

4.0 Construction Impacts at the Proposed Site

This chapter examines the environmental issues associated with the potential construction of one or more additional nuclear power units at the proposed Grand Gulf early site permit (ESP) site as described in the application for an ESP submitted by System Energy Resources, Inc. (SERI). As part of this application, SERI submitted an environmental report (SERI 2005) that provides a plant parameter envelope (PPE) (see Appendix I) as the basis for the environmental review. Although certain site preparation activities are permitted by Title 10 of the Code of Federal Regulations (CFR) 52.25(a) under an ESP, SERI has chosen not to include a site redress plan in its application and, therefore, would not be permitted to undertake site preparation activities prior to obtaining a construction permit (CP) or combined license (COL) from the U.S. Nuclear Regulatory Commission (NRC), except as provided in 10 CFR 50.10(e).

Sections 4.1 through 4.9 of this chapter discuss potential impacts of construction on land use, air quality, water, ecosystems, socioeconomics, historic and cultural resources, and environmental justice, as well as nonradiological and radiological health effects. In accordance with 10 CFR Part 51, the impacts are analyzed and, where possible, a single significance level of potential impact – SMALL, MODERATE, or LARGE – is assigned to each analysis. Measures and controls to limit adverse impact are presented in Section 4.10. A summary of construction impacts is presented in Section 4.11. Section 4.12 lists the references cited in this chapter.

The staff relied on the mitigation measures and the required Federal, State, and local permits and authorizations presented in the SERI environmental report in reaching its conclusion on the significance level of the adverse impacts. The staff also relied on the infrastructure upgrades planned by the counties, cities, and towns, such as road and school expansions, in assigning significance levels to the impacts. The staff will verify the continued applicability of all assumptions used in this environmental impact statement, should an applicant for a CP or COL reference an ESP for the Grand Gulf ESP site.

4.1 Land-Use Impacts

This section provides information regarding land-use impacts associated with site preparation activities and construction of a new nuclear facility at the Grand Gulf ESP site. Topics discussed include land-use impacts at the site and in the vicinity of the site and land-use impacts in transmission line rights-of-way and offsite areas.

Construction Impacts at the Proposed Site

4.1.1 Site and Vicinity

- | Certain details of construction at the Grand Gulf ESP site are not known at the ESP stage. Consequently, the staff's analysis is not to the depth warranted for actual construction. It is, however, sufficient for the purpose of comparing the proposed action to the alternatives.
- | The Grand Gulf site encompasses approximately 850 ha (2100 ac). Figure 2-4 indicates the areas likely to be affected by ESP site preparation and construction activities. Construction of a new facility would result in some alterations of current land use. Much of the area for a new facility within the proposed construction area footprint was altered as a result of the construction and operation of the Grand Gulf Nuclear Station (GGNS).
- | An estimated 162 ha (400 ac) of the 850-ha (2100-ac) Grand Gulf site would be affected by construction of a new facility (SERI 2005). The principal impacts during site preparation and construction of a new nuclear reactor at the Grand Gulf ESP site would include clearing, dredging, grading, excavation, spoil deposition, and dewatering. Based on the information provided by SERI (2005) and in response to the staff's request for additional information (SERI 2004e), the staff estimates that approximately 30 percent, about 49 ha (120 ac), of the proposed construction footprint for the Grand Gulf ESP facility would affect areas of the site that were not previously affected during the GGNS construction. These land areas primarily consist of forested tracts left intact during the GGNS construction.
- | An estimated 51 ha (125 ac) would contain permanent structures (primarily a power block area, cooling tower area, and bottomland pipeline and intake areas) (SERI 2005). Acreage not containing permanent structures would be reclaimed to the maximum extent possible (SERI 2005).

Construction activities would be conducted within the Mississippi River floodplain. These include dredging at the existing barge slip area and proposed water intake structure and embayment, along with construction of other items that are part of that water intake facility. Additionally, trenching from the intake to the proposed power block on the bluffs east of the river would be required to lay supply and discharge piping from the Grand Gulf ESP facility. The water intake for the Grand Gulf ESP facility would be located at or near the existing barge slip area (SERI 2005). Dredging of the new intake areas would have some impact as the dredged material would most likely be deposited on the Grand Gulf ESP site. Excavation and construction of the intake structure along the river bank in the flood plain areas would have some impact on land use, but the impact is expected to be temporary.

- | The magnitude of the impact from local or onsite use of dredged material, construction, or other excavated spoils cannot be determined until a facility design is submitted at the CP or COL

stage. Given the information provided in the applicant's environmental report and the staff's independent review, impacts on land use in the site and vicinity could be SMALL if the disposition of dredge spoils and the use of borrow are shown to be confined to the proposed ESP facility construction footprint, and best management practices are used in the management of affected areas. Land use impacts could be MODERATE if the disposition of dredge spoils and the use of borrow affect areas outside the proposed ESP facility construction footprint, or if best management practices are not followed in the management of these resources. An applicant for a CP or COL referencing an ESP for the Grand Gulf ESP site would need to provide additional information on the planned disposition of dredge spoils and the use of borrow in order for the staff to make a significance determination regarding the impacts of construction on land use at the site and vicinity.

In its response to a staff request for additional information, SERI (2004d) indicated that, although the restoration of rail service to the Grand Gulf ESP site was not evaluated for the ESP application, it could be reconsidered at the time of a CP or COL application. Based on statements by SERI in the environmental report (SERI 2005), the staff assumes that construction material would be barged to the site and trucked on the reconditioned heavy haul road, and that rail service would not be restored to the Grand Gulf ESP site.

