occur prior to initiation of site preparation activities.

All site preparation and construction activities will be conducted in accordance with federal, state and local regulations. As described in Section 3.9.2, Southern Nuclear Operating Company (SNC) will acquire all necessary permits and authorizations and implement environmental controls such as stormwater management systems, groundwater monitoring wells, and spill containment controls prior to commencement of earth disturbing activities. Site preparation and construction activities that will affect land use include clearing, grubbing, grading and excavating, and stockpiling soils. Permanently disturbed locations will be stabilized and contoured in accordance with design specifications. Re-vegetation will comply with site maintenance and safety requirements. Methods to stabilize areas and prevent erosion or sedimentation will comply with applicable laws, regulations, permit requirements and good engineering and construction practices, and recognized environmental best management practices. The Georgia Stormwater Management Manual (**ARC/DNR 2003**) and industry guidance will be followed to reduce stormwater quantity, improve stormwater quality, and protect receiving waters and downstream areas. SNC maintains a landfill at VEGP that is permitted for inert construction and demolition debris. Construction debris will be disposed either in this on-site landfill, or taken to an off-site permitted disposal facility.

The intake, discharge, and barge facilities will be located in the 100-year floodplain. With those exceptions, construction activities will be outside the 500-year floodplain (**FEMA 1989**). As stated in Section 2.2.1.2, no mineral deposits occur in Burke County. As stated in Section 2.2.1.1, no prime farmland soils occur on the VEGP site. Burke County does not have zoning laws; therefore, the VEGP site does not have zoning requirements.

Approximately 310 acres of the 500 acres disturbed during site preparation and construction will be used for the new units and will be lost to other uses until after decommissioning of those reactors.

Most of the land that will be occupied by the new units and associated facilities was disturbed during the construction of the existing units, however some construction will occur on land that has not been recently disturbed.

The new plant footprint is wholly contained on an existing dedicated nuclear site originally planned for four units and will not be available for other uses until decommissioning. SNC concludes that the site land use impacts will be SMALL and will not warrant mitigation.

4.1.1.2 The Vicinity

Land in the vicinity of the VEGP site is rural, or owned by the federal or state governments. Land within 6 miles of the site is predominantly forested (including forested wetlands) (Figure 2.2-2).

The Yuchi Wildlife Management Area (WMA), immediately south of the site, comprises 7,800 acres of forest (**Georgia Outdoor 2003**).

A recreational vehicle park and store within 6 miles of the site that operated during construction of the existing units could reopen, or local land owners could convert some property to mobile home parks. No other land use changes in the vicinity as a result of the construction workforce are anticipated.

SNC concludes that impacts to land use in the vicinity of VEGP from construction of the new units will be SMALL and will not require mitigation.

4.1.2 Transmission Corridors and Offsite Areas

The additional electricity generated from two new reactors on the VEGP site will require the addition of a 500-kilovolt transmission line. The new units will utilize the new line or some combination of new and existing lines. The exact route of the proposed new 500 kV line has not been determined; however, it will be routed northwest from the VEGP site, passing west of Fort Gordon, a U.S. Army facility west of Augusta, Georgia, then north to the Thomson substation. In early January 2007, SNC and GPC conducted a study to determine a macro-corridor for the route of this proposed line. This study was conducted by Photo Science and is discussed in Section 2.2.2.2, Proposed Transmission Corridor (**Photo Science 2007**).

Georgia Power Company (GPC) will site the line in accordance with Georgia Code Title 22, Section 22-3-161, which states:

In selecting the route for the location of the electric transmission line, the utility shall consider existing land uses in the geographic area where the line is to be located, existing corridors, existing environmental conditions in the area, engineering practices related to the construction and operation of the line, and costs related to the construction, operation, and maintenance of the line.

GPC has procedures for implementing this regulation, which involve data gathering on land uses, environmental issues, existing corridors, and cultural resources in the study area; consultation with the State Historic Preservation Officer, the U.S. Fish and Wildlife Service (USFWS), the Georgia Department of Natural Resources (GDNR), the U.S. Army Corps of Engineers (USACE); and evaluation of environmental, cultural, and land use issues. The environmental evaluation addresses crossings wetlands, National Forests, government lands under protection, and streams and rivers; and impacts to special habitats and threatened or endangered species. Alternative engineering practices, such as underground transmission, rebuilding existing facilities to accommodate new transmission, and construction on county or state road rights-of-way, will be evaluated by GPC.

SNC has reviewed the land use plans of the counties that could be affected by a new transmission corridor (**Burke County 1991, Jefferson County 2004, Warren County 2005, McDuffie County 1992**) and has not identified any conflicts, zoning or otherwise, that would preclude construction of a transmission line. Figure 2.2-4 provides a land use map of the region where the proposed corridor will be constructed. Section 3.7 estimates that approximately 2.0 sq mi will be required for a new transmission corridor. Land use in this new corridor is not known but SNC expects it will be a mix of agriculture, planted forest resources and natural forested land. Table 2.4-2 lists protected species in the counties the transmission line will cross.

GPC will comply with all applicable laws, regulations, permit requirements, and good engineering and construction practices.

Impacts to offsite land use from the construction of a new transmission corridor could be MODERATE, but will be mitigated by siting it to avoid sensitive land uses.

4.1.3 Historic Properties

Table 2.5.3-1 lists properties in Burke County which appear on the National Register of Historic Places. One property is within 10 miles of the VEGP site. The Savannah River Site has been identified as being eligible for the National Register because of its contributions to the Cold War.

As described in Section 2.5.3.2, the cultural resource survey of VEGP identified 10 archaeological sites, two of which are recommended as eligible for inclusion on the National Register. As a result of the survey, SNC moved the location of the intake structure, access road, and intake piping route to avoid disturbing one of the eligible sites. SNC contacted the Georgia and South Carolina SHPOs and discussed the cultural resource issues associated with this project. Subsequently, SNC revised the route of the intake pipe again to provide a more direct route and minimize the amount of impact to the area resulting from grading to maintain acceptable side slopes on the road and pipeline trench. SNC has re-initiated discussion with the Georgia SHPO relative to this proposed change.

Excavations for the new units will extend down to the Blue Bluff marl. VEGP maintains procedures which include actions to protect cultural, historic, or paleontological resources. As part of the site preparations activities, before land-disturbing activities begin, SNC will prepare a similar procedure for construction activities.

Table 2.5.3-3 lists National Historic Register properties in the counties the new transmission corridor will cross.

Prior to the clearing of any new transmission corridor, SNC or GPC will correspond with the Georgia SHPO as required by Section 106 of the National Historic Preservation Act. All land disturbing activities associated with constructing a new transmission line will follow established GPC procedures as described in the previous section. SNC concludes that impacts to historic or cultural resources from construction will be SMALL and will not warrant additional mitigation.

Table 4.1-1 Construction Areas

Construction Zone	Acreage
Dedicated facilities for two units	310
Spoils storage	72
Temporary facilities	118

Section 4.1 References

- (ARC/DNR 2003)** Atlanta Regional Commission/Georgia Department of Natural Resources Environmental Protection Division, *Georgia Stormwater Management Manual*, Atlanta, Georgia, 2003.
- (Burke County 1991)** Burke County Board of Commission, Burke County Comprehensive Plan: 2010, Waynesboro, Georgia, January, 1991.
- (FEMA 1989)** Federal Emergency Management Agency, Flood Insurance Rate Map, Burke County, Georgia, National Flood Insurance Program, Washington, D.C., September 15, 1989.
- (Georgia Outdoor 2003)** Georgia's Outdoor Recreation and Adventure Guide, "Georgia's Wildlife Management Areas," available at <http://www.n-georgia.com/wildlife.htm>, Accessed June 21, 2005.
- (Jefferson County 2004)** Jefferson County, *Jefferson County Joint Comprehensive Plan, 2004 - 2024*, Louisville, Georgia, 2004.
- (McDuffie County 1992)** McDuffie County, *Joint McDuffie County, City of Thomson, City of Dearing Comprehensive Plan: 2015*, Thomson, Georgia, April, 1992.
- (Photo Science 2007)** Photo Science, Corridor Study: Thompson – Vogtle 500-kV Transmission Project. Prepared for Georgia Power Company. Norcross, Ga. January.
- (Warren County 2005)** Warren County, Georgia, *Land Use Ordinance*.
- (TRC 2006)** Third Rock Consultants, LLC, *Threatened and Endangered Species Survey Final Report, Vogtle Electric Generating Plant and Associated Transmission Corridors*, Lexington Kentucky, prepared for Tetra Tech NUS, Aiken, South Carolina, January 16, 2006.

4.2 Water-Related Impacts

Water-related impacts from construction of a nuclear power plant will be similar to those from any large construction project. Large construction projects can, if not properly planned, result in impacts to groundwater, the physical alteration of local streams and wetlands, and impact downstream water quality as a result of erosion and sedimentation or spills of fuel and lubricants used in construction equipment. Because of this potential for harming surface- and groundwater resources, applicants are required to obtain a number of permits prior to initiating construction. Tables in Section 1.3 provide a complete list of construction-related consultations and permits SNC will have to obtain prior to initiating construction activities.

4.2.1 Hydrological Alterations

This section identifies proposed construction activities that could result in impacts to the hydrology at the VEGP site, including:

- Clearing land at project site and constructing infrastructure such as roads and stormwater drainage systems
- Construction of new buildings (reactor containment structure, turbine building, cooling towers), structures (e.g., electrical sub-station), road/rails, and parking lots
- Construction of new cooling water intake structure and discharge structure on the Savannah River
- Modification of the existing barge slip
- Temporary disturbance of currently vegetated areas for construction laydown areas, concrete batch plants, sand/soil/gravel stockpiles, and construction-phase parking areas
- Dewatering of foundation excavations during construction

Potentially affected waterbodies include the unnamed on-site drainage associated with Mallard Pond, several on-site ponds created as sediment retention basins during the original site construction and their associated drainages, and the Savannah River.

The State of Georgia NPDES Construction Stormwater Program requires industrial facilities that discharge to waters of the U.S. and plan construction that will disturb more than 5 acres of land to (1) obtain National Pollutant Discharge Elimination System (NPDES) permit coverage, (2) implement best management practices including structural (i.e., erosion control devices and retention ponds) and operational measures to prevent the movement of pollutants (including sediments) offsite via storm water runoff, and (3) develop a Storm Water Pollution Prevention Plan. The U.S. Environmental Protection Agency (EPA) has issued guidance on best (soil and erosion control) management practices and the development of Storm Water Pollution Prevention Plans (**EPA 1992**). The old retention ponds used during the construction of the existing facilities will not be reused for the new construction. New retention ponds will be constructed to accommodate surface-water runoff and to allow sediment-laden water from

dewatering activities to pass through them, if necessary, prior to discharge at an NPDES permitted outfall. Dewatering activities in the surficial aquifer will not impact local water well users because most local wells are located in the Tertiary or Floridan aquifer. Dewatering will occur within a limited area for a reasonably short period of time, slightly affecting the unconfined layer. Once dewatering ceases the water table-water level at the site is expected to return to normal levels. Dewatering would not present problems with subsidence. Groundwater pumped from wells installed to dewater large construction areas can be discharged directly to surface water without passing through a settlement basin. Dewatering an excavation within sheet piles, open excavation or behind a coffer dam could be pumped to a settling basin before discharge through a permitted NPDES outfall. SNC will follow best management practices for soil and erosion control as required by applicable federal and state laws and regulations. Therefore, impacts to the local hydrology from construction activities will be SMALL and will not warrant mitigation.

4.2.2 Water Use Impacts

SNC evaluated the proposed use of surface water from the Savannah River and groundwater during the construction phase of the project. Because of the presence of existing groundwater production wells at VEGP, SNC evaluated their production capacity and current use to determine if these wells will produce an adequate supply of water for use during construction. A description of the groundwater underlying VEGP is provided in Section 2.3.1.2.2. A description of current groundwater use at VEGP is provided in Section 2.3.2.2 and Table 2.9-1.

During VEGP construction in the 1970s, GPC used approximately 240 gallons per minute (gpm) of untreated well water for concrete batch plant operation, dust suppression, and potable needs (**GPC 1973**). At the height of construction, well water usage peaked at approximately 420 gpm. Most of this water was supplied by makeup wells 1 and 2. One existing makeup well MU-2A will likely be replaced by a new well because it is in the footprint of the expanded Units 3 and 4 switchyard. If this change is implemented, the existing MU-2A will be closed and a new well of comparable size will be constructed. No net change in withdrawal will occur.

Water use requirements for construction of a nuclear plant are similar to those for other large industrial construction projects. SNC will obtain water for various standard construction uses, such as dust abatement and mixing concrete, and all potable water required by the construction workforce will be provided from the existing makeup wells including the replacement well noted in the previous paragraph. As noted in Sections 2.3.2.2.2 and 2.5.2.7, one makeup well supplies all necessary makeup water for normal plant operation, leaving two wells in standby. Two of these wells are screened in both the Cretaceous and Tertiary aquifers. The third well is screened in the deep Cretaceous aquifer only. The recharge area for these wells is north of VEGP along a 10- to 30-mile wide zone across Georgia and South Carolina. Most local residential and agricultural wells are in the shallower Tertiary aquifer.

VEGP is permitted by the State of Georgia to withdraw groundwater at a monthly average rate of 6 million gallons per day (MGD) and an annual average of 5.5 MGD (Section 2.3.2.2.2). Average daily usage for the existing units is 1.052 MGD, for all purposes. Based on water use during the original construction, which peaked at 420 gpm (604,800 gallons per day [gpd]), the existing permitted groundwater withdrawal rates should be capable of providing all construction water needs. During construction, groundwater withdrawals will increase from an average of 730 gpm use by existing wells to 1,150 gpm assuming 420 gpm for construction. This could conservatively increase the current potentiometric surface drawdown at the property boundary by approximately 2.3 feet to approximately 6.5 feet. For one year startup procedures for Unit 3 will occur at the same time construction of Unit 4 is completed. This could conservatively result in water use of approximately 1,316 gpm and lower the current potentiometric surface at the property boundary by approximately 3.4 feet to approximately 7.8 feet. SNC prepared a calculation package supporting this analysis. Because the high yield wells at the site are under confined conditions, pumping at the proposed rates will reduce water pressure within the aquifer but will not affect the availability of water to off-site users. Groundwater use during construction will be in accordance with existing permits and in accordance with the Georgia Comprehensive State-wide Water Management Planning Act of 2004. Because most domestic water well users near VEGP use the Tertiary aquifer as their source of water, and the lack of impact from pumping, SNC concludes that impacts will be SMALL and will not warrant mitigation.