If an applicant were to resume active rail service on the existing spur for construction activities at the Grand Gulf EIS site, the staff estimates that 29.2 km (18.2 mi) of abandoned railway would need to be evaluated to determine the level of restoration that would be necessary. The evaluation of railway restoration necessarily would require the participation of the railway owner, State and local officials, and the requester of rail service restoration. For example, no determination has been made to identify whether the existing spur line can be restored, or whether an entirely new rail line would be needed. Given the information provided in the applicant's environmental report, the staff's requests for additional information, and the staff's independent review, impacts on land use in the site and vicinity could be SMALL if minimal reconditioning of the abandoned rail spur would be needed to return the line to service for the ESP facility construction. Land use impacts could be MODERATE if the restoration of rail service to the ESP site would involve extensive reconditioning or construction of an entirely new rail line to transport construction materials to the ESP site. An applicant for a CP or COL referencing an ESP for the Grand Gulf ESP site would need to provide additional information on the full extent of any planned restoration of rail service to the ESP site in order for the staff to make a significance determination regarding the impacts on land use at the site and vicinity.

Based on its review, the staff concludes that additional information on (1) the planned disposition of dredge spoils and the use of borrow and (2) the full extent of any planned restoration of rail service to the ESP site is needed in order to determine the impacts associated with construction on land use at the site and vicinity. Therefore, the staff concludes that this issue is unresolved.

4.1.2 Transmission Line Rights-of-Way and Offsite Areas

Certain details of construction at the Grand Gulf ESP site are not known at the ESP stage. Consequently, the staff's analysis is not to the depth warranted for actual construction. It is, however, sufficient for the purpose of comparing the proposed action to the alternatives.

The transmission and distribution system existing at the GGNS at the time of startup and operation of the Grand Gulf ESP facility would be relied upon to distribute the power generated by a new ESP facility (SERI 2005). A study conducted by SERI concluded that the existing system would be adequate for at least an additional 1311 MW(e) generating capacity, assuming that modifications and upgrades are made to equipment in the switchyard of the GGNS Unit 1 facility (SERI 2005). However, the maximum generating capacity identified in the PPE is approximately 3000 MW(e) (SERI 2005). If 3000 MW(e) generating capacity is installed, the existing transmission lines would have to be upgraded or additional transmission lines would be needed.

If the Grand Gulf ESP facility is constructed, the actual need for and type of transmission system improvements would be determined definitively by the transmission and distribution system owner and operator (currently Entergy Mississippi, Inc.) under the provisions of 18 CFR Part 35. In general, the process is designed to determine the optimal routing of new transmission service by performing studies of feasibility, impact, and facilities associated with the transmission request. This process is discussed in Section 3.3 of this EIS. The staff assumed that once the transmission routing is determined, if required, State or local agencies governing the actual siting of transmission facilities would be consulted.

Upgrading the existing transmission line rights-of-way would be necessary to accommodate the full generating capacity of the proposed ESP facility. To accomplish this upgrade, one or more new rights-of-way could be needed, or all upgrades could be sited within the existing rights-of-way with no right-of-way expansion necessary. The addition of new support structures and transmission lines and vegetation clearing would be necessary for construction of new transmission lines on new or expanded rights-of-way. Based on values in Table 2-1, the staff estimated that the land-use impact of doubling the width of the current rights-of-way would include conversion of as much as 524 ha (1296 ac) of currently undeveloped forested land to vegetation-managed land along the widened portions of the rights-of-way. Although the existing rights-of-way traverse unzoned and largely undeveloped land and were impacted previously when the existing transmission lines were constructed, the actual route or routes for any upgrade involving new rights-of-way are unknown.

Land ownership in the vicinity of the existing transmission line rights-of-way include a mixture of public land and private land. About 14.4 km (9 mi) of the Franklin transmission line right-of-way traverses the Homochitto National Forest, which includes a mix of public and private land ownership (USFS 1989). SERI, the transmission line owner, and the U.S. Forest Service (USFS) would need to coordinate processes in order to follow the procedures the USFS requires to effect changes, upgrades, or other significant modifications to these transmission line rights-of-way.

Given the information provided in the applicant's environmental report and the staff's independent review, impacts on land use in the transmission line rights-of-way and offsite areas could be SMALL if the existing rights-of-way are determined to be the preferred routing of any new transmission lines that may be needed to deliver power from a proposed ESP facility. Land use impacts could be MODERATE if the preferred routing of any new transmission lines would convert significant tracts of previously undeveloped land not adjacent to the existing rights-of-way. An applicant for a CP or COL referencing any ESP that may be issued for the Grand Gulf ESP site would need to provide additional information on the precise routing of any planned transmission service needed to deliver power from the ESP facility for the staff to make a significance determination with respect to this resource.

Based on its review, the staff concludes that additional information on the precise routing of any planned transmission service needed to deliver power from a proposed ESP facility is needed in order to determine the construction impacts to offsite land use. Therefore, the staff concludes that the issue of offsite land use impacts associated with construction of a proposed ESP facility is unresolved.

4.2 Meteorological and Air Quality Impacts

Sections 2.3.1 and 2.3.2 describe the meteorological characteristics and air quality of the Grand Gulf ESP site. Dust from construction activities, smoke and other pollutants from open burning, emissions from equipment and machinery used in construction, concrete batch plant operations, and emissions from vehicles used to transport workers and materials to and from the site would be the primary impacts of construction of the Grand Gulf ESP facility on local meteorology and air quality.

4.2.1 Construction Activities

Activities associated with construction of the Grand Gulf ESP facility would be similar to the activities associated with construction of any large industrial complex. There will be ground-clearing, grading, excavation, and movement of materials and machinery.

Construction Impacts at the Proposed Site

Ground-clearing, grading, and excavation activities will raise dust, as will the movement of materials and machinery. Fugitive dust may also rise from cleared areas during windy periods. SERI has stated in its environmental report (SERI 2005) that dust from construction activities would be mitigated to the extent possible. Mitigation measures would include wetting of unpaved roads and construction areas during dry periods and seeding or mulching bare areas. The concrete batch plant would be equipped with a dust-control system that would be checked and maintained on a routine basis.

Construction equipment burning gasoline or diesel fuel would be inspected and maintained to prevent excessive exhaust emissions. SERI states (SERI 2005) that equipment that does not meet air quality regulations and permits in place at the time of construction would be repaired or replaced.

SERI stated (SERI 2005) that open burning would be conducted in a burn pit using technology to increase combustion efficiency and reduce smoke level in compliance with applicable air-permit requirements established by the Mississippi Department of Environmental Quality (MDEQ). Procedures would be established to prevent brush and forest fires initiated by open burning.

Construction activities take place for a limited duration. Any impacts on meteorology and air quality that might occur would be temporary. The staff concludes that the impacts of construction activities on air quality would be SMALL, based on mitigation identified in SERI's environmental report (SERI 2005).

4.2.2 Transportation

SERI estimates that the maximum construction workforce would be approximately 3150 workers (SERI 2005). Exhaust from the vehicles required to transport this workforce would decrease air quality somewhat, but it is unlikely that air quality would be degraded sufficiently to be noticeable beyond the immediate vicinity of Grand Gulf Road and State Highway 18 and U.S. Highway 61. Mitigation of potential air quality impacts of increased traffic could be achieved by arranging shift changes for construction workers so they do not coincide with shift changes for GGNS Unit 1 personnel.

The effects of vehicle exhaust from 2300 cars (4600 trips per day) were considered by the NRC in NUREG-1437 (NRC 1996) and found to be of potential concern if the trips were made in an area where air quality does not meet the National Ambient Air Quality Standards. Air quality in Mississippi and nearby counties in Louisiana is consistent with all Standards. Therefore, the staff concludes that the impact on air quality of increased traffic associated with construction of the Grand Gulf ESP facility would be SMALL, and additional mitigation would not be warranted.

4.3 Water-Related Impacts

Water-related impacts involved in the construction of a nuclear power plant are similar to impacts that would be associated with any large industrial construction project. Prior to issuance of a CP or COL, SERI would be required to obtain permits, certificates, and determinations regulating water use and water quality. These permits, certificates, and determinations may include:

- Clean Water Act Section 404 permit. This permit would be issued by the U.S. Army Corps of Engineers (ACE) and would regulate the impacts of construction activities on wetlands and management of dredged material.
- Clean Water Act Section 401 certification. This certification would be issued by MDEQ and would ensure that the project does not conflict with state water quality management programs.
- Clean Water Act Section 402(p) National Pollutant Discharge Elimination System (NPDES) storm water permit. This permit would be issued by MDEQ and would regulate point source storm water discharges. U.S. Environmental Protection Agency's Phase 1 Storm Water Regulation established requirements for storm water discharges from various activities including construction activities disturbing an area of at least 2.0 ha (5.0 ac). EPA has delegated the responsibility for administering the NPDES program in Mississippi to MDEQ.
- Section 10 of the Rivers and Harbors Act of 1899. This section prohibits the obstruction or alteration or the excavation or filling of navigable waters of the United States without a permit. Appropriate ACE permits would be obtained for construction in the floodplain.
- Section 1424(e) of the Safe Drinking Water Act of 1974. This section prohibits any commitment for federal financial assistance (through a grant, contract, loan guarantee, or otherwise) for any project which the EPA Administrator determines may contaminate an aquifer designated by the Administrator to be a sole-source aquifer. EPA has identified the Southern Hills Aquifer, which includes the Catahoula formation beneath the Grand Gulf site, to be a sole-source aquifer (EPA 1998).

4.3.1 Hydrological Alterations

The staff did not identify any significant changes to the local flow patterns or intensities that would occur at the site due to construction. The construction site drainage system would generally drain surface water runoff and storm flow in approximately the same levels to

Construction Impacts at the Proposed Site

- | Stream A and Stream B. Any increase in runoff intensity resulting from the increase in the impervious surface area would be mitigated using standard engineering storm water management practices pursuant to the site's NPDES storm water management program.
- | The construction of the shoreline intake and discharge structures along the Mississippi River would likely involve some temporary structures for protection from the flow of the river. However, these structures would not extend significantly into the river and would have minimal impact on the river's flow pattern adjacent to the shoreline.
- | Dewatering systems during construction would only impact the shallow aquifers. However, based on the character of the shallow groundwater system, staff concluded that any impacts on the groundwater flow pattern would be localized and any change would unlikely extend beyond the site boundary.
- | Based on the above, the staff concludes that the impact of hydrological alterations from construction would be SMALL, and additional mitigation would not be warranted.

4.3.2 Water-Use Impacts

- | Certain details of construction at the Grand Gulf ESP site are not known at the ESP stage. Consequently, the staff's analysis is not to the depth warranted for actual construction. It is, however, sufficient for the purpose of comparing the proposed action to the alternatives.
- | SERI stated (2005) that construction activities at the Grand Gulf ESP site would not be expected to use surface water. SERI stated that additional groundwater wells would be required for construction purposes such as concrete batch plant operation, dust suppression, and sanitary needs (SERI 2005). SERI also stated that the use of the additional wells installed in the Catahoula formation for construction water needs would not significantly affect the groundwater water surface elevation in the vicinity (SERI 2005). However, the staff concluded that the characterization of the Catahoula aquifer was inadequate to support such a conclusion, particularly given the significance of the aquifer for local domestic water supplies and its designation by EPA as a sole-source aquifer. Because of the limited number of borings into the Catahoula formation, limited hydraulic conductivity measurements, and limited long-term pump tests, the staff was unable to assess reliably the impact of a significant increase in the groundwater withdrawal at the site. Given the information provided in the applicant's environmental report and the staff's independent review, impacts on the Catahoula formation could be SMALL if the proposed withdrawal had little effect on the Catahoula formation or MODERATE if the proposed withdrawal were to adversely affect current water withdrawals elsewhere in the aquifer. An applicant for a CP or COL referencing an ESP for the Grand Gulf

ESP site would need to provide additional information on the ability of the Catahoula aquifer to sustain proposed withdrawals in order for the staff to make a significance determination with respect to this resource.

Dewatering at the new ESP power block excavation would likely be necessary during construction. Specific dewatering well locations and well design details would be determined when the detailed facility design and layout are finalized. Construction standards for temporary construction dewatering wells and for permanent dewatering wells would be in accordance with applicable standards published in the MDEQ groundwater use and protection regulations (MDEQ 1994), and necessary permits would be obtained from the MDEQ. MDEQ regulations allow for permit denial or reduction of withdrawal rate if such a withdrawal is expected to interfere with existing permitted uses or if it conflicts with the public interest. The staff concludes that the impact of construction dewatering would be small, temporary, and localized.