Excavation for new reactor building foundations will be to the top of the Blue Bluff marl layer, approximately 86 feet below grade. Dewatering systems will remove subsurface water associated with the shallow, water-table aquifer, which has a maximum depth of 80-100 feet below land surface (**AEC 1974; NRC 1985**). The dewatering systems are expected to have no impact on the deeper Cretaceous and Tertiary aquifers from which all water for construction of the project will be obtained. There are no plans to use surface water during the construction phase of the project, but it is conceivable that relatively small amounts of water from the stormwater retention ponds could be used to wash construction equipment or sprayed on roads for dust control. Based on these considerations and their localized and temporary nature, SNC believes water use impacts from construction dewatering will be SMALL and will not warrant mitigation.

4.2.3 Water-Quality Impacts

4.2.3.1 Surface Water

Impacts to surface water quality can occur as the result of soil erosion due to soil disturbance during construction. Mallard Pond (Figure 2.1-1) will be the most likely on-site waterbody to be affected by construction. Beaverdam Creek/Telfair Pond also receives surface water from the site and could therefore be impacted by site disturbance activities but this is less likely because of the distance between the construction site and the waterway. Buffers of vegetated land exist between Mallard Pond, Telfair Pond, and the construction site that will reduce the likelihood of

any impacts due to sedimentation. The proposed heavy-haul road will rise to the top of a hill overlooking a north-south ravine that drains into Mallard Pond and could convey storm water into the head of Mallard Pond. The new switchyard will be constructed just south of the heavy haul road. Land clearing, excavation, and grading associated with the heavy-haul road and the adjacent switchyard will disturb soil and could result in sediment moving downgradient into Mallard Pond with rainwater runoff. SNC will plan and carry out road building and other construction activities in accordance with all applicable regulations and best management practices including erosion control measures such as silt fences and sediment retention basins to prevent storm water from carrying soil into down-gradient waterbodies.

Because the area slated to be disturbed for facilities and supporting infrastructure is more than 5 acres, SNC will, in compliance with Georgia NPDES Construction Stormwater Program, do the following (see Section 3.9):

- Obtain Georgia General NPDES Permit for Construction Stormwater Discharges (for stand-alone construction projects).
- Develop an Erosion, Sedimentation and Pollution Control Plan.
- Implement Best Management Practices, including structural and operational controls to prevent the movement of pollutants (including sediments) into wetlands and waterbodies via storm water runoff.
- Obtain stream buffer variances from Georgia EPD.

SNC will have a passage dredged from the main channel of the Savannah River to the new barge slip to facilitate movement of heavy equipment and components to the site by barge. Dredge material will be removed and transported to a pre-approved spoil area for disposal. In addition to the dredging, there will be significant construction along the shoreline of the Savannah River in support of the new barge slip, intake structure, and discharge structure. These activities will inevitably disturb sediments (dredging, pile driving) and soils (shoreline construction), which will increase turbidity immediately downstream of the construction sites. Prior to construction in or adjacent to the Savannah River, SNC will install sediment controls to limit the distribution downstream of sediments and debris. The dredging and construction activities will require permits from the USACE. Based on the fact that any ground disturbing activities will be permitted and overseen by state and federal regulators, and guided by an approved Storm Water Pollution Prevention Plan, SNC believes that any impacts to surface water during the construction phase will be SMALL and will not warrant mitigation beyond those best practices required by permits.

4.2.3.2 Groundwater

The VEGP site lies atop a hill bounded by stream channels that have cut down to relatively impermeable marl. The marl forms an aquiclude between the shallow water-table aquifer and the deep, confined aquifer. The streams act as interceptor drains for the groundwater in the

sands overlying the marl. The water table aquifer beneath the plant is thus hydraulically isolated on an interfluvial high. The groundwater is replenished by natural precipitation that percolates to the water table and then moves laterally to one of the interceptor streams. As a consequence, any contaminants (e.g., diesel fuel, hydraulic fluid, antifreeze, or lubricants) spilled during construction would affect only the shallow, water-table aquifer and would ultimately move to surface waterbodies where they could be intercepted (**GPC 1973**).

Any minor spills of diesel fuel, hydraulic fluid, or lubricants during construction of the project will be cleaned up quickly in accordance with the construction Erosion, Sedimentation, and Pollution Control Plan.

None of the planned construction activities has the potential to affect the deep, confined aquifers. In the unlikely event small amounts of contaminants escape into the environment, they will have only a small, localized, temporary impact on the shallow, water table aquifer. SNC believes that any impacts to groundwater quality will be SMALL and will not warrant mitigation beyond those described in this section or required by permit.

Section 4.2 References

(AEC 1974) U.S. Atomic Energy Commission, Final Environmental Statement related to the proposed Alvin W. Vogtle Nuclear Plant Units 1, 2, 3, and 4, Directorate of Licensing, Washington, DC, March, 1974.

(EPA 1992) U.S. Environmental Protection Agency, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices, Office of Water, Washington, DC, September, 1992.

(GPC 1973) Georgia Power Company, Environmental Report for Alvin W. Vogtle Nuclear Plant Units 1, 2, 3, and 4, Atlanta, Georgia, 1973.

(NRC 1985) U.S. Nuclear Regulatory Commission, Final Environmental Statement related to the operation of Vogtle Electric Generating Plant, Units 1 and 2, Office of Nuclear Reactor Regulation, Washington, DC, March, 1985.

4.3 Ecological Impacts

4.3.1 Terrestrial Ecosystems

4.3.1.1 The Site and Vicinity

Section 4.1.1 describes the impacts of construction to land-use at the site. Construction of the proposed facilities will result in the removal of essentially all forested habitat (approximately 500 acres) within the construction and support areas (Figure 2.1-1). Approximately 250 acres of the total 1,634 acres of pine forests at VEGP will be impacted by construction activities. Pine forests at VEGP (See Section 2.4.1.1) include some areas of naturally vegetated pines, but are mostly slash pine plantations. The 250 acres of pine forest that will be impacted by construction activities is almost exclusively planted slash pine. Approximately 25 acres of the total 612 acres of hardwood forest at VEGP will be impacted by construction activities. The remaining approximately 225 acres that will be impacted by construction consist of existing facilities and open, developed areas. The construction and support areas do not contain any old growth timber, unique or sensitive plants, or unique or sensitive plant communities and are largely planted slash pines and open areas. Therefore, construction activities will not noticeably reduce the local diversity of plants or plant communities. As stated in Section 2.4.1, there are no important species as defined in NUREG-1555 *Standard Review Plans for Environmental Reviews for Nuclear Power Plants 1999* (NUREG-1555) on the VEGP property except common game species such as deer, rabbits, squirrels, and game birds. No areas designated by the USFWS as critical habitat for endangered species exist at or in the vicinity of the VEGP site. No threatened or endangered plants or animals are known to occur in the construction area, and the proposed construction footprint does not provide suitable habitat for threatened or endangered plants or animals. Therefore, construction will have no impact on any threatened or endangered terrestrial species, or other important terrestrial species or habitats.

New intake and discharge structures will be constructed and a new barge facility will be added to support the new units. As part of the site preparation activities, any wetlands associated with the intake/discharge structures and barge facility or within the upland construction site will be delineated to determine impacts and any required mitigation.

Land clearing will be conducted according to Federal and state regulations, permit requirements, existing GPC or Southern Company procedures, good construction practices, and established best management practices (e.g., directed drainage ditches, silt fencing). Fugitive dust will be minimized by watering the access roads and construction site as necessary. Emissions and spills from construction equipment will be minimized through scheduled equipment maintenance procedures.

As the site undergoes clearing and grading, disturbance and habitat loss will displace mobile animals such as birds and larger mammals. Species that can adapt to disturbed or developed areas (e.g., raccoon, opossum, and many bird species) may recolonize portions of the site where

grasses and other vegetation are undisturbed or are replanted following construction. Species more dependent on forested habitat may be permanently displaced. Clearing and grading activities may result in the loss of some individuals, particularly less mobile animals such as reptiles, amphibians, and small mammals.

Section 3.9.4 discusses noise that will result from construction-related activities. As discussed in that section, construction-related noise rapidly attenuates over relatively short distances. At 400 feet from the construction activity, noises will range from approximately 60 to 80 dB. These noise levels are below the 80 to 85 dB threshold at which birds and small mammals are startled or frightened (**Golden et al. 1980**). Thus, it is likely that noise from construction activities will not disturb wildlife beyond 400 feet from the perimeter of the construction site.

Avian collisions with man-made structures are the result of numerous factors related to species characteristics such as flight behavior, age, and habitat use, seasonal and diurnal habitats; and to environmental characteristics such as weather, topography, land use, and orientation of the structures. Most authors on the subject of avian collisions with utility structures agree that collisions are not a biologically significant source of mortality for thriving populations of birds with good reproductive potential (**Brown 1993**). The number of bird collisions with construction equipment, such as cranes, or new structures has not been quantitatively assessed, however, few avian collisions with existing structures at VEGP have been noted by SNC and it is expected that such collisions during the construction phase will also be negligible.

In summary, while construction-related impacts of habitat loss to local wildlife populations cannot be quantitatively assessed because population data for species on and adjacent to the VEGP site are not available, there are relatively large tracts of forest available to displaced animals to the north, west, and south of the VEGP site. Given the fact that approximately 500 acres of potentially affected habitat at the site represents a small portion of the available undeveloped land in the vicinity, the construction-related mortality or temporary displacement of wildlife will be minimal relative to wildlife populations in the vicinity. Construction activities will not reduce the local diversity of plants or plant communities, and will not impact endangered or threatened species. Noise-related impacts and bird collisions during construction will be negligible. Therefore, construction-related impacts to terrestrial resources in the vicinity will be SMALL, and mitigation beyond what is discussed in this section will not be warranted.

4.3.1.2 Transmission Corridors

As discussed in Section 3.7.2, the additional generation from the proposed new units will require the addition of a 500-kV transmission line. The new line likely will connect VEGP with the Thomason substation west of Augusta. The exact route of the line has not been determined, but a macro-corridor has been developed delineating the best route alternatives and providing the information necessary to support the NRC NEPA analysis (**Photo Science 2007**). This study will be used by GPC to locate the final route for this line. The line will exit the site to the west parallel to the Scherer corridor then turn northwest to Thomason, an existing substation west of Augusta,

Georgia. It will cross Burke, Glasscock, Jefferson, McDuffie, Richmond, and Warren counties. No areas designated by USFWS as “critical habitat” for endangered species exist in the macro-corridor. As discussed in Section 4.1.2, GPC will site any new transmission line in accordance with Georgia Code Title 22, Section 22-3-161 and will comply with all applicable laws, regulations, permit requirements, and good engineering and construction practices.

GPC evaluates potential impacts to the local environment from preparing a transmission corridor, and constructing transmission towers, transmission-tower configurations, or transmission tower access roads with a bounding analysis to ensure that all reasonably foreseeable impacts to terrestrial resources are adequately considered. Because GPC will comply with all federal and state regulations regarding siting transmission lines, and use construction best management practices, impacts to terrestrial ecosystems in the region will likely be SMALL. Environmental effects will not destabilize or noticeably alter important terrestrial ecosystems.

4.3.2 Aquatic Ecosystems

Section 4.2 describes proposed construction activities that could potentially affect on- and offsite waterbodies. Impacts to aquatic ecosystems could result from sedimentation and, to a lesser extent, spills of petroleum products. The effects of construction-generated sediment on aquatic ecosystems have been widely studied and documented. Three major groups of aquatic organisms are typically affected: (1) aquatic plants (both periphyton and vascular plants), (2) benthic macroinvertebrates, and (3) fish. Turbidity associated with suspended sediments may reduce photosynthetic activity in both periphyton and rooted aquatic plants. Deposited sediments can smother these plants. Suspended sediment can interfere with respiration and filter feeding of macrobenthos (especially mussels and aquatic insect larvae), while heavy deposition of sediment on the streambed can blanket both surficial and interstitial habitats of these organisms. Suspended sediment in streams can interfere with respiration and feeding in both young and adult fish, but juvenile and adult fish are generally able to leave areas with high levels of silt and sediment. Deposited sediment may render formerly prime areas unsuitable for spawning or, if deposited after spawning has been completed, may actually destroy eggs and fry. Spills may adversely affect an ecosystem, but the impacts of small spills are generally short-lived.

The construction of the intake and discharge structures and barge facility will result in the loss of some aquatic habitat permanently or temporarily; however no aquatic habitats in the Savannah River adjacent to the VEGP property are believed to be rare or unique. Fish will be displaced and other forms of aquatic life such as macroinvertebrates will be lost.

SNC will avoid or minimize construction impacts to water resources through best management practices and good construction engineering practices such as stormwater retention basins and sediment controls as described in Section 4.2. Protecting water quality ensures the protection of aquatic ecosystems.

4.3.2.1 The Site and Vicinity

Based on the proposed locations of new facilities and infrastructure (see Figure 2.1-1), the only permanent waterbody on the VEGP site that could be affected by construction is Mallard Pond. It is possible that some sediment could move into the pond with rainfall runoff during construction of the new switchyard or the heavy-haul road. Best construction management practices will reduce the amount of erosion and sedimentation associated with construction in these areas, however, and will limit impacts to aquatic communities in down-gradient waterbodies. Although unlikely, it is also possible that excavated soil placed in the proposed spoils and overflow storage area south of the Main Plant Access Road (see Figure 2.1-1) could move with runoff into Telfair Pond or Beaverdam Creek via one of the small intermittent streams in the area.

Potential impacts of construction of the existing Units 1 and 2 intake and discharge structures and barge slip were assessed in the Atomic Energy Commission's (AEC) Final Environmental Statement on the Vogtle Nuclear Plant (**AEC 1974**). The AEC estimated that one inch of sediment would be deposited over 18,200 square yards (3.76 acre) of Savannah River bottom as a result of riverbank construction (**AEC 1974**). This translated into a 60 foot by 2,730 foot strip of river bottom covered. The AEC suggested that periphyton (attached algae), mussels, and aquatic insect larvae in this relatively small area could be adversely affected and that potential spawning sites for sunfish could be destroyed by silt and that eggs of sunfish could be smothered. Having identified these potential impacts, the AEC concluded that "impacts will be temporary since recolonization is expected to occur within a relatively short period" and "...there will be no significant long-term adverse effects resulting from activities associated with construction of the intake and discharge structures and the barge slip" (**AEC 1974**). SNC concludes that similar impacts will result from the current project.

Based on the fact that any ground or river disturbing activities will be (1) of relatively short duration, (2) permitted and overseen by state and federal regulators, (3) guided by an approved Storm Water Pollution Prevention Plan, (4) any small spills will be mitigated according to the existing VEGP Spill Prevention, Control, and Countermeasures Plan, and (5) there are no sensitive habitats or species of interest at the proposed location, SNC concludes that impacts to aquatic communities from construction will be SMALL and temporary, and not warrant mitigation.

4.3.2.2 Transmission Corridors

As discussed in Section 3.7, GPC will build a new 500-kV transmission line to handle the new generating capacity. The new transmission line route will run northwest from the VEGP site and connect to the Thomson substation west of Augusta, GA. The exact route for this new line has not been selected, but a macro-corridor study has been conducted to delineate the routing options to support the NEPA analysis (**Photo Science 2007**). The new line will cross Burke, Glascock, Jefferson, Richmond, Warren, and McDuffie counties.

As noted in Section 4.1.2, public utilities are required by Georgia state law to select routes for transmission lines based on a consideration of environmental factors as well as engineering and economic factors. To the extent practicable, GPC selects routes based on compatibility with existing land uses and the presence/absence of important cultural and ecological resources. With respect to aquatic resources, GPC tries to avoid impacts to streams, ponds, reservoirs, and wetlands.

The new transmission line could cross several intermittent and perennial streams in the upper Coastal Plain and lower Piedmont of Georgia. Brier Creek, a major tributary of the Savannah River, could be crossed by the new transmission line several times. Land clearing for transmission corridors could, if not properly managed, affect aquatic plants, aquatic insects, mussels, and fish in the streams crossed by the lines. GPC has procedures and Best Management Practices in place to protect aquatic communities and prevent degradation of water quality. For example, in accordance with Georgia Sediment and Erosion Control Act best management practices, a 25-foot buffer would be maintained along all waters of the state that need to be cleared for new transmission corridor right-of-way. No structures will be placed within the buffer. All buffers will be cleared with methods approved by the Georgia Environmental Protection Division (EPD). Access roads will be built only as necessary to construct and service the transmission facilities.

Only two listed aquatic species, the shortnose sturgeon and the Atlantic pigtoe mussel, are known to occur in the counties (Burke, Jefferson, Warren, and McDuffie) where the new line will be constructed (Table 2.4-2). As noted in Section 2.4.2, shortnose sturgeons spawn in the Savannah River. The new transmission line would not cross the Savannah River, but could cross one or more of its tributaries, including Brier Creek and McBean Creek. Because shortnose sturgeon do not leave the Savannah River during spawning runs to enter tributary streams (**Hall, Smith and Lamprecht 1991; Marcy et al. 2005**), construction of this line will have no effect on spawning shortnose sturgeon.

The historical range of the Atlantic pigtoe mussel included the Savannah and Ogeechee River basins, but populations in both these river systems were assumed to have been extirpated until 1991, when a remnant population was discovered in Williamson Swamp Creek, a tributary of the Ogeechee River in Jefferson County (**Georgia DNR 2005, USACE 2006**). Although the proposed new transmission line would cross Jefferson County, it would move through the northern portion of the county, and would not approach the Ogeechee River, which lies in the southern part of the county. SNC recognizes that both (USFWS) Georgia Ecological Services and Georgia DNR websites indicate that Atlantic pigtoe populations are found in two other counties (Burke and Warren) that would be crossed by the new 500-kV transmission line. The preponderance of evidence, however, suggests that Ogeechee River populations in Burke and Warren counties have been eliminated and these agency lists are based on older (pre-1990) records. It is conceivable that the Williamson Swamp Creek population has also been

eliminated. A recent inventory of the mussels of the Ogeechee River drainage that included surveys of 50 sites in the drainage found no Atlantic pigtoe mussels (**Skelton et al. 2006**).

In summary, Best Management Practices will be employed to minimize impacts of transmission line construction on aquatic life, including populations of state- and federally-listed species. With the implementation of these measures, impacts to water quality and aquatic ecosystems will be SMALL and of short duration, and will not require mitigation.

Section 4.3 References

- (AEC 1974)** U.S. Atomic Energy Commission, Final Environmental Statement related to the proposed Alvin W. Vogtle Nuclear Plant Units 1, 2, 3, and 4, Directorate of Licensing, Washington, DC, March, 1974.
- (Brown 1993)** Brown, W.M., “Avian Collisions with Utility Structures: Biological Perspectives.” In *Proceedings: Avian Interactions with Utility Structures International Workshop*, Miami, Florida, September 13-16, 1992, prepared by Electric Power Research Institute, Palo Alto, California, December, 1993.
- (GDNR 2005)** Georgia Department of Natural Resources, Comprehensive Wildlife Conservation Strategy, Southern Coastal Plain, available at <http://www.gadnr.org/cwcs/Documents/strategy.html>.
- (Golden et al. 1980)** Golden, J., R. P. Ouellette, S. Saari, and P. N. Cheremisinoff, “Chapter 8: Noise” In *Environmental Impact Data Book* (Second Printing), Ann Arbor Science Publishers, Inc., Ann Arbor, Michigan, 1980.
- (Hall, Smith, and Lamprecht 1991)** Hall, J. W., T. I. J. Smith, and S. D. Lamprecht, *Movements and Habits of Shortnose sturgeons, Acipenser brevirostrum, in the Savannah River*, Copeia 199(3) 695-702.
- (Marcy et al. 2005)** Marcy, B.C., D. E. Fletcher, F. D. Martin, M. H. Paller, and M. J. M. Reichert 2005, *Fishes of the Middle Savannah River Basin With Emphasis on the Savannah River Site*, The University of Georgia Press, Athens, Georgia, 2005.
- (McCord 2004)** American eel (*Anguilla rostrata*), Species account prepared for South Carolina Department of Natural Resources, available at <http://www.dnr.state.sc.us/wcp/pdf/American Eel.pdf>.
- (Photo Science 2007)** Photo Science, Corridor Study: Thompson – Vogtle 500-kV Transmission Project. Prepared for Georgia Power Company. Norcross, Ga. January.
- (Skelton et al. 2006)** Skelton, C.E., J.D. Williams, G.R. Dinkins, and E.M. Schilling, *Inventory of freshwater mussels (Family Unionidae) in the Ogeechee River drainage, Georgia, with emphasis on Atlantic Pigtoe (Fusconaia mason) and other rare taxa*, presented at the 2006 Annual meeting of the North American Benthological Society, Anchorage, Alaska, available at <http://www.benthos.org/database/allnabstracts.cfm/db/Anchorage2006abstracts/id/730>.
- (USACE 2006)** U.S. Army Corps of Engineers, *Threatened & Endangered Species of the Upper Savannah River Basin, Atlantic Pigtoe Mussel (Fusconaia mason)*, available at <http://www.sas.usace.army.mil/imussel.htm>.

Page intentionally left blank.

4.4 Socioeconomic Impacts

4.4.1 Physical Impacts

Construction activities can cause temporary and localized physical impacts such as noise, odors, vehicle exhaust, and dust. Vibration and shock impacts are not expected, due to the strict control of blasting and other shock-producing activities. This section addresses potential construction impacts that may affect people, buildings, and roads. Any physical impacts will be small and, therefore, all are presented qualitatively.

The new VEGP Unit 3 and 4 footprint is in an industrial area, surrounded by forests. All construction activities will occur within the construction site boundary. Therefore, impacts on existing VEGP facilities from constructing new units will be small incremental impacts to those associated with their normal operation. The use of public roadways and railways will be necessary to transport construction materials and equipment. The roadways could require some minor repairs or upgrading, such as patching and filling potholes to allow safe equipment access. The railroad was recently upgraded to support the replacement of a transformer, but will be inspected to ensure its condition. However, no extensive work is planned to the existing public roads or railways and no new offsite routes will be required.

4.4.1.1 Groups or Physical Features Vulnerable to Physical Impacts

4.4.1.1.1 People

Approximately 3,500 people live within 10 miles of VEGP. The vicinity is predominately rural and characterized by farmland and wooded tracts. No significant industrial or commercial facilities other than the VEGP nuclear units exist or are planned for the vicinity. Population distribution details are given in Section 2.5.1.

People who could be vulnerable to noise, fugitive dust, and gaseous emissions resulting from construction activities are listed below in order of most vulnerable to least vulnerable:

- Construction workers and personnel working onsite
- People working or living immediately adjacent to the site
- Transient populations (i.e., temporary employees, recreational visitors, tourists)

Construction workers will have adequate training and personal protective equipment to minimize the risk of potentially harmful exposures. Emergency first-aid care will be available at the construction site, and regular health and safety monitoring will be conducted during construction.

People working onsite or living near the VEGP site will not experience any physical impacts greater than those that will be considered an annoyance or nuisance. In the event that atypical or noisy construction activities will be necessary, public announcements or notifications will be

provided. These activities will be performed in compliance with local, state, and federal regulations, and site-specific permit conditions.

Fugitive dust and odors could be generated as a result of normal construction activities. Mitigation measures (e.g., paving disturbed areas, water suppression, reduced material handling) will prevent or reduce such occurrences. Additional mitigation control measures will address any nuisance issues on a case-by-case basis. Odors could result from exhaust emissions and will dissipate on site.

Exhaust emissions from construction equipment will have no discernible impact on the local air quality. All equipment will be serviced regularly and operated in accordance with local, state, and federal emission requirements (see Section 4.4.1.3).

Reasonable efforts will be made to ensure that transient populations (mostly sportsmen using the GPC Savannah River boat landing or the Yuchi WMA) are aware of the potential impacts of construction activities. Signs will be posted at or near construction site entrances and exits to make the public aware of the potential for high construction traffic.

4.4.1.1.2 Buildings

Construction activities will not impact any offsite buildings because of distance. The nearest residence is approximately 1 mile from the construction site. In the event that pile driving is necessary, the building(s) most vulnerable to shock and vibration will be those within the VEGP boundary. Onsite buildings have been constructed to safely withstand any possible impacts, including shock and vibration from construction activities associated with the proposed activity. No historically significant buildings (see Section 2.5.3) exist in the VEGP site vicinity.

4.4.1.1.3 Roads

The transportation network in Burke County is already a well-developed system, and will not be significantly physically impacted as a result of construction activities. The construction workforce will use a construction access road, not the VEGP access road. Material transportation routes (haul routes) will be selected based on equipment accessibility, existing traffic patterns, and noise restrictions, logistics, distance, costs, and safety. Methods to mitigate potential impacts include: (1) avoiding routes that could adversely affect sensitive areas (e.g., housing, hospitals, schools, retirement communities, businesses) to the extent possible and (2) restricting activities and delivery times to daylight hours.

No new public roads will be required as a result of construction activities. No public roads will be altered (e.g., widened) as a result of construction activities. Some minor road repairs and improvements in the vicinity of VEGP (e.g., patching cracks and potholes, adding turn lanes, re-enforcing soft shoulders) will be necessary to enable equipment accessibility and reduce safety risks.

The construction site exit onto River Road will be marked clearly with signs maintained such that they are clear of debris and markings are visible. Any damage to public roads, markings, or signs caused by construction activities will be repaired to pre-existing conditions or better.

A new access road to the construction site and a heavy haul route from the barge facility on the Savannah River will support construction activities (Figure 3.1-3). Both will be private and fully contained within the existing site boundary.

Any effects of physical impacts will be SMALL and will not warrant mitigation.

4.4.1.2 Predicted Noise Levels

As presented previously, Burke County is predominantly farmland and wooded tracts. Areas that are subject to farming are prone to seasonal noise-related events such as planting and harvesting. Wooded areas provide natural noise abatement control to reduce noise propagation. Table 4.4.1-1 identifies expected noise levels in the immediate vicinity (less than 10 feet) of operating construction tools.

Noise level attenuates with distance. A 10-dB decrease is perceived as roughly halving loudness; a 10-dB increase doubles the loudness. The noise from an earth mover can be as high as 94 decibels (dB) from 10 feet away, and 82 dB from 70 feet away. A crane lifting a load can make 96 dB of noise; at rest, it may make less than 80 dB. Moderate auto traffic at a distance of 100 feet (30 m) rates about 50 dB. To a driver with a car window open or a pedestrian on the sidewalk, the same traffic rates about 70 dB (**CPWR 2006**); that is, it sounds four times louder. The level of normal conversation is about 50 to 60 dB.

Section 3.9 discusses noise levels during construction, which could be as high as 110 dB in the immediate area of the equipment. Construction workers will use hearing protection per good construction practices. Noise attenuates quickly with distance (see Table 3.9-1) so that the loudest construction noise will register 60 – 80 dBa 400 feet from the source, and will continue to attenuate with distance.

The exclusion area boundary is greater than ½ mile in all directions from the new Unit 3 and 4 footprint. No major roads, public buildings or residences are located within the exclusion area.

The following controls or similar ones could be incorporated into activity planning to further minimize noise and associated impacts:

- Regularly inspect and maintain equipment to include noise aspects (e.g., mufflers)
- Restrict noise-related activities (e.g., pile driving) to daylight hours
- Restrict delivery times to daylight hours

Impacts from the noise of construction activities will be SMALL and temporary and will not require mitigation beyond that discussed above.