Based on its review, the staff concludes that additional aquifer characterization is needed to determine the impacts of additional groundwater withdrawals from the Catahoula formation for construction water needs. Therefore, the staff concludes that the issue of water-use impacts associated with the construction of a facility at the ESP site is unresolved.

4.3.3 Water-Quality Impacts

Certain details of construction activities at the Grand Gulf ESP site are not known at the ESP stage. Consequently, the staff's analysis was not performed to the depth warranted for actual construction. It is, however, sufficient for the purpose of comparing the proposed action to the alternatives.

Erosion of exposed and poorly graded soil during construction activities can result in a significant increase in the sediment load to nearby water bodies. Based on the location of the proposed facility, Stream A is most likely to represent a significant sediment concern. The ESP application (SERI 2005) proposed that the intake and discharge pipelines would follow the path of the existing haul roads for approximately 1.8 km (1.1 mi) to the uplands. Pipelines would also be required to cross Stream A to reach the proposed cooling tower area. This would either involve crossing Sediment Basin A or crossing upstream of Sediment Basin A adjacent to the existing roadway to the northern end of the ESP site. The excavations associated with these pipelines, as well as the reactor block(s) excavation and site grading for the cooling towers and other buildings, represent an opportunity for the region's frequent storms to mobilize a considerable amount of sediment into the streams. SERI would be regulated by a NPDES storm water permit issued by MDEQ to employ erosion-prevention practices such as vegetation buffers, temporary sedimentation basins, and silt fences within a storm water pollution prevention plan. The staff concludes that, because the lowlands environment naturally

Construction Impacts at the Proposed Site

experiences high sediment loads during the annual flooding of the Mississippi River, current best management practices for storm water management would be adequate to ensure that the impacts on to water quality from the erosion of sediment would be small.

Federal financially assisted projects that have potential to contaminate a designated sole source aquifer are subject to EPA review. Federal financial assistance is defined as any financial benefits provided directly as aid to a project by a department, agency or instrumentality of the Federal government in any form, including contracts, grants, and loan guarantees. If Federal financial assistance is obtained, a CP or COL applicant would be required to obtain an EPA determination that construction (and operational) activities would not adversely impact the groundwater quality at the facility.

Dredging and shoreline construction would be needed to expand and deepen the shoreline embayment and to improve the barge slip or unloading facility. During these activities, turbidity in the Mississippi River would be expected to increase in the immediate vicinity. Dredging operations would be regulated by the ACE to protect navigation and habitat. SERI has committed to restrict shoreline construction of the intake and discharge structures to periods when river water level would be low to minimize the impacts to the river. Based on the above, and the large assimilative capacity of the Mississippi River, the staff concludes the impacts would be negligible.

Given the information provided in the applicant's environmental report and the staff's independent review, impacts on the Catahoula formation could be SMALL if the proposed withdrawal had little effect on the Catahoula formation or LARGE if the proposed withdrawal were to induce degradation of the water quality of the sole source aquifer. An applicant for a CP or COL referencing an ESP for the Grand Gulf ESP site would need to provide additional information on the ability of the Catahoula aquifer to sustain proposed withdrawals in order for the staff to make a significance determination with respect to this resource.

Based on its review, the staff concludes that additional aquifer characterization is needed to determine the impacts of additional groundwater withdrawals from the Catahoula formation for construction water needs. Therefore, the staff concludes that the issue of water-quality impacts associated with the construction of the proposed Grand Gulf ESP facility is unresolved.

4.4 Ecological Impacts

This section describes the potential impacts of construction on the ecological resources at the Grand Gulf site and along the transmission line rights-of-way. The section is divided into three subsections: Terrestrial Ecosystems, Aquatic Ecosystems, and Threatened and Endangered Species.

4.4.1 Terrestrial Ecosystems

The NRC staff evaluated the potential impacts to wildlife and their habitat from construction of the Grand Gulf ESP facility and potential expansion of the existing transmission line rights-of-way on terrestrial ecosystems.

Certain details of construction activities at the Grand Gulf ESP site are not known at the ESP stage. Consequently, the staff's analysis was not performed to the depth warranted for actual construction. It is, however, sufficient for the purpose of comparing the proposed action to the alternatives.

4.4.1.1 Wildlife Habitat on the Grand Gulf Site

The construction associated with GGNS Unit 1 and subsequent vegetation succession is relevant to the potential impact of construction on wildlife habitat at the Grand Gulf ESP site.

A total of 850 ha (2100 ac) is located within the Grand Gulf site boundary (NRC 1996; SERI 2005). The site was originally intended to contain two nuclear units. GGNS Unit 1 was completed and the second unit was only partially completed. Approximately 188 ha (465 ac) of the site were affected by construction of the existing GGNS Unit 1 facility and partial completion of Unit 2. Currently, developed land occupies a total of about 132 ha (325 ac) or about 15 percent of the total site area, about 110 ha (270 ac) in the uplands and 22 ha (55 ac) in the bottomlands (Figure 2-5). About half of this total consists of permanent structures and facilities (68 ha (169 ac)) (SERI 2005).

Of the total area disturbed by construction of the GGNS Unit 1 facility, the portions not currently occupied by permanent structures and facilities and those not artificially maintained in an herbaceous state (for example, via herbicide applications) have been allowed to revegetate naturally. In the 30 years since construction of GGNS Unit 1, these areas have largely become colonized by invasive weedy plant species and have not succeeded to hardwood forest communities (SERI 2005). Lack of hardwood forest succession in previously disturbed areas has also been documented from old fields in the uplands (presumably former grazing land) and bottomlands (presumably former crop land). According to SERI (2005), upland and bottomland old fields were succeeding to loblolly pine (*Pinus taeda*) and American sycamore (*Platanus occidentalis*) stands, respectively. However, in reality, hardwood forest succession was not taking place in these areas. Instead, Entergy Operations had replanted these forest stands (SERI 2005).