4.4.1.3 Air Quality

Burke County Georgia is part of the Augusta-Aiken Interstate Air Quality Control Region (AQCR) (40 CFR 81.114). All areas within the Augusta-Aiken AQCR are classified as achieving attainment with the National Ambient Air Quality Standards (NAAQS) (40 CFR 81.311 and 40 CFR 81.341). The NAAQS define ambient concentration criteria for sulfur dioxide (SO₂), particulate matter with aerodynamic diameters of 10 microns or less (PM₁₀), particulate matter with aerodynamic diameters of 2.5 microns or less (PM_{2.5}), carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), and lead (Pb). These pollutants are generally referred to as “criteria pollutants.” Areas of the United States having air quality as good as or better than the NAAQS are designated by EPA as attainment areas. Areas having air quality that is worse than the NAAQS are designated by EPA as non-attainment areas. The nearest non-attainment area to VEGP is the Columbia, South Carolina metropolitan area, a non-attainment area under the 8-hour ozone standard, which is located approximately 80 miles northeast of the plant.

Temporary and minor impacts to local ambient air quality could occur as a result of normal construction activities. Fugitive dust and fine particulate matter emissions – including those less than 10 microns (PM₁₀) in size, will be generated during earth-moving and material-handling activities. Construction equipment and offsite vehicles used for hauling debris, equipment, and supplies also produce emissions. The pollutants of primary concern include PM₁₀ fugitive dust, reactive organic gases, oxides of nitrogen, carbon monoxide, and, to a lesser extent, sulfur dioxides. Variables affecting construction emissions (e.g., type of construction vehicles, timing and phasing of construction activities, and haul routes) cannot be accurately determined until the project is initiated. Actual construction-related emissions cannot be effectively quantified before the project begins. General estimates are available and the impacts on air quality can be minimized by compliance with all federal, state and local regulations that govern construction activities and emissions from construction vehicles.

Specific mitigation measures to control fugitive dust will be identified in a dust control plan, or similar document, prepared prior to project construction. These mitigation measures could include any or all of the following:

- Stabilize construction roads and spoil piles
- Limit speeds on unpaved construction roads
- Periodically water unpaved construction roads to control dust
- Perform housekeeping (e.g., remove dirt spilled onto paved roads)
- Cover haul trucks when loaded or unloaded
- Minimize material handling (e.g., drop heights, double-handling)
- Cease grading and excavation activities during high winds and during extreme air pollution episodes
- Phase grading to minimize the area of disturbed soils

- Re-vegetate road medians and slopes

While emissions from construction activities and equipment will be unavoidable, a mitigation plan will minimize impacts to local ambient air quality and the nuisance impacts to the public in proximity to the project. The mitigation plan will include:

- Phase construction to minimize daily emissions
- Perform proper maintenance of construction vehicles to maximize efficiency and minimize emissions

Impacts to air quality from construction will be SMALL and will not warrant mitigation beyond that discussed above.

4.4.2 Social and Economic Impacts

This section evaluates the demographic, economic, infrastructure, and community impacts to the region as a result of constructing two Westinghouse AP1000 nuclear units at the VEGP. The evaluation assesses impacts of construction related activities and of the construction workforce on the region.

4.4.2.1 Demography

SNC based the following analyses on the estimated peak construction workforce. SNC assumed that the construction workforce will locate in the 50-mile region in approximately the same proportion as the existing workforce, that is, 79 percent will relocate to Richmond, Columbia, or Burke Counties, and the remainder will be scattered throughout the region. Therefore, this analysis is restricted to the three counties most affected by the construction workforce.

The 2000 population within the 50-mile radius was approximately 670,000 and it is projected to grow to approximately 1,000,000 by 2030, for an average annual growth rate during the ESP banking period of 1.8 percent (see Table 2.5.1-1). SNC anticipates employing 4,400 construction workers at peak construction activity (Table 3.10-2). (Figure 3.10-1 illustrates the distribution of the construction workforce over the construction period.) Based on the information presented in Section 3.10, SNC anticipates that approximately 1,000 workers will already reside within the 50-mile region. The remainder will migrate into the region. Of the peak construction jobs filled by in-migrating workers, 2,700 will last two or more years, and are considered permanent jobs in this analysis. The remainder will be for less than two years and are considered temporary in this analysis (Table 4.4.2-1).

The in-migration of approximately 3,400 workers, will create new indirect jobs in the area because of the multiplier effect. In the multiplier effect, each dollar spent on goods and services by a construction worker becomes income to the recipient who saves some but re-spends the rest. In turn, this re-spending becomes income to someone else, who in turn saves part and re-spends the rest. The number of times the final increase in consumption exceeds the initial

dollar spent is called the “multiplier.” The U.S. Department of Commerce Bureau of Economic Analysis, Economics and Statistics Division provide multipliers for industry jobs and earnings **(BEA 2005)**. The economic model, RIMS II, incorporates buying and selling linkages among regional industries and was used to estimate the impact of new nuclear plant-related expenditure of money in the three-county region of interest. For every construction worker, an estimated additional 0.70 jobs will be created in the three-county area (Table 4.4.2-2). **(BEA 2005)**

Construction will create approximately 4,600 permanent (direct + indirect) jobs in 50-mile region, and approximately 1,200 temporary (direct + indirect) jobs. SNC assumes that the indirect jobs created by the temporary construction workforce will also be temporary.

Most indirect jobs are service-related and not highly specialized, so, for this analysis, SNC has assumed that most indirect jobs will be filled by the existing workforce within the 50-mile region, particularly the three-county area, because 79 percent of the workforce is expected to settle there. The total number of indirect jobs that will be generated by construction (approximately 2,400) is approximately 31 percent of the unemployed persons in the three-county region in 2004 (Table 4.4.2-2).

SNC has conservatively assumed that each permanent direct worker will bring a family. The average household size in Georgia is 2.65 people **(USCB 2005)**. Therefore, construction will increase the population in the 50-mile region by 7,200 people (Table 4.4.2-2).

The majority of the current VEGP workforce lives in Burke (20 percent), Richmond (26 percent), or Columbia (34 percent) Counties (Section 2.5). SNC assumes that the residential distribution of the permanent construction workforce will resemble the residential distribution of the current VEGP workforce. Of the total population increase due to the construction workforce, 1,400 people (20 percent of 7,200) will settle in Burke County, 1,900 people will settle in Richmond County, and 2,400 people will settle in Columbia County. These numbers constitute 6 percent, 1 percent, and 3 percent of the 2000 Census populations of Burke, Richmond, and Columbia Counties, respectively.

The construction employees and their families will represent small to moderate increases to Burke County’s total population, small increases to Richmond and Columbia Counties’ total populations, and even smaller increases to the total populations of the other counties in the 50-mile region.

4.4.2.2 Impacts to the Community

This section evaluates the social, economic, infrastructure, and community impacts to the three county area and 50-mile region as a result of constructing new nuclear units at the VEGP. It is expected that site preparation and construction activities will continue for approximately 7 years and employ as many as 4,400 construction workers.

4.4.2.2.1 Economy

The impacts of construction on the local and regional economy depend on the region's current and projected economy and population. The ESP, if approved, will be in effect for 20 years after approval, and construction could begin anytime in that 20 years. For this analysis, the assumed construction schedule projects a construction start date in 2010 with a commercial operation date of 2015 for Unit 3 and 2016 for Unit 4.

As stated previously, the construction workforce will create additional jobs in the region through the multiplier effect of direct employment. The expenditures of the construction workforce in the region for shelter, food and services could, through the multiplier effect of expenditures, also create a number of new jobs. An influx of 3,400 workers migrating into the region would create 2,400 indirect jobs, permanent or temporary, for a total of 5,800 jobs (Table 4.4.2-2).

The employment of such a large workforce over a 7-year period could have small to large positive economic impacts on the surrounding region. The creation of such a large pool of jobs would inject millions of dollars into the regional economy, reducing unemployment and creating business opportunities for housing and service-related industries. Burke County will probably be the most affected. Beyond Burke County, the impacts will become more diffuse as a result of interacting with the larger economic base of other counties, particularly Richmond and Columbia Counties.

The magnitude of the positive economic impacts would be less discernible diffused in the larger economic bases of Richmond and Columbia Counties. Burke County as the site of the construction would be affected more than Richmond and Columbia Counties. SNC concludes that the impacts of construction on the economy of the region would be beneficial and SMALL everywhere in the region except Burke County, where the positive impacts could be MODERATE to LARGE, and that mitigation would not be warranted.

4.4.2.2.2 Taxes

Several types of taxes will be generated by construction activities and purchases and by workforce expenditures, including income taxes on corporate profits and on wages and salaries, sales and use taxes on SNC and employee purchases, property taxes related to the building of new nuclear units, and property taxes on owned real property. Increased taxes collected are viewed as a benefit to the state and the local jurisdictions in the region.

Personal and Corporate Income Taxes

As discussed in Section 2.5.2.3, Georgia has personal and corporate income taxes. Construction workers will pay taxes on their wages and salaries to Georgia if (1) their residence is in Georgia, (2) they are nonresidents working in Georgia and filing a federal return which will 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. While the exact amount of income taxes the project will generate for Georgia cannot be known, it could be fairly large over a 7-year pre-construction and construction period.

Corporations undertaking the construction of new nuclear units at the VEGP will pay corporate income taxes on the net income earned from the construction activity. Again, while the exact amount of tax revenue cannot be known, it could be fairly large, in absolute terms, over the 7-year construction period.

In addition, the wages and salaries of the construction workforce will have a multiplier effect, where money will be spent and re-spent within the region. Because of the multiplier effect, businesses, particularly retail and service sector businesses, in the 50-mile region, and particularly in the Augusta-Richmond County, GA-SC, Metropolitan Statistical Area (MSA), will experience an increase in business. This could provide opportunities for new start-up businesses and increased job opportunities. The businesses will generate additional profits and additional employees will receive salaries or wages upon all of which income taxes will be paid.

Sales and Use Taxes

The 50-mile region will experience an increase in the amount of sales and use taxes generated by retail expenditures (restaurants, hotels, merchant sales, and food) of the construction workforce.

The region will also experience an increase in the sales and use taxes collected from construction materials and supplies purchased for the project. It is difficult to assess which counties and local jurisdictions will be most affected, but it is probable that Burke County could receive a large increase in taxes relative to their current tax use given it has a relatively small population.

Property Taxes

VEGP's current tax payments to Burke County represent approximately 80 percent of the total county property tax revenues (see Table 2.5.2-8). SNC has chosen not to estimate tax payments on the new units that will occur during construction. During construction the new units will be assessed at some negotiated valuation that will likely be greater than \$0 and less than actual cost. It is likely that this negotiated value will be no more than 50 percent of the invested capital each year. The owners will pay some taxes to Burke County during the 5-year construction period.

A second source of revenue from property taxes will be housing purchased by the permanent construction workforce. In-migrating workers will construct new housing or increase the demand for existing housing, which will drive housing prices up, increasing values (and property taxes

levied). The increased housing demand will have little effect on tax revenues in the more heavily populated jurisdictions but in rural Burke County, the effects could be more significant.

Summary of Tax Impacts

In summary, the amount of income taxes collected over a potential 7-year pre-construction/ construction period could be large in absolute amount, but small when compared to the total amount of taxes that Georgia and South Carolina collect in any given year or in a 7-year period. In absolute terms, the amount of sales and use taxes collected over a potential 7-year construction period could be large, but small when compared to the total amount of taxes collected by Georgia, South Carolina, and the governmental jurisdictions within the region. However, given its smaller economic base, Burke County could be the exception and the sales and use taxes collected could have a moderate impact. The construction site-related property taxes collected and distributed to Burke County will be large when compared to the total amount of taxes Burke County collects in any given year or will collect over the 7-year construction term. Also, Burke, Richmond, and Columbia Counties will benefit from an increase in housing values and inventory caused by the influx of the permanent construction workforce, thereby increasing the counties' property tax revenues. Therefore, SNC concludes that the potential beneficial impacts of taxes collected during construction will be LARGE in Burke County and SMALL in Richmond and Columbia Counties and the remainder of the 50-mile region and that mitigation will not be warranted.

4.4.2.2.3 Land Use

In the Generic Environmental Impact Statement (*GEIS*) for *License Renewal of Nuclear Plants* (NUREG-1437, 1999), the NRC presents their method for defining the impact significance of offsite land use during refurbishment (i.e. large construction activities). SNC reviewed this methodology and determined that the significance levels were appropriate to apply to an assessment of off-site land use impacts as a result of new construction. Burke County is the focus of the land use analysis because the new units will be built there and approximately one-fifth of the construction workforce will reside there. Even higher percentages of the workforce will live in Richmond and Columbia Counties, but those counties are heavily populated and land use changes there are influenced by a variety of other socioeconomic forces. Those forces will dilute potential land use impacts created by the construction of the new units.

In NUREG-1437, the NRC concluded that land-use changes [during refurbishment] at nuclear plants would be:

Small – if population growth results in very little new residential or commercial development compared with existing conditions and if the limited development results only in minimal changes in the area's basic land use pattern.

Moderate – if plant-related population growth results in considerable new residential and commercial development and the development results in some changes to an area's basic land use pattern.

Large – if population growth results in large-scale new residential or commercial development and the development results in major changes in an area's basic land-use pattern.

Further, NRC defined the magnitude of population changes as follows:

Small – if plant-related population growth is less than five percent of the study area's total population, especially if the study area has established patterns of residential and commercial development, a population density of at least 60 persons per square mile, and at least one urban area with a population of 100,000 or more within 50 miles.

Moderate – if plant-related growth is between five and 20 percent of the study area's total population, especially if the study area has established patterns of residential and commercial development, a population density of 30 to 60 persons per square mile, and one urban area within 50 miles.

Large – if plant-related population growth is greater than 20 percent of the area's total population and density is less than 30 persons per square mile.

Land Use in the Area

At 830 sq mi (**USCB 2006**) Burke County has the second largest land area of any county in Georgia and includes six small incorporated municipalities and a very large unincorporated area. The predominant land uses are agriculture and forestry (76 percent of the unincorporated area in the County in 1990) (Section 2.2). In 1990, developed areas represented approximately 6 to 7 percent of the total land area in the County (Section 2.2). Most industry is related to forestry and manufacturing and no new industries have been located in the area as a result of the VEGP's presence. The majority of the current VEGP workforce does not live in Burke County.

As stated in Sections 2.2 and 2.5.2.4, Burke County and municipalities within the County use comprehensive land use planning, land development codes, zoning, and subdivision regulations to guide development. From 1990 to 2000, the Burke County population grew at an average annual growth rate of 0.8 percent. The County encourages growth in areas where public facilities, such as water and sewer systems, exist or are scheduled to be built in the future. Burke County promotes the preservation of its communities' natural resources and has no growth control measures. The County is revising its comprehensive plan and developing a zoning plan.

Construction-Related Population Growth

Construction of VEGP Units 1 and 2 had large indirect impacts on the economy in Burke County, as evidenced by an upswing in residential and commercial activity, but those were temporary and the economy returned to pre-construction levels when construction was completed.

As stated in Section 2.5.1, the 2000 population of Burke County was 22,243 with a population density of 27 persons per square mile. At peak, construction-related population growth in Burke County will reach 1,400 people (workers and families, Section 4.4.2.1). According to NRC guidelines, construction-related population changes will be considered MODERATE as plant-related population will be six percent of Burke County's total population, the area has an established pattern of residential and commercial development, a population density of at nearly 30 persons per square mile, and at least one urban area with a population of 100,000 or more (Augusta: 195,182) within 50 miles.

The increase in population from the construction workforce will be small in Richmond, Columbia, and other counties in the region. Using 2000 Census data, Richmond has a population density of 609 people per square mile and the construction population will increase the total population less than 1 percent. Columbia County has a population density of 251 people per square mile and the in-migrating construction workforce would increase its population by 2.6 percent.

Conclusion

From a land use perspective, Burke County is still predominantly rural, and land in the County will likely continue to be used for agriculture and forestry into the foreseeable future. Commercial and residential development is minimal and has experienced little change. Similar to the construction of the existing VEGP units, the construction of two Westinghouse AP1000 units will create a temporary upswing in residential and commercial activity, possibly converting some land to other uses, such as trailer parks, convenience stores, hotel/motel property, etc. Some construction workers may become long-term residents, staying two or more years. However, SNC estimates based on the Units 1 and 2 construction experience, upon project completion most in-migrating construction workers and their families will leave the 50-mile radius, and residential and commercial activity will return to pre-construction levels. Therefore, employing NRC criteria, off-site land use changes will be considered SMALL in all surrounding counties with the exception of Burke County, where impacts will be MODERATE, but temporary, and will not warrant mitigation.

4.4.2.2.4 Transportation

Impacts of the proposed construction on transportation and traffic will be most obvious on the rural roads of Burke County, particularly River Road, a two-lane highway which provides the only access to VEGP. Impacts of construction on traffic are determined by five elements: (1) the

number of construction workers and their vehicles on the roads; (2) the number of shift changes for the construction workforce; (3) the number of truck deliveries to the construction site; (4) the projected population growth rate in Burke County, the county most affected by the construction; and (5) the capacity of the roads.

For this analysis, SNC has assumed that there will be four construction shifts and each shift will include 25 percent of the total construction workforce. While it is a common practice for construction workers to car pool, this analysis conservatively assumes one worker per vehicle. In addition to construction workers, SNC estimated approximately 100 truck deliveries will be made daily to the construction site. Both truck deliveries and construction worker vehicles will enter the site via the Construction Access Road (Figure 3.1-3). The construction workforce, the existing units' workforce (and outage workforces) will all access the VEGP site via River Road.

Georgia Department of Transportation (GDOT) assumes road capacity on two lane highways to be 1,700 passenger cars per hour (pc/h) for one direction and 3,200 pc/h for both directions combined (**TRB 2000**). GDOT considers tractor trailers as equivalent to 3 to 3½ passenger vehicles. Smaller trucks such as cement trucks and other delivery trucks could be considered the equivalent of two passenger vehicles. Traffic on River Road north of VEGP, as measured by the 2004 Average Annual Daily Traffic (AADT) was 1,277 in one direction (see Table 2.5.2-6 and Figure 2.5.2-2; location 33). Most traffic on River Road is related to VEGP, although there is some local traffic.

SNC doubled the 2004 AADT unidirectional count on River Road to arrive at an estimate of 2,554 vehicles on River Road north of the VEGP site in a single 24-hour period. For purposes of analysis SNC assumed that 100 percent of the 2,554 vehicles were attributable to the current VEGP workforce (60 percent day shift; 30 percent night shift; 10 percent graveyard shift). The AADT does not consider hourly traffic volume. After conservatively assuming that all traffic is due to VEGP workers, SNC assumed that all traffic on River Road occurred during shift change. SNC assumes that the afternoon shift change results in the highest hourly traffic count as approximately 800 day shift workers leave and 400 night shift workers arrive. Therefore, SNC used 1,200 cars per hour as the basis of predicting the impacts of construction traffic.

The 2000 Burke County population was 22,243 (Table 2.5.1-4) and is expected to increase by 10 percent by 2010, the earliest date SNC estimates construction activities can begin, however because most of the traffic on River Road is plant-related and because of the conservative assumptions SNC has made regarding the timing of VEGP traffic on River Road, local traffic was not factored into the analysis.

The capacity of River Road is 3,200 cars per hour, so there is enough capacity for an additional 2,000 passenger cars or equivalent beyond the current 1,200 cars per hour use now. For the proposed construction, road capacity could be reached during Year 2 of construction and exceeded through Year 5 (month 50) (Table 4.4.2-3).

In addition to the operations and construction work force analyzed above, an average outage work force of approximately 800 workers for the current VEGP Units 1 and 2 uses River Road for approximately 1 month during every refueling outage (which occur on 18 month schedules for each reactor).

Construction workers will have a MODERATE to LARGE impact on the two-lane highways in Burke County, particularly River Road and the highways that feed into it. Mitigation may be necessary to accommodate the additional vehicles on Burke County roads, particularly River Road.

Mitigation measures will be included in a construction management traffic plan developed prior to the start of construction. Potential mitigation measures could include installing turn lanes at the construction entrance, establishing a centralized parking area away from the site and shuttling construction workers to the site in buses or vans, encouraging carpools, and staggering construction shifts so they don't coincide with operational shifts. SNC could also establish a shuttle service from the central Augusta area, where many of the construction workforce is likely to settle. The operations work force will continue to enter the plant at the current entrance on River Road which has a left turn lane allowing through north-south traffic to pass, alleviating congestion at that entrance.

4.4.2.2.5 Aesthetics and Recreation

As part of construction, the approximately 500-acre new Units 3 and 4 footprint will be cleared and excavated, temporary roads and a barge facility will be constructed, and heavy equipment will be brought to the site. Most of the clearing will be at the location of the new units, however, approximately 12.5 acres of river shoreline will be cleared, excavated, and graded for the water intake structure, approximately 10 acres will be cleared and graded for the barge facility, and discharge pipe. The two construction sites will be approximately 1,500 feet apart. The clearing and excavation for the new units and adjacent support facilities will not be visible from offsite roads. However, clearing and construction activities for the riverfront facilities will be visible from the river. SNC will use best management practices to prevent erosion and sedimentation, including seeding bare earth, but the affected riverfront will clearly be a construction site for the duration of the time necessary to build the barge dock and intake and discharge structures. Construction of the reactors will require a 250-foot tall crane tower. The steel tower could be visible from the River Road and the Savannah River, but because it has an open structure does not significantly impact the aesthetes at the site or the surrounding area. Because the aesthetic impacts of construction will be localized and because that reach of the river is not popular for recreational boating except by fishermen, SNC has determined that impacts will be SMALL and not warrant mitigation.

The Yuchi WMA is immediately south of the SNC property. GPC has a boat landing on the Savannah River downstream of the VEGP property. The WMA is used by hunters and the boat

landing by fishermen during the appropriate seasons. Use of the WMA/boat landing is seasonal and it will be unlikely that hunters and fishermen will be on River Road at the same time as the construction shifts. Construction impacts such as noise and air pollutants will be limited to the VEGP site and will not be noticeable from offsite. Construction will not affect any other recreational facilities in the 50-mile region. Impacts will be SMALL and will not warrant mitigation.

4.4.2.2.6 Housing

Rental property is scarce in the rural counties in proximity to VEGP, but is more plentiful supply in the larger municipalities such as Augusta, North Augusta, Martinez, and Evans. Generally, the counties with larger populations (Richmond and Columbia Counties) have more available vacant housing. Tables 2.5.2-10 and 2.5.2-11 detail housing in Burke, Richmond, and Columbia Counties.

Impacts on housing from the construction workforce depend on the number of workers already residing within the 50-mile region and the number that will relocate and require housing.

Based on assumptions presented in Table 4.4.2-1, approximately 3,400 construction workers will in-migrate to the 50-mile region. Of these, approximately 2,700 will purchase or rent permanent housing. Of these, approximately 540 workers will settle in Burke County. The 680 temporary workers will rent temporary (e.g., hotels, motels, rooms in private home) or permanent housing, or bring their own housing in the form of campers and mobile homes.

In 2000, there were 4,466 vacant rental units and 1,997 vacant housing units for sale in Burke, Richmond, and Columbia Counties. SNC estimates that, in absolute numbers, the available housing would be sufficient to house the permanent and temporary construction workforce. However, there may not be enough housing of the type desired by the workers in any of the three counties of interest, especially Burke County. In this event, workers would relocate to other areas within the 50-mile region, have new homes constructed, bring their own housing, or live in hotels and motels. Given this increased demand for housing, prices of existing housing could rise to some degree. Burke County (and other counties to a lesser extent) will benefit from increased property values and the addition of new houses to the tax rolls. Increasing the demand for homes could increase rental rates and housing prices. It is possible that some low-income populations could be priced out of their rental housing due to upward pressure on rents. The increased demand for housing could increase new home construction and temporary housing. With time market forces will increase the housing supply to meet demand. Construction employment would increase gradually, reaching the peak of 4,400 workers after four to five years (Table 4.4.2-3), allowing time for market forces to accommodate the influx, causing housing prices and rental rates to stabilize.

Because Burke County contains the proposed construction site, has a small population, and has a relatively small economy, its housing market would likely be the most impacted. Richmond and Columbia Counties' housing markets would also experience an impact, though not as large.

The greatest shortage of housing would be in Burke County and there could be upward pressure on rents and housing prices. Richmond and Columbia Counties would experience a similar impact, though to a lesser extent. The majority of these impacts will be mitigated by normal market forces and impacts caused by housing temporary workers in temporary housing will cease when construction is complete. SNC concludes that the potential impacts on housing will be SMALL in Richmond and Columbia Counties and MODERATE to LARGE in Burke County and that mitigation would not be warranted where the impacts were small. Mitigation of the moderate impacts will most likely be market- driven.

4.4.2.2.7 Public Services

Water Supply Facilities

SNC considered both construction demand and population increases on local water resources. Construction could bring as many as 7,200 people to the region. Peak onsite construction workforce could be as high as 4,400 workers. The average per capita water usage in the U.S. is 90 gallons per day per person. Of that, 26 gallons is used for personal use (**EPA 2003**). The balance is used for bathing, laundry and other household uses.

VEGP does not use water from a municipal system. Onsite wells provide potable water, and will provide the water for the construction project as well. Therefore, water usage by the workforce, while onsite, will not impact municipal water suppliers. The VEGP wells pump an average of 1.052 million gallons of water per day for all uses (Section 4.2.2). VEGP is permitted to take an annual average of 5.5 million gallons of groundwater per day. During peak construction, an additional 4,400 people on site could increase potable consumption by a maximum of 114,400 gpd (4,400 x 26 gpd) for personal use. Estimated maximum construction use is 420 gpm (Section 4.2.2) for batch plant operations, dust abatement and potable needs. Therefore, SNC conservatively estimated that total daily groundwater usage during construction, including usage by the existing VEGP units, will be 1.8 million gpd, well within the permitted limits. However, in reality, potable water consumption will be less because most of the construction workforce will have access to stand-alone drinking water stations, and portable toilets, and 420 gpm will be peak use during batch plant operation, rather than continuous use. Construction impacts to VEGP groundwater use will be SMALL and will not warrant mitigation.

Municipal water suppliers in the region have excess capacity (see Table 2.5.2-12). The impact to the local water supply systems from construction-related population growth can be estimated by calculating the amount of water that will be required by total population increase. The average person in the U.S. uses about 90 gpd (**EPA 2003**). Construction-related population increase of 7,200 people could increase consumption by 648,000 gpd in a region where the excess public water supply capacity from groundwater in Burke County, alone, is approximately 3,000,000 gpd

and aquifer yields of 2,000 gpm are common. Impacts of the in-migrating construction workforce on municipal water supplies will be SMALL and will not warrant mitigation.

Waste Water Treatment Facilities

VEGP has a private wastewater treatment facility sized for the two existing units. As part of the new units' construction project, the facility will be expanded to support the increased capacity due to construction and the additional units. During construction the temporary office and warehouse facilities will be tied in to the existing facility. In addition, portable toilets will be provided in the construction area. Therefore, construction will not impact the VEGP wastewater treatment facility.

Section 2.5.2.7 describes the public waste water treatment systems in the three counties, their permitted capacities, and current demands. Waste water treatment facilities in the three counties have excess capacity (see Table 2.5.2-13). The impact to local waste water treatment systems from construction-related population increases can be determined by calculating the amount of water that will be used and disposed of by these individuals. The average person in the U.S. uses about 90°gpd (**EPA 2003**). To be conservative, SNC estimates that 100 percent of this water will be disposed of through the waste water treatment facilities. The construction-related population increase of 7,200 people could require 648,000 gpd of additional waste water treatment capacity in an area where the excess treatment capacity is approximately 19 million gpd. Impacts of the in-migrating construction workforce on waste water treatment facilities in the region will be SMALL and will not warrant mitigation.