Construction Impacts at the Proposed Site

Most of the footprint of the proposed Grand Gulf ESP facility consists of power block, cooling towers, new intake and discharge, pipelines, and associated equipment staging areas and borrow sites. However, the specific locations of many of these permanent structures and facilities and equipment staging and borrow areas are currently unknown. Specific locations would be determined definitively prior to or during the CP or COL phase.

SERI (2005) denotes the total area that would be disturbed by construction of the Grand Gulf ESP facility to be 162 ha (400 ac). In Figure 2-5, however, SERI (2005) denotes the area disturbed by construction to be a total of about 160 ha (395 ac) of the Grand Gulf site with 138 ha (340 ac) in the uplands (hardwood forests, fields, and previously disturbed areas) and 22 ha (55 ac) in the bottomlands (palustrine, forested, seasonally flooded wetland). Disturbance would result from construction of permanent structures and facilities and temporary equipment staging and borrow areas. About 51 ha (125 ac) or 31 percent of the total 160 ha (395 ac) disturbed area would be occupied by permanent structures and facilities, about 41 ha (100 ac) in the uplands and 10 ha (25 ac) in the bottomlands (SERI 2005).

SERI did not indicate in its environmental report (SERI 2005) the quantity of upland hardwood forest, upland field, and previously disturbed area in the uplands that would be occupied by permanent structures and facilities. Therefore, these quantities were estimated as follows. It is known that disturbance of a total of 59 ha (145 ac) of upland hardwood forests, 43 ha (105 ac) of upland fields, and 36 ha (90 ac) of previously disturbed areas in the uplands would occur (SERI 2005), totaling 138 ha (340 ac). Thus, the proportions of total disturbance in upland hardwood forests, upland fields, and previously disturbed areas in the uplands would be 43 percent, 31 percent, and 26 percent, respectively. These percentages were applied to the total amount of disturbance in the uplands that would be dedicated to permanent structures and facilities (41 ha (100 ac)). This yielded 17 ha (43 ac) of upland hardwood forests, 13 ha (31 ac) of upland fields, and 11 ha (26 ac) of previously disturbed areas in the uplands that would be occupied by permanent structures and facilities. This assumes the amount of total disturbance is related 1:1 to the amount of disturbance dedicated to permanent structures and facilities.

The remaining 109 ha (270 ac) that would be disturbed on the Grand Gulf site (97 ha (240 ac)) in the uplands and 12 ha (30 ac) in the bottomlands) would be for equipment staging and borrow areas and the associated impact is expected to be temporary (SERI 2005). However, unless managed, such areas would likely become colonized by invasive weedy plant species. Based on the lack of hardwood forest succession in areas disturbed during construction of the GGNS Unit 1 facility and in old fields (SERI 2005), as noted above, weedy plant species invasion would likely decelerate or entirely prevent hardwood forest succession. Without implementing proactive restoration plans, such areas would be unlikely to succeed to hardwood forest and wetland communities in the foreseeable future. For the purposes of analysis, the staff assumed that an applicant would likely develop hardwood forest and wetland restoration plans prior to or during the CP or COL phase. Wetlands could be restored or created anew, as

would be specified in the ACE Section 404 permit (for excavation or clearing in jurisdictional wetlands) that would be obtained by an applicant prior to beginning construction. This permitting process would also ensure that the impacts of construction would be limited by requiring that appropriate construction best management and mitigation practices are followed.

An embayment intake structure, located on the east bank of the Mississippi River north of the existing barge slip, would be constructed to provide makeup water for the Grand Gulf ESP facility. A new shoreline discharge structure would be constructed just downstream of the entrance of the embayment. The river shoreline has been revetted (rip-rap emplaced for bank stabilization) by the ACE to stabilize the course of the river. Bank stabilization measures would be restored and preserved following any construction on the shore.

4.4.1.2 Wildlife Habitat along the Transmission Line Rights-of-Way

The transmission and distribution system existing at the time of startup and operation of the Grand Gulf ESP facility would be relied upon to distribute the power generated by a new ESP facility (SERI 2005). A study conducted by SERI concluded that the existing system would be adequate for an additional 1311 MW(e) generating capacity, assuming that modifications and upgrades are made to equipment in the switchyard of the GGNS Unit 1 facility. However, the maximum generating capacity identified in the PPE is approximately 3000 MW(e) (SERI 2005). If 3000 MW(e) generating capacity is installed, the existing transmission lines would have to be upgraded or additional transmission lines would be needed. This issue is discussed more fully in Section 4.1.2.

The location and nature of the environmental impacts associated with the construction of any transmission system improvements would be established definitively by the transmission and distribution system owner and operator (currently Entergy Mississippi, Inc.) prior to or during the CP or COL phase. The remainder of this section describes three reasonable scenarios that span the range of construction impacts that could be incurred, should new transmission lines be added to the existing system. Implicit in all three of these scenarios are the following assumptions made by the staff: (1) temporary construction areas in forest habitat would be reforested/restored as nearly as possible to preconstruction conditions; (2) prior to beginning construction, SERI would obtain an ACE Section 404 permit - this permitting process would ensure that the impacts of construction, in any wetlands or floodplains crossed by the transmission line rights-of-way, would be limited by requiring that appropriate construction best management and mitigation practices are followed; (3) right-of-way clearing and waste disposal methods would likely be dictated in large part by land the owner - however, absent direction from the property owner(s), clearing and waste disposal would be done in accordance with industry guidelines and best management practices.