Police, Fire, and Medical Facilities

In 2001, Burke, Richmond, and Columbia Counties' persons per police officer ratios were 271:1, 998:1, and 992:1, respectively (see Table 2.5.2-14). Burke County has the largest police force relative to the size of its population. Local planning officials state that police protection is adequately provided throughout the Central Savannah River Area (CSRA) region, but future expansions and facility upgrades may be needed to accommodate future population growth and advancements in technology (CSRARDC 2005). SNC does now and will continue to employ its own security force at VEGP.

The construction project will produce an influx of approximately 1,400 new residents to Burke County. Approximately 1,900 new residents will move into Richmond County, and approximately 2,400 will move into Columbia County. The rest of the construction workforce and families will live in other counties in the 50-mile region. These population increases will increase the persons per police officer ratios slightly (Table 4.4.2-4). The percent increase in ratio attributed to construction will be 6, 1, and 3 percent in Burke, Richmond, and Columbia counties, respectively.

Based on the percentage increase in "persons per police officer" ratios, the impact of the construction on police services will be insignificant in Richmond and Columbia Counties. In

Burke County, however, the percentage increase in “persons per police officer” ratio will be significant. Therefore, SNC concludes that the potential impacts of construction on police services in Richmond and Columbia Counties will be SMALL and that mitigation will not be warranted in those counties. SNC concludes that the potential impacts on police services will be MODERATE in Burke County and will most likely be mitigated by using increased property tax revenues from the construction project to fund additional police manpower and facilities. SNC has a history of keeping local officials apprised of activities and planned activities at VEGP, and would continue to do so, thus county officials will be aware of any planned influx of construction workers, and would develop mitigation strategies before their arrival.

This conclusion is based in part on an analysis NRC performed of nuclear plant refurbishment impacts based on impacts sustained during original plant construction (in NUREG-1437). NRC selected seven case study plants whose characteristics resembled the spectrum of nuclear plants in the United States today. NRC reported that, “(n)o serious disruption of public safety services occurred as a result of original construction at the seven case study sites. Most communities showed a steady increase in expenditures connected with public safety departments. Tax contributions from the plant often enabled expansion of public safety services in the purchase of new buildings and equipment and the acquisition of additional staff.”

In 2000, Burke, Richmond, and Columbia Counties’ persons per firefighter ratios were 890:1, 666:1, and 676:1, respectively (Table 2.5.2-14). The construction project will produce an influx of approximately 1,400 new residents to Burke County. Approximately 1,900 new residents will move into Richmond County, and approximately 2,400 will move into Columbia County. The rest of the construction workforce and families will live in other counties in the 50-mile region. These population increases will increase the persons per firefighter ratios slightly (Table 4.4.2-5). The percent increase in ratio attributed to construction will be 6, 1, and 3 percent in Burke, Richmond, and Columbia Counties, respectively. Local planning officials state that fire protection may be under-funded in some counties. Burke County has the highest “persons per firefighter” rate and a relatively high fire insurance rating. Local officials state that high fire insurance ratings and below-expected fire expenditures indicate a need for additional funding for manpower and equipment for fire protection services in Burke County (**CSRARDC 2005**). Local planners consider Burke County fire fighting capabilities under-staffed and under-equipped.

At 1 and 3 percent in Richmond and Columbia Counties, respectively, the percent increase in “persons per firefighter” ratio attributed to construction is not considered significant. At 6 percent in Burke County, the percent increase in “persons per firefighter” ratio is considered significant.

The construction workforces and their families will not have a significant impact on existing fire protection services in Richmond and Columbia Counties. Therefore, SNC concludes that the potential impacts of nuclear plant construction on fire protection services in Richmond and Columbia Counties will be SMALL and that mitigation will not be warranted. SNC concludes that the potential impacts on fire protection services will be MODERATE in Burke County and will

most likely be mitigated by using increased property tax revenues to fund additional firefighters and facilities. As with the analysis of the adequacy of police protection the conclusions of this analysis are based in part on NRC's review of original construction impacts on public services. As stated in the previous section, in NUREG-1437, NRC performed an analysis of nuclear plant refurbishment impacts based on impacts sustained during original plant construction. NRC reported that, "(n)o serious disruption of public safety services occurred as a result of original construction at the seven case study sites. Most communities showed a steady increase in expenditures connected with public safety departments. Tax contributions from the plant often enabled expansion of public safety services in the purchase of new buildings and equipment and the acquisition of additional staff." Based on this statement, SNC concludes that the moderate impacts to fire protection services in Burke County would be mitigated by the increase in tax contributions made by the owners of the plant to the local taxing jurisdictions.

Detailed information concerning the medical services in the three-county region is provided in Section 2.5.2.7. Minor injuries to construction workers will be assessed and treated by onsite medical personnel. Other injuries will be treated at one of the hospitals in the three-county region, depending on severity of the injury. For the existing VEGP workforce, agreements are in place with some local medical providers to support emergencies. SNC will reach similar agreements to provide emergency medical services to the construction workforce. Construction activities should not burden existing medical services.

The medical facilities in the three-county region provide medical care to much of the population within the 50-mile region. The peak construction workforce will increase the population in the 50-mile region by less than 1 percent. The potential impacts of construction on medical services will be SMALL and mitigation will not be warranted.

Social Services

This section focuses on the potential impacts of construction on the social and related services provided to disadvantaged segments of the population. This section is distinguished from environmental justice issues, which are discussed in Section 4.4.3.

Construction could be viewed as economically beneficial to the disadvantaged population served by the Department of Human Resources. The constructing contractor could hire local unemployed people, thus improving their economic position, and decreasing their need for the services provided by the Department of Human Resources. At a minimum, the spending by the construction workforce for goods and services will have a multiplier effect, increasing the number of jobs that could be filled by the economically disadvantaged.

SNC concludes that the potential impacts of construction on the demand for social and related services will be SMALL and positive and will not warrant mitigation.

4.4.2.2.8 Education

SNC assumes that 2,700 of the peak construction workforce will relocate to the 50-mile region with their families, increasing the population by approximately 7,200 people. Approximately 20 percent will settle in Burke County, 26 percent in Richmond County, and 34 percent in Columbia County. The remaining 20 percent will be distributed across the 25 other counties within the region.

In Georgia 26.5 percent of the population is under 18 years old (Table 2.5.1-5). Therefore, SNC conservatively estimates that in a construction-workforce related population of 7,200, approximately 1,900 will be school-aged. Table 4.4.2-6 applies the population distribution percentage assumptions to the number of school-aged children in the construction workforce population to estimate the number of construction workforce-related school-aged children in each of the three counties.

It is likely that the Richmond and Columbia County school systems could accommodate the increase in student population. The analysis is based on the peak construction workforce, which will not be reached sooner than the third year of construction, giving schools several years to make accommodations for the additional influx of students.

Additionally, Richmond and Columbia Counties plan to build additional schools before the construction period begins (although they have no plans to include space for these hypothetical students). The impact to these counties will be SMALL. The Burke County student population could increase by 9 percent, which will be a MODERATE impact on its education system and will require mitigation. Burke County is not planning to construct additional schools.

The quickest mitigation will be to hire additional teachers and move modular classrooms to existing schools. Increased property and special option sales tax revenues as a result of the increased population, and, in the case of Burke County, property taxes on the new reactors, will fund additional teachers and facilities. No additional mitigation will be warranted.

4.4.3 Environmental Justice Impacts

Environmental justice refers to a Federal policy under which each Federal agency identifies and addresses, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority or low-income populations. The NRC has a policy on the treatment of environmental justice matters in licensing actions (69 FR 52040).

SNC evaluated whether the health or welfare of minority and low-income populations could be disproportionately adversely affected by potential impacts.

SNC located minority and low-income populations within the 50-mile radius of VEGP (Figures 2.5.4-1 through 2.5.4-4). VEGP is in a predominantly Black Races census block group, and adjacent census block groups also have predominantly Black Races populations.

SNC identified the most likely pathways by which adverse environmental impacts associated with construction at the VEGP site could affect human populations. Exhaust emissions from construction equipment and dust will cause minor and localized adverse impacts to air quality; however, the air quality at the site boundary will not be affected. No contaminants, including sediments, are expected to reach the Savannah River because all construction will be done using Best Management Practices as discussed in Section 3.9. Land use impacts could occur in Burke County, as the influx of construction workers could cause landowners to convert some undeveloped land to other uses, such as trailer parks, convenience stores, hotel/motel property, etc. Local low-income and minority populations could benefit by gaining access to new services or employment at them. However, the new uses are considered temporary, as completion of the construction project will eliminate the demand for the services. Traffic could increase beyond the capacity of some local roads, but SNC will mitigate impacts by encouraging car pooling, providing van pools, or staggering work shifts. The large construction project likely will provide additional temporary jobs for some of the unemployed work force, thus decreasing their need for social services, and freeing funding up for other populations in need. Burke County's police and fire protection services will be impacted by the increase in population due to construction, but the increase in property tax revenues as a result of the construction project will fund facilities, equipment, and additional personnel to meet these needs. The local Burke County school systems will be adversely affected by an influx of new students; however, the additional property tax revenues will fund additional teachers and facilities. Rental housing rates could increase, potentially displacing low-income renters. However, it is unlikely the construction workforce will need low-income housing. Except for increased rental housing rates no adverse impacts in Burke County will disproportionately affect minority or low-income populations.

Impacts in the other counties in the 50-mile region of interest will be all SMALL.

SNC also investigated the possibility of subsistence-living populations in the vicinity of VEGP by contacting local government officials, the staff of social welfare agencies, and local businesses concerning any known unusual resource dependencies or practices that could result in potentially disproportionate impacts to minority and low-income populations. SNC asked about the presence of minority, low-income, or migrant populations of particular concern, and whether subsistence living conditions were evident. No agency reported such dependencies or practices, as subsistence agriculture, hunting, or fishing, through which the populations could be disproportionately adversely affected by the construction project.

Construction-related moderate adverse impacts were identified in Burke County. However, except for increased rental housing rates, no adverse impacts in Burke County will disproportionately affect minority or low-income populations. Impacts in the other counties in the 50-mile region of interest will all be SMALL. Mitigation beyond that previously described will not be warranted.

Table 4.4.1-1 Equipment and Approximate Noise Level in the Immediate Vicinity of the Equipment¹

Equipment	Noise Level (dB) within 10 ft
Pneumatic chip hammer	103-113
Earth tamper	90-96
Jackhammer	102-111
Crane	90-96
Concrete joint cutter	99-102
Hammer	87-95
Skilsaw	88-102
Gradeall	87-94
Front-end loader	86-94
Bulldozer	93-96
Backhoe	84-93

¹ Source: (CPWR 2006)

Table 4.4.2-1 Construction Workforce for the VEGP Site

Construction Workforce	AP1000 2 units
Total peak workforce	4,400
Number of available local skilled craft labor who will join the project ¹	1,000
In-migrate	3,400
80% will stay more than 2 years ²	2,720
20% will stay less than two years ³	680

¹ Based on the assumption used for large construction projects that approximately 20 to 25 percent of the local skilled craft workforce will join the project

² In the analysis in Chapter 4, these are considered permanent residents

³ In the analysis in Chapter 4, these are considered temporary residents

Table 4.4.2-2 Impacts of the Construction Workforce on Three Counties of Interest

Demographic	AP1000 2 Units
In-migrating Construction Workforce Peak	3,400
Permanent	2,700
Temporary	680
Indirect Jobs	
Permanent (2,700 x 0.70)	1,900
Temporary (680 x 0.70)	480
2004 unemployed in three counties ¹	7,800
Total number of indirect jobs as a percent of unemployed population in 3-county area	31%
New Residents	
50-mile region (2,700 x 2.65)	7,200
Burke County – 20%	1,400
Richmond – 26%	1,900
Columbia – 34%	2,400

¹ See Table 2.5.2-3

Table 4.4.2-3 Number of Construction Workforce Passenger Cars/Hour on River Road During Shift Changes During Construction

Construction Phase	Timeline by Month	Number of Workers	Number of Construction Workforce Passenger Cars on the two-lane highways during shift change, both directions
Preconstruction - 18-Month Duration			
First month of preconstruction	Month -18	80	40
Final month of preconstruction	Month -1	2,175	1,087
Construction - 66-Month Duration			
Year 1	Month 5	3,045	1,088
Year 2	Month 17	4,000	2,000
Year 3	Month 28-36	4,400	2,200
Year 5	Month 49-50	4,000	2,000
Year 6	Month 62	3,000	1,500
	Month 64	2,000	1,000
	Month 65	1,000	500
	Month 66	500	250

Note: Shaded months represent peak construction workforces during each phase.

Table 4.4.2-4 Police Protection in the Three Counties of Interest, Adjusted for the Construction Workforce and Associated Population Increase

County	Total Population in 2000	Additional Population Due to New Plant Construction	Total Population	Police Protection in 2001 ¹	Persons per Police Officer Ratio	Percent Increase from 2001 Persons per Police Officer Ratio
Burke	22,243	1,400	23,643	82	288:1	6
Richmond	199,775	1,900	201,675	200	1,008:1	1
Columbia	89,288	2,400	91,688	90	1,019:1	3

¹ Source: CSRARDC 2005

Table 4.4.2-5 Fire Protection in the Three Counties of Interest, Adjusted for the Construction Workforce and Associated Population Increase

County	Total Population in 2000	Additional Population Due to New Plant Construction	Total Population	Firefighters (Full time and Volunteer) in 2001¹	Persons per Firefighter	Percent Increase from Current Persons per Firefighter Ratio
Burke	22,243	1,400	23,643	25	946:1	6
Richmond	199,775	1,900	201,675	300	672:1	1
Columbia	89,288	2,400	91,688	132	695:1	3

¹ Source: CSRARDC 2005

Table 4.4.2-6 Estimated Additional Public School Age Students in the Three-County Region as a Result of Construction

County	Construction-Related Population Increase	Construction-related Population under age 18	Percentage of Additional Public School Children per County
Burke	1,400	382	9
Richmond	1,900	496	1
Columbia	2,400	649	3

Section 4.4 References

(BEA 2005) U.S. Bureau of Economic Analysis, “Re: RIMS II Multipliers for the Augusta, GA Region,” Regional Economic Analysis Division, Economics and Statistics Administration, August 8, 2005.

(CPWR 2006) Center to Protect Worker’s Rights, “Construction Noise Hazard Alert,” available at <http://www.cpwr.com/hazpdfs/kfnoise.PDF>, Accessed March 24, 2006.

(CSRARDC 2005) Central Savannah River Area Regional Development Center, *Draft Central Savannah River Area Regional Plan, 2005-2025, Technical Staff Report*, “Community Facilities”, March, 2005.

(EPA 2003) U.S. Environmental Protection Agency, *Water on Tap: What You Need to Know*, EPA 815- K-03-007, Office of Water, Office of Water, Washington, DC, 2003.

(TRB 2000) Transportation Research Board, *Highway Capacity Manual*, National Academics of Science, Washington DC. 2000.

(USCB 2005) U.S. Census Bureau, *State and County Quickfacts, Georgia and South Carolina*, U.S. Census Bureau, 2005, available at <http://www.census.gov/>, Accessed August 10, 2005.

(USCB 2006) U.S. Census Bureau, *State and County Quickfacts, Burke County, Georgia*, available at <http://www.quickfacts.census.gov>, Accessed July 13.

4.5 Radiation Exposure to Construction Workers

4.5.1 Site Layout

The physical location of the new units relative to the existing VEGP units is depicted on Figure 3.1-3. As shown, the new units will be immediately west of the existing units. Construction activity will take place outside the existing protected area, but inside the restricted area boundary.

4.5.2 Radiation Sources

During the construction of the new units, the construction workers could be exposed to radiation sources from the routine operation of the existing units. Furthermore, Unit 4 construction workers could be exposed to radiation from Unit 3 operation.

4.5.2.1 Direct Radiation

The existing units' principal sources contributing to direct radiation exposure at the construction site include the reactor buildings and the planned Independent Spent Fuel Storage Installation (ISFSI), which will be located west of the existing Unit 2 (See Figure 3.1-3). In addition, workers constructing Unit 4 could be exposed to direct radiation from the Unit 3 reactor building.

4.5.2.2 Gaseous Effluents

Sources of gaseous releases for the existing units are currently confined to the following paths: plant vents (Unit 1 and Unit 2), the condenser air ejector, the steam packing exhauster systems (Unit 1 and Unit 2), Radwaste Processing Facility and the DAW (Dry Active Waste Building). Waste gas decay tanks are batch released through the Unit 1 plant vent. The containment purges are released through their respective plant vents. **(SNC 2004a)**

The annual releases for 2002 were reported as 26.3 curies of fission and activation products, 0.0207 curies of I-131, 1.67×10^{-5} curies of particulates with half-lives greater than eight days, and 105 curies of tritium **(SNC 2003)**. The annual releases for 2002 were selected because they resulted in the maximum exposure to the public among the years 2001-2004.

Unit 4 construction workers could also be exposed to radioactivity in gaseous effluents from Unit 3. Section 3.5 presents the projected gaseous effluent releases for Unit 3.

4.5.2.3 Liquid Effluents

Effluents from the liquid waste disposal system result in small amounts of radioactivity in the Savannah River. The annual liquid radioactivity releases for 2001 were reported as 0.220 curies of fission and activation products, 1,490 curies of tritium, and 0.000423 curies of dissolved and entrained gases **(SNC 2002)**. The annual releases for 2001 were selected because they were reported as the maximum exposure to the public among the years 2001-2004.

Unit 4 construction workers could be exposed to radioactivity in liquid effluents from Unit 3, but that is unlikely given that drinking water is derived from sources other than the Savannah River. Section 3.5 presents the projected liquid effluent releases for Unit 3. Applying the Units 1, 2, and 3 liquid effluent doses to Unit 4 construction workers is conservative in that it assumes these construction workers engage in the same activities that lead to the calculated liquid effluent doses (i.e., consuming fish and drinking surface water).

4.5.3 Measured and Calculated Dose Rates

The measured or calculated dose rates used to estimate worker dose are presented below.

4.5.3.1 Direct Radiation

Existing External Radiation Exposure

The average accumulated exposure from the six thermoluminescent dosimeters (TLDs) along the VEGP Protected Area Fence closest to the proposed construction site over a 365 day period is 115.9 mrem. The average TLD exposure from sixteen environmental locations surrounding the site over a 365 day period is 49.0 mrem. The measured radiation dose from the Protected Area Fence TLDs minus the Surrounding Environmental Site TLDs, is:

$$115.9 \text{ mrem per year} - 49.0 \text{ mrem per year} = 66.9 \text{ mrem per year}$$

Independent Spent Fuel Storage Installation (ISFSI)

The estimated dose to construction workers from the planned ISFSI is estimated to be 15 mrem per year for the Unit 3 construction workforce and negligible for the Unit 4 construction workforce. It is conservatively assumed that SNC will put the ISFSI in service during Unit 3 construction and that the Unit 3 construction workers would be exposed for an entire year.

Unit 3 Direct Radiation Exposure to Unit 4 Construction Workers

Conservatively assuming that the 66.9 mrem per year value presented above for Units 1 and 2 is attributable only to direct radiation from these units, and assuming this would be representative of the direct radiation dose from Unit 3 to Unit 4 construction workers gives a direct radiation dose to Unit 4 construction workers from Unit 3 operations of:

$$66.9 \text{ mrem per year} / 2 \text{ units} = 33.5 \text{ mrem per year (for one unit)}$$

Summary of External Radiation

From all of the sources discussed above, the highest direct radiation dose to construction workers will be during Unit 4 construction and is estimated to be 100.4 mrem per year (66.9 mrem from Units 1 and 2 + 33.5 mrem from Unit 3). The highest direct radiation exposure during Unit 3 construction would be 81.9 mrem per year (66.9 mrem from Units 1 and 2 + 15 mrem from the ISFSI). Therefore the Unit 4 construction workers doses would be bounding and are discussed in the remainder of this section.

4.5.3.2 Gaseous Effluents

Units 1 and 2

The XOQDOQ and GASPAR codes were used to calculate the dose to Unit 4 workers from Units 1 and 2 gaseous effluents. The calculation is analogous to that for the new units as described in Section 5.4. Unit 4 construction workers would receive a total body radiation dose of 0.077 millirem per year and a maximum organ (lung) dose of 0.16 millirem per year from Units 1 and 2 normal radiological releases.

Unit 3 Gaseous Effluent Exposure to Unit 4 Construction Workers

Using the XOQDOQ and GASPAR codes, as described in Section 5.4, Unit 4 construction workers would receive a total body radiation dose of 0.74 millirem per year and a maximum organ (skin) dose of 2.51 millirem per year from Unit 3 normal radiological releases.

4.5.3.3 Liquid Effluents

Units 1 and 2

The Annual Radioactive Effluent Release Report for 2001 (**SNC 2002**) reports a total body dose of 0.0907 millirem and a critical organ dose (GI-LLI) of 0.153 millirem to the maximally exposed member of the public due to the release of liquid effluents from the existing units, calculated in accordance with the existing units' Offsite Dose Calculation Manual (**SNC 2004b**). SNC assumes this dose rate represents the rate for construction workers from Units 1 and 2 releases.

Unit 3 Liquid Effluent Exposure to Unit 4 Construction Workers

Using the LADTAP code, as described in Section 5.4, the maximally exposed member of the public would receive a total body radiation dose of 0.017 millirem per year and a maximum organ (liver) dose of 0.021 millirem per year from normal Unit 3 liquid radiological releases.

4.5.4 Construction Worker Doses

Construction worker doses were conservatively estimated using the following information (see Section 4.4.2):

- The estimated maximum dose rate for each pathway
- An exposure time of 2000 hours per year
- All gaseous releases assumed at ground level
- A peak loading of 4,400 construction workers per year total for two AP1000 units

The estimated maximum annual dose for each pathway as well as the total dose is shown in Table 4.5-1.

4.5.4.1 Direct Radiation

Section 4.5.3 indicates an average annual direct radiation dose of 100.4 millirem based on TLD measurements. These TLD measurements and calculated doses reflect continuous exposures for long periods of time. The average measured dose rate of 100.4 millirem/yr is based on continuous exposure.

Adjusting for an exposure time of 2000 hours/year yields an annual worker whole body dose or total effective dose equivalent (TEDE) of 22.9 millirem.

4.5.4.2 Gaseous Effluents

The annual gaseous effluent doses to a Unit 4 construction worker after Unit 3 is operating (Section 4.5.3.2), which accounts for an exposure time of 2,000 hours per year, are 0.077 millirem for the total body, and 0.16 millirem for the critical organ (lung) from Units 1 and 2 gaseous effluent releases and 0.74 millirem for the total body, and 2.51 millirem (skin) for the critical organ from Unit 3 gaseous effluent releases. The total dose is 0.81 millirem total body and 2.60 millirem to the critical organ (skin).

4.5.4.3 Liquid Effluents

As the annual liquid effluent doses to the maximally exposed member of the public in Section 4.5.3 are based on continuous occupancy, they were adjusted for an exposure time of 2000 hr/yr. Although it is unlikely that the construction workers will be exposed to liquid effluent pathways, it is assumed that the liquid effluent dose rates to which the workers will be exposed are the same as those for the maximally exposed member of the public.

The resulting doses are 0.021 millirem for the total body and 0.035 millirem for the critical organ (GI-LLI) from Units 1 and 2 liquid effluent releases and 0.0038 millirem for the total body, and 0.0047 millirem for the critical organ (liver) from Unit 3 liquid effluent releases. The total annual dose is 0.025 millirem total body and 0.037 millirem to the critical organ (GI-LLI).

4.5.4.4 Total Doses

The annual doses from all three pathways are summarized in Table 4.5-1 and compared to the public dose criteria in 10 CFR 20.1301 and 40 CFR 190 in Table 4.5-2 and Table 4.5-3, respectively. The unrestricted area dose rate in Table 4.5-2 was estimated from the annual TLD doses. Since the calculated doses (24.1 mrem per year and 0.012 mrem per hour) meet the public dose criteria of 10 CFR 20.1301 and 40 CFR 190, the workers will not need to be classified as radiation workers. Table 4.5-4 provides documentation confirming that the doses also meet the design objectives of 10 CFR 50, Appendix I, for gaseous and liquid effluents.

The maximum annual collective dose to the AP1000 construction work force (4,400 workers) is estimated to be 106 person-rem. The calculated doses are based on available dose rate measurements and calculations. It is possible that these dose rates will increase in the future as site conditions change. However, the VEGP site will be continually monitored during the construction period and appropriate actions will be taken as necessary to ensure that the construction workers are protected from radiation.

Table 4.5-1 Annual Construction Worker Doses

	Annual Dose (mrem)		Total Effective Dose Equivalent (TEDE)
	Total Body	Critical Organ	
Direct irradiation	22.9	NA	22.9
Gaseous effluents	0.81	2.6 (skin)	1.16
Liquid effluents	0.025	0.037 (GI-LLI)	0.034
Total	23.8	2.6 (skin)	24.1

Table 4.5-2 Comparison with 10 CFR 20.1301 Criteria for Doses to Members of the Public

Criterion	Dose Limit	Estimated Dose (TEDE)
Annual dose (millirem)	100	24.1
Unrestricted area dose rate (millirem/hour)	2	0.012

Table 4.5-3 Comparison with 40 CFR 190 Criteria for Doses to Members of the Public

Organ	Annual Dose (mrem)	
	Limit	Estimated
Total body	25	23.8
Thyroid	75	1.4
Other organ	25	2.6 (skin)

Table 4.5-4 Comparison with 10 CFR 50, Appendix I Criteria for Effluent Doses

	Annual dose (mrem)	
	Limit	Estimated
Total body dose from liquid effluents	3	0.025
Organ dose from liquid effluents	10	0.037 (GI-LLI)
Total body dose from gaseous effluents	5	0.81
Organ dose from radioactive iodine and radioactive particulates in gaseous effluents	15	0.81 (thyroid)

Section 4.5 References

(SNC 2002) Southern Nuclear Company, Vogtle Electric Generating Plant – Units 1 And 2, NRC Docket Nos. 50-424 and 50-425, Facility Operating License Nos. NPF-68 and NPF-81, Annual Radioactive Effluent Release Report for January 1 2001 To December 31, 2001.

(SNC 2003) Southern Nuclear Company, Vogtle Electric Generating Plant – Units 1 And 2, NRC Docket Nos. 50-424 and 50-425, Facility Operating License Nos. NPF-68 and NPF-81, Annual Radioactive Effluent Release Report for January 1 2002 To December 31, 2002.

(SNC 2004a) Southern Nuclear Company, Vogtle Electric Generating Plant – Units 1 And 2, NRC Docket Nos. 50-424 and 50-425, Facility Operating License Nos. NPF-68 and NPF-81, Annual Radioactive Effluent Release Report for January 1 2003 To December 31, 2003.

(SNC 2004b) Southern Nuclear Company, *Offsite Dose Calculation Manual for Southern Nuclear Operating Company Vogtle Electric Generating Plant, Version 22*, June 25.

Page intentionally left blank.

4.6 Measures and Controls to Limit Adverse Impacts During Construction

The following measures and controls would limit adverse environmental impacts:

- Compliance with applicable local, state, and federal, ordinances, laws and regulations intended to prevent or minimize the adverse environmental effects of construction activities on air, water and land, workers and the public.
- Compliance with existing permits and licenses for the existing units.
- Compliance with existing SNC or Georgia Power Company procedures and processes applicable to construction projects
- Incorporation of environmental requirements of construction permits in construction contracts

In Table 4.6-1, the significance of potential impacts are identified as (S)mall, (M)oderate or (L)arge, based on the analyses done in this chapter.