Construction Impacts at the Proposed Site

| In the first scenario, new transmission lines would be added to existing support structures (e.g., via stacking) such that the effects of associated construction would occur entirely within the existing 40.3-km (25.2-mi) Baxter-Wilson and 69.8-km (43.6-mi) Franklin 500-kV corridors currently used to transmit electricity from GGNS Unit 1 (see Section 3.3). In this scenario, impacts would occur to wildlife habitat in established rights-of-way that are currently maintained via mechanical means and low-toxicity herbicides (see Section 2.7.1.1). The resulting impacts to wildlife habitat would be SMALL.

| In the second scenario, new transmission lines and support structures would be added adjacent to the existing corridors, and the effects of associated construction would result in a doubling of the existing rights-of-way. The total area of both the Baxter-Wilson and Franklin transmission line rights-of-way that has adjacent undeveloped land (mostly forest) is 524 ha (1296 ac) (see Section 4.1.2). The total area of both the Baxter-Wilson and Franklin rights-of-way that has adjacent water or wetlands is 39 ha (96 ac) (see Section 2.2.1). Consequently, a substantial quantity of hardwood forest habitat (524 ha (1296 ac)) could be lost and a relatively small area of wetlands could be affected if the rights-of-way needed to be doubled in width. SERI did not indicate in its environmental report (SERI 2005) whether any special habitat areas are crossed by the Baxter-Wilson and Franklin transmission line rights-of-way, and no such information is available from the transmission and distribution system owner and operator, Entergy Mississippi, Inc. (Entergy Services 2004). Impacts to wildlife habitat from doubling the existing rights-of-way would be MODERATE, based on effects to hardwood forest and wetlands.

| In the third scenario, one or more new corridors would be needed to accommodate the addition of new transmission lines. The locations of any such new corridors cannot be predicted with any reliability. However, because of the relatively large expanses of intact hardwood forest in the region surrounding the Grand Gulf site and the Baxter-Wilson and Franklin corridors, any new corridors could readily cross such forests over most of their length. In addition, wildlife habitat of relatively high quality (e.g., wetlands) or unique value (e.g., State wildlife areas) could be crossed. Therefore, construction impacts to wildlife habitat from creation of one or more new corridors could range from MODERATE to LARGE.

| An applicant for a CP or COL referencing an ESP for the Grand Gulf ESP site would need to provide additional information on the location and nature of environmental impacts associated with construction of any transmission system improvements. Therefore, the issue of construction impacts on wildlife habitat along the transmission line rights-of-way is unresolved.

4.4.1.3 Wildlife Habitat Impact Summary

In summary, an estimated 17 ha (43 ac) of upland hardwood forest habitat on the Grand Gulf site would be lost to permanent structures and facilities associated with construction of the

proposed ESP facility. This represents about 11 percent of the total 162 ha (400 ac) of upland hardwood forest habitat currently available onsite (Figure 2-5). An estimated 13 ha (31 ac) of upland field habitat would be lost to permanent structures and facilities, representing about 20 percent of the total 63 ha (155 ac) of upland field habitat currently available onsite (Figure 2-5). An estimated 11 ha (26 ac) of previously disturbed area in the uplands would be lost to permanent structures and facilities. The total amount of previously disturbed area currently available in the uplands is unknown. Ten hectares (25 ac) of bottomland palustrine, forested, seasonally flooded wetland would be lost to permanent structures and facilities, representing about 3 percent of the 358 ha (885 ac) of bottomland forested wetland currently available onsite (Figure 2-5). Upland hardwood forests and bottomland wetlands have much greater plant species and structural diversity than upland fields and previously disturbed areas, and are thus assumed to be much more important as wildlife habitat. Previously disturbed areas have minimal wildlife habitat value. Because the combined upland hardwood forest and bottomland forested wetland lost to permanent structures and facilities represents only about 5 percent of the combined total of these available onsite, this impact would be SMALL and additional mitigation would not be warranted.

Impacts on the 109 ha (270 ac) of the Grand Gulf site that would be disturbed for equipment staging and borrow areas are expected to be temporary (SERI 2005) because SERI intends to restore the hardwood forest and wetland. With the assumption that temporary construction areas in forest habitat would be reforested/restored, the impacts, being temporary in nature, would also be SMALL and additional mitigation would not be warranted.

The location and nature of environmental impacts associated with construction of any transmission system improvements would be established definitively by the transmission and distribution system owner and operator prior to or during the CP or COL phase under the process described in Section 4.1.2. Because this analysis would be needed to determine the impacts of transmission system improvements on wildlife habitat, this issue is unresolved.

4.4.1.4 Wildlife

During construction of the Grand Gulf ESP facility, wildlife may be destroyed or displaced, primarily as a result of operating heavy equipment (during land clearing, for example). Less mobile animals, such as reptiles, amphibians, and small mammals, are expected to incur greater mortality than more mobile animals, such as birds. Ample undisturbed forested wetland habitat onsite would be available to displaced animals during construction. Species that can adapt to disturbed or developed areas such as raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), and northern cardinal (*Cardinalis cardinalis*), may readily recolonize portions of the disturbed area where suitable habitat remains or is replanted or restored. All forested or wetland areas that are disturbed and replanted or restored would likely be recolonized by

Construction Impacts at the Proposed Site

wildlife communities similar to those that currently occupy these areas. The destruction, displacement, and recolonization of wildlife also apply to offsite disturbances in forest habitat that could result if the transmission system improvements described above were undertaken.

To minimize construction-related impacts on wildlife, such as the destruction of nests and eggs of migratory birds, SERI would adhere to permit conditions that may restrict the timing of construction activities based on important biological periods (the nesting of migratory birds, for example).

Construction of the Grand Gulf ESP facility would be done according to Federal and State regulations, permit conditions, existing procedures, good construction practices, and established best management practices (for example, directed drainage ditches, and silt fencing would be used). Fugitive dust would be minimized by watering the access roads and construction site as necessary. Thus, the impact from dust would be negligible and further mitigation is not warranted. Emissions from heavy construction equipment would be minimal because of scheduled equipment maintenance procedures.

Construction activities would generate noise resulting from the movement of workers, materials, and equipment, and the operation of construction equipment (such as earth-moving equipment, portable generators, pile drivers, pneumatic equipment, and hand tools). Noise from construction can affect wildlife by inducing physiological changes, nest or habitat abandonment, behavioral modifications, or it may disrupt communications required for breeding or defense (Larkin 1996). However, it is not unusual for wildlife to habituate to such noise (Larkin 1996).

Continuous noise levels from construction activities would range from 69 to 98 dBA at 15 m (50 ft) from the source (SERI 2005). At 732 m (2400 ft), this noise level would be reduced to 65 dBA (SERI 2005), well below the 80- to 85-dBA threshold at which birds and small mammals are startled or frightened (Golden et al. 1980). Additionally, construction would occur near the GGNS Unit 1 facility, where wildlife have presumably become accustomed to typical operating facility noise levels. Thus, impacts on wildlife from construction noise are expected to be negligible.

Avian collisions with fabricated structures are a result of numerous factors related to species' characteristics such as flight behavior, age, habitat use, seasonal habits, 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 significant source of mortality for thriving populations of birds with good reproductive potential (EPRI 1993). The NRC (1996) reviewed monitoring data concerning avian collisions at nuclear power plants with large cooling towers and determined that overall avian mortality is low. No avian collisions with existing structures at the Grand Gulf site have been noted (SERI 2005), although no plan is in place to monitor avian mortality. Nevertheless, the number of construction-related bird collisions with structures is expected to be negligible.

Grand Gulf Road off U.S. Highway 61 currently provides the only road access to the Grand Gulf site. The most recent daily traffic count on the segment of Grand Gulf Road nearest to the site is 940 to 1100 vehicles per day (see Section 4.5.4.1). This number is projected to increase during construction of the Grand Gulf ESP facility by 1100 vehicles per shift in a two-shift day (see Section 4.5.4.1). This would likely increase traffic-related wildlife mortalities. Local wildlife populations could suffer declines if roadkill rates were to exceed the rates of reproduction and immigration. However, while roadkills are an obvious source of wildlife mortality, except for special situations not applicable to the Grand Gulf site (e.g., ponds and wetlands crossed by roads where large numbers of migrating amphibians and reptiles would be susceptible), traffic mortality rates rarely limit population size (Forman and Alexander 1998). Consequently, the overall impact on local wildlife populations from increased vehicular traffic on Grand Gulf Road during construction would be expected to be negligible.

State-Listed Species

Animal Species

The State-listed endangered wood stork (*Mycteria americana*) was observed in summer on Gin and/or Hamilton Lakes during 18 years prior to construction of the GGNS Unit 1 facility (AEC 1973). The wood stork should thus still be considered a possible non-breeding transient to the Grand Gulf site and vicinity (SERI 2005; MNHP 2004a, 2004b). Consequently, it is possible that construction activities could disturb non-breeding storks and that such disturbance could result in feeding and associated energetic losses. However, because wood storks are present only for a short duration in the area, any disturbance due to construction would be considered negligible in terms of its effects on population viability, which is largely determined by the success of the species on its breeding grounds in Alabama, Florida, Georgia, and South Carolina (49 FR 7332; FWS 1996).

Plant Species

The critically imperiled hairy waterclover (*Marsilea vestita*), the jug orchid (*Platythelys quercetica*), the imperiled glade fern (*Diplazium pycnocarpon*), and the American bittersweet (*Celastrus scandens*) are known to occur beyond 3.2 km (2 mi) but within 16 km (10 mi) of the Grand Gulf site (MNHP 2004b). The critically imperiled Allegheny monkeyflower (*Mimulus ringens*) is known to occur about 17.6 km (11 mi) from the Grand Gulf site (SERI 2005). Based on these distances, these five species would not be affected by construction activities. However, the range of habitat affinities of these species spans hardwood forest, roadsides, forest margins, and wetlands, all general habitat types that occur in relative abundance on the Grand Gulf site. Thus, although they are not known to occur in close proximity to the site, these five species could yet occur on the Grand Gulf ESP site and along its transmission line rights-of-way. Consequently, upland and bottomland areas on the Grand Gulf ESP site that would be disturbed by construction (for example, land clearing, staging of equipment,

Construction Impacts at the Proposed Site

| excavation of borrow sites, etc.) should undergo a botanical survey prior to initiating such activities.

| In summary, the impact on wildlife, including State-listed species, from construction of the Grand Gulf ESP facility and construction associated with any transmission system improvements, including land clearing, noise, bird collisions, and traffic-related mortality, is expected to be negligible.

4.4.1.5 Terrestrial Ecosystems Impact Summary

| The impact of construction on wildlife habitat on the Grand Gulf site (including permanent and temporary losses of upland hardwood forest and bottomland forested wetlands) would be minimal. The impact on wildlife populations, including State-listed species, onsite would also be minimal. However, impacts on wildlife habitat and populations associated with the transmission system could be SMALL if additional transmission capacity were to be accommodated within the existing right-of-way, or MODERATE to LARGE if the right-of-way were to be expanded or if new rights-of-way were needed. Therefore, the staff concludes that this issue is not resolved, and an applicant for a CP or COL referencing an ESP for the Grand Gulf ESP site would need to provide additional information on the location and nature of environmental impacts associated with construction of transmission system improvements.

4.4.2 Aquatic Ecosystems

| Impacts on the aquatic ecosystem from construction of the Grand Gulf ESP facility would be associated with construction of new cooling water intake and discharge structures and widening of transmission line rights-of-way. Construction along the Mississippi River would result in the removal or reshaping of the shoreline. These activities would likely lead to loss of benthic macroinvertebrates and some shoreline habitat along the Mississippi River, as well as temporary displacement of other aquatic species (SERI 2005). Construction of the trenches for the intake and discharge pipelines from the bank of the Mississippi River to the Grand Gulf ESP facility site could lead to temporary soil erosion and increased turbidity for the streams, lakes, and ponds onsite.

| The proposed location for a new intake structure is at or near the north side entrance of the existing barge slip. Water from the Mississippi River would be used as makeup water to the cooling towers and service water system, and other miscellaneous water uses. The structure would be located at Mississippi River Mile (RM) 406.4. Water would be withdrawn from an embayment through piping connected to pumps and equipment housed in an intake pumping station located on shore. During construction, the existing riprap along the barge slip would be removed and dredging would be required to excavate the embayment for the location of the

intake screens. Construction activities would be restricted to periods when river water level was low. The exposed areas are expected to be sandy, based on information obtained during construction of GGNS Unit 1. Very little turbidity and siltation is expected from construction activities at the shoreline through the use of standard construction practices (SERI 2005).

The construction activities for a new cooling water intake, discharge structures, and a possible widening of the transmission line right-of-way that could affect the Mississippi River are described below.

- Dredging. Dredging impacts on the banks of the Mississippi River would be minimal because of the localized area and the temporary nature of construction of the intake and discharge structures. Temporary increase in turbidity may occur in the river near the Grand Gulf ESP site during dredging; however, dredging operations would be in compliance with ACE and MDEQ requirements so that long-term water quality is not degraded.
- Construction of Cooling Towers and Onsite Impacts on Water Sources. These activities could lead to soil erosion into streams. During construction, the river may also receive dewatering effluent from trenching in the floodplain, or runoff from the bluff area via onsite streams and Hamilton Lake. Site runoff reaching the Mississippi River via Hamilton Lake is buffered by the lake and the sedimentation ponds. Any water-quality impacts on the Mississippi River during construction of a new facility would be similar to the impact during the construction of GGNS Unit 1. Construction of GGNS Unit 1 did not result in any significant impacts on the water quality of the Mississippi River (SERI 2005).
- Construction for Pipelines. Excavation for burial of approximately 1.8 km (1.1 mi) of intake and discharge pipelines would directly affect wetlands in the floodplain. Construction would be primarily along the existing haul road for GGNS Unit 1, leading to minimal incremental impacts on the wetland. The pipes would be buried, so there would be no permanent alteration of water flow patterns in the floodplain. Construction of the pipeline connecting the power block to the cooling tower area would need to cross a small existing wetland. This would require approval from the ACE, and all work would be performed in accordance with the permit.

The construction activities for the possible need to widen the transmission line rights-of-way would affect several waterways. The Baxter-Wilson right-of-way crosses the Big Black River, and the substation in Warren County is within 0.75 km (0.47 mi) of the Mississippi River. The Franklin right-of-way crosses Bayou Pierre approximately 5.5 km (3.4 mi) to the south of the Grand Gulf site. Plans for widening the right-of-way have not been developed. NRC expects that SERI would work with the appropriate Federal and State agencies and the transmission

Construction Impacts at the Proposed Site

| line owner, Entergy Mississippi, Inc., to develop and implement plans for widening the
| transmission line rights-of-way that would have minimal impacts on the aquatic ecosystems.

State-Listed Species

Animal Species

| The endangered crystal darter (*Crystallaria asprella*) is found in Bayou Pierre and its tributaries,
| which flow as close as 3 km (1.9 mi) east of the Grand Gulf site (Ross 2001; MNHP 2004b;
| Katula 2004). Construction activities at the Grand Gulf ESP site would not affect the regions
| where the crystal darter is found. The Franklin transmission line right-of-way crosses Bayou
| Pierre approximately 5.5 km (3.4 mi) to the south of the Grand Gulf site. NRC expects that
| SERI would work with the appropriate State agencies and the transmission line owner, Entergy
| Mississippi, Inc., to develop and implement plans for the possible widening of the transmission
| line rights-of-way that would have minimal impacts on Bayou Pierre and the crystal darter.

Plant Species

No State-listed aquatic plant species are known to occur within 16 km (10 mi) of the Grand Gulf site (MNHP 2004b).

| After reviewing these construction activities and their potential impacts on aquatic ecological
| resources, the staff concludes that the overall impacts would be SMALL because these
| activities would take place for a limited time and could be readily mitigated (SERI 2005).
| Appropriate construction mitigation would include instituting best management practices for
| erosion control into the Mississippi and Big Black rivers, Bayou Pierre, and other potentially
| affected streams. The staff will verify the necessary construction surveys and monitoring prior
| to issuance of a CP or COL that references the Grand Gulf ESP.

4.4.3 Threatened and Endangered Species

| The potential impacts of construction of the Grand Gulf ESP facility and possible expansion of
| the transmission line rights-of-way on terrestrial and aquatic Federally listed threatened and
| endangered species was evaluated. These species were identified through correspondence
| with the U.S. Fish and Wildlife Service (FWS) (FWS 2004a, 2004b), National Oceanic and
| Atmospheric Administration (NOAA) Fisheries (NMFS 2004), and Mississippi Natural Heritage
| Program (MNHP) (MNHP 2004a, 2004b) and review of FWS county listings of such species for
| the state of Mississippi (FWS 2000).

4.4.3.1 Federally Listed Animal Species

The potential impacts of construction activities on Federally listed animal species are described below.

Florida Panther - Endangered

Currently no viable populations of the Florida panther occur outside of Florida (SERI 2005). Reports of Florida panthers (*Puma concolor coryi*) seen within 3.2 km (2 mi) of the Grand Gulf site are from 1973 (MNHP 2004c) and are suspect because a viable population of Florida panthers has not been known in the state of Mississippi since the late 1800s (MNHP 2004d). Therefore, the potential impact on Florida panthers from construction at the Grand Gulf ESP site is considered minimal.

American Alligator - Threatened

The American alligator (*Alligator mississippiensis*) is currently classified as “threatened based on similarity of appearance” to the American crocodile (*Crocodylus acutus*) throughout its range, including Mississippi. The classification helps prevent excessive hunting of the alligator and protects the American crocodile (52 FR 21059). Alligator populations are considered disjunct, limited to available habitat, but stable. Because wetlands would be minimally affected by construction at the Grand Gulf ESP site (see Section 4.4.1.1), impacts on alligators would be considered negligible.

Bald Eagle - Threatened

The Grand Gulf site lacks dominant living pine (*Pinus* spp.) or bald cypress (*Taxodium distichum*), the trees in which bald eagle nest (FWS 2004a). Eagle occurrences have not been reported within 16 km (10 mi) of the Grand Gulf site (MNHP 2004b). Eagle occurrences have also not been reported in Warren County except for one nest site at Halpine Lake. This nest site is located along the Mississippi River north of Vicksburg several miles south of Eagle Lake (MMNS 2005). The nest site is thus several miles north of the terminus of the Baxter-Wilson transmission line right-of-way at the Baxter-Wilson Substation. Consequently, bald eagles are unlikely to be affected by construction at the Grand Gulf ESP site or by possible expansion of the Baxter-Wilson transmission line right-of-way.

However, bald