Table 4.6-1 Summary of Measures and Controls to Limit Adverse Impacts During Construction

		Potential Impact Significance ^{1,2}											Impact Description or Activity	Specific Measures and Controls				
Section Reference		Noise	Erosion and Sediment	Air Quality	Traffic	Wastes	Surface Water	Groundwater	Land Use	Water Use	Terrestrial Ecosystems	Aquatic Ecosystems			Socioeconomic	Radiation Exposure	Other (site-specific)	
4.1	Land-Use Impacts																	
4.1.1	The Site and Vicinity		S				S		S								<ul style="list-style-type: none"> • Ground disturbing activities including grading and recontouring • Removal of existing vegetation. • Stockpiling of soils onsite • Construction of new buildings and impervious surfaces 	<ul style="list-style-type: none"> • Conduct ground disturbing activities in accordance with regulatory and permit requirements. Use adequate erosion controls and stabilization measures to minimize impacts. • Limit vegetation removal to the area within the VEGP site designated for construction activities • Minimize potential impacts to wetlands through avoidance and compliance with applicable permitting requirements • Restrict soil stockpiling and reuse to designated areas on the VEGP site • Restrict construction activities to the ESP site

Table 4.6-1 (cont.) Summary of Measures and Controls to Limit Adverse Impacts During Construction

Potential Impact Significance^{1,2}

Section Reference	Noise	Erosion and Sediment	Air Quality	Traffic	Wastes	Surface Water	Groundwater	Land Use	Water Use	Terrestrial Ecosystems	Aquatic Ecosystems	Socioeconomic	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
4.1.2 Transmission Corridors and Offsite Areas		S				S		S							<ul style="list-style-type: none"> Construction of transmission line in a new corridor 	<ul style="list-style-type: none"> Site new corridor to avoid critical or sensitive habitats/species as much as possible Limit vegetation removal and construction activities to corridor, and to fall and winter to avoid nesting activities Restrict sites of access to corridor for construction equipment Minimize potential impacts through avoidance and compliance with permitting requirements and best management practices

Table 4.6-1 (cont.) Summary of Measures and Controls to Limit Adverse Impacts During Construction

Potential Impact Significance^{1,2}

Section Reference	Noise	Erosion and Sediment	Air Quality	Traffic	Wastes	Surface Water	Groundwater	Land Use	Water Use	Terrestrial Ecosystems	Aquatic Ecosystems	Socioeconomic	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
4.1.3 Historic Properties and Cultural Resources														S	<ul style="list-style-type: none"> • Ground disturbing activities including grading, excavation, and recontouring, and construction of new transmission lines 	<ul style="list-style-type: none"> • Conduct cultural resource surveys, including subsurface sampling prior to initiating ground disturbing activities to identify buried historic or cultural or paleontological resources • Follow established VEGP procedures to stop work if a potential historic/cultural or paleontological resource is discovered • Follow established VEGP procedure to contact appropriate regulatory agencies if a potential historic/ cultural or paleontological resource is discovered
4.2 Water-Related Impacts																
4.2.1 Hydrologic Alterations							S								<ul style="list-style-type: none"> • Excavation to marl layer, through the shallow aquifer, and subsequent dewatering of shallow aquifer 	<ul style="list-style-type: none"> • Adhere to applicable regulations, and permits • Install drainage controls to direct dewatering runoff • Wells in area are in deep aquifer which should not be affected by construction

Table 4.6-1 (cont.) Summary of Measures and Controls to Limit Adverse Impacts During Construction

Potential Impact Significance^{1,2}

Section Reference	Noise	Erosion and Sediment	Air Quality	Traffic	Wastes	Surface Water	Groundwater	Land Use	Water Use	Terrestrial Ecosystems	Aquatic Ecosystems	Socioeconomic	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
4.2.2 Water-Use Impacts									S						<ul style="list-style-type: none"> • Using groundwater as the source for all water used for construction 	<ul style="list-style-type: none"> • No measures or controls will be necessary because impacts will be less than anticipated by existing permits

Table 4.6-1 (cont.) Summary of Measures and Controls to Limit Adverse Impacts During Construction

Potential Impact Significance^{1,2}

Section Reference	Noise	Erosion and Sediment	Air Quality	Traffic	Wastes	Surface Water	Groundwater	Land Use	Water Use	Terrestrial Ecosystems	Aquatic Ecosystems	Socioeconomic	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
4.2.3 Water Quality Impacts						S	S		S						<ul style="list-style-type: none"> • Construction of barge facility and intake and discharge structures and dredging of channels in the Savannah River • Potential minor spills of petroleum products or other chemicals • Potential erosion, sediment and stormwater runoff from construction activities into the Savannah River or site ponds 	<ul style="list-style-type: none"> • Install coffer dams in Savannah River • Install stormwater drainage system at construction sites and stabilize disturbed soils • Use Best Management Practices to minimize erosion and sedimentation • Use good construction practices to maintain equipment, and prevent spills and leaks • Invoke VEGP's existing SPCC plan for construction activities

Table 4.6-1 (cont.) Summary of Measures and Controls to Limit Adverse Impacts During Construction

Potential Impact Significance^{1,2}

Section Reference	Noise	Erosion and Sediment	Air Quality	Traffic	Wastes	Surface Water	Groundwater	Land Use	Water Use	Terrestrial Ecosystems	Aquatic Ecosystems	Socioeconomic	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
-------------------	-------	----------------------	-------------	---------	--------	---------------	-------------	----------	-----------	------------------------	--------------------	---------------	--------------------	-----------------------	--------------------------------	--------------------------------

4.3 Ecological Impacts (i.e., impacts on the physical environment)

Table 4.6-1 (cont.) Summary of Measures and Controls to Limit Adverse Impacts During Construction

Potential Impact Significance^{1,2}

Section Reference	Noise	Erosion and Sediment	Air Quality	Traffic	Wastes	Surface Water	Groundwater	Land Use	Water Use	Terrestrial Ecosystems	Aquatic Ecosystems	Socioeconomic	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
4.3.1 Terrestrial Ecosystems	S		S							S					<ul style="list-style-type: none"> • Clearing and grading and habitat loss will displace animals such as birds and mammals from the construction site and will kill less mobile animals • Wildlife may be startled or frightened away by construction noises • Potential impacts from bird collisions with man-made structures (cranes, buildings) during construction 	<ul style="list-style-type: none"> • No measures or controls will be necessary because impacts will be small

Table 4.6-1 (cont.) Summary of Measures and Controls to Limit Adverse Impacts During Construction

Potential Impact Significance^{1,2}

Section Reference	Noise	Erosion and Sediment	Air Quality	Traffic	Wastes	Surface Water	Groundwater	Land Use	Water Use	Terrestrial Ecosystems	Aquatic Ecosystems	Socioeconomic	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
4.3.2 Aquatic Ecosystems		S				S					S				<ul style="list-style-type: none"> • Potential impacts to surface water from spills • Potential impacts to surface water from increased sediment load during construction • Temporarily degraded aquatic habitat due to construction on Savannah River shoreline • Temporary loss of benthic habitat due to construction 	<ul style="list-style-type: none"> • Develop and implement a construction Storm Water Pollution Prevention Plan (SWPPP) • Invoke existing VEGP SPCC plan for construction activities • Implement erosion and sediment control plans that incorporates recognized best management practices • Install appropriate barriers in river prior to construction

Table 4.6-1 (cont.) Summary of Measures and Controls to Limit Adverse Impacts During Construction

Potential Impact Significance^{1,2}

Section Reference	Noise	Erosion and Sediment	Air Quality	Traffic	Wastes	Surface Water	Groundwater	Land Use	Water Use	Terrestrial Ecosystems	Aquatic Ecosystems	Socioeconomic	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
-------------------	-------	----------------------	-------------	---------	--------	---------------	-------------	----------	-----------	------------------------	--------------------	---------------	--------------------	-----------------------	--------------------------------	--------------------------------

4.4 Socioeconomic Impacts (i.e., Impacts on the Human Community)

Table 4.6-1 (cont.) Summary of Measures and Controls to Limit Adverse Impacts During Construction

Potential Impact Significance^{1,2}

Section Reference	Noise	Erosion and Sediment	Air Quality	Traffic	Wastes	Surface Water	Groundwater	Land Use	Water Use	Terrestrial Ecosystems	Aquatic Ecosystems	Socioeconomic	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
4.4.1 Physical Impacts	S		S	S	S										<ul style="list-style-type: none"> • Potential temporary and limited impacts to sensitive populations from noise, fugitive dust, and exhaust emissions during construction • Potential for increased traffic accidents with increased construction traffic • Potential for construction accidents • Increased debris to existing landfills 	<ul style="list-style-type: none"> • Train and appropriately protect VEGP employees and construction workers to reduce the risk of potential exposure to noise, dust and exhaust emissions • Provide on-site services for emergency first aid, and conduct regular health and safety monitoring • Provide appropriate job-training to construction workers • Make public announcements or prior notification of atypically loud construction activities • Use dust control measures (such as watering, stabilizing disturbed areas, covering trucks) • Manage concerns from adjacent residents or visitors on a case-by-case basis through an SNC concerns resolution program • Post signs near construction entrances and exits to make the public aware of potentially high construction traffic areas • Develop traffic control mitigation plan

Table 4.6-1 (cont.) Summary of Measures and Controls to Limit Adverse Impacts During Construction

Potential Impact Significance^{1,2}

Section Reference	Noise	Erosion and Sediment	Air Quality	Traffic	Wastes	Surface Water	Groundwater	Land Use	Water Use	Terrestrial Ecosystems	Aquatic Ecosystems	Socioeconomic	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
4.4.2 Social and Economic Impacts				M-L				S-M				S-L	S	M-L	<ul style="list-style-type: none"> • Potential impacts to existing traffic in the vicinity of VEGP due to increased construction traffic • Potential short-term housing shortage • Potential short-term ability of schools to accommodate influx of students without additional facilities and teachers 	<ul style="list-style-type: none"> • Stagger shifts, encourage car or van pooling; time deliveries to avoid shift change or commute times • Erect signs alerting drivers of the construction and the potential for increased construction traffic • Mitigation of any housing shortage will be through new construction in anticipation of arrival of construction workforce • Increased tax revenues as a result of the large construction project will fund additional school resources, police and fire protection

Table 4.6-1 (cont.) Summary of Measures and Controls to Limit Adverse Impacts During Construction

Potential Impact Significance^{1,2}

Section Reference	Noise	Erosion and Sediment	Air Quality	Traffic	Wastes	Surface Water	Groundwater	Land Use	Water Use	Terrestrial Ecosystems	Aquatic Ecosystems	Socioeconomic	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls	
4.4.3 Environmental Justice Impacts				M-L				S-M					S	S	S-L	<ul style="list-style-type: none"> No disproportionately high or adverse impacts identified 	<ul style="list-style-type: none"> No mitigation measures required beyond those listed above
4.5 Radiation Exposure to Construction Workers													S		<ul style="list-style-type: none"> No impacts identified 	<ul style="list-style-type: none"> No mitigation measures required 	
4.7 Non-Radiological Health Impacts														S	<ul style="list-style-type: none"> Potential of construction accidents requiring first aid or medical treatment 	<ul style="list-style-type: none"> Provide job-training and institute procedures to ensure a safe working environment Provide first aid capabilities at the construction site 	

¹ The assigned significance levels [(S)mall, (M)oderate, or (L)arge] are based on the assumption that for each impact, the associated proposed mitigation measures and controls (or equivalents) will be implemented.

² A blank in the elements column denotes “no impact” on that specific element due to the assessed impacts.

Page intentionally left blank.

4.7 Non-radiological Health Impacts

4.7.1 Public Health

Members of the public can potentially be put at risk by construction activities at the VEGP site. Nonradiological air emissions and dust can transport offsite through the atmosphere to where people are living. Noise can also propagate offsite. The increase in traffic from commuting construction workers and deliveries can result in additional air emissions and traffic accidents.

Section 4.4.1, "Physical Impacts" addresses the impacts to the public from construction activities.

4.7.2 Occupational Health

Construction of the new units and associated transmission lines will involve risk to workers from accidents or occupational illnesses. These risks could result from construction accidents (e.g., falls, electrocutions, and burns), exposure to toxic or oxygen-replacing gases, and other causes. SNC has a health and safety program that addresses these risks, with procedures on such topics as electrical work practices, confined space entry, industrial hygiene for specific chemicals and materials, heat stress, and other topics with the goal of reducing them to the extent practicable.

The Bureau of Labor Statistics maintains records of a statistic known as total recordable cases (TRC), which are a measure of work-related injuries or illnesses that include death, days away from work, restricted work activity, medical treatment beyond first aid, and other criteria. The nationwide TRC rate published by the Bureau of Labor Statistics for utility system construction is 6.9 percent (**BLS 2003a**). The same statistic for the State of Georgia is 4.9 percent (**BLS 2003b**). During 1984 and 1985, more than 10,000 workers were involved in the construction of the existing units at VEGP. During those two years, the VEGP construction TRC rate was 10.5 percent and 6.7 percent, respectively.

SNC has calculated the TRC incidence for the proposed construction project as the TRC rate times the number of workers. Using monthly employment numbers and the annual average TRCs over the 84 months of pre-construction and construction, the average TRCs per year will then be as follows:

Maximum No. Workers	TRC Incidence U.S. Rate	TRC Incidence Georgia Rate	TRC Incidence VEGP Rate
4,400	217	154	271

Seven construction deaths occurred during the construction of VEGP Units 1 and 2. The Bureau of Labor Statistics reports that the nationwide annual rate of fatal occupational injuries is 0.036 percent for utility system construction (**BLS 2003a; BLS 2003c**). Therefore, it is possible that

construction deaths could occur. Using monthly construction employment predictions and national average statistics, SNC estimates 8 deaths during Units 3 and 4 construction.

Construction deaths are a serious issue. Nevertheless, SNC does not believe that the construction of new reactors will produce more construction deaths than for other similarly sized heavy construction projects.

Section 4.7 References

(BLS 2003a) Bureau of Labor Statistics “Table 1, Incidence rates of nonfatal occupational injuries and illnesses by industry and case types, 2003,” available at <http://www.bls.gov/iif/>, Accessed July 14, 2005.

(BLS 2003b) Bureau of Labor Statistics “Table 6, Incidence rates of nonfatal occupational injuries and illnesses by industry and case types, 2003, Georgia,” available at <http://www.bls.gov/iif/>, Accessed July 14, 2005.

(BLS 2003c) Bureau of Labor Statistics “Table A-1, Fatal occupational injuries by industry and event or exposure, All United States, 2003.” available at <http://www.bls.gov/iif/>, Accessed July 14, 2005.

Page intentionally left blank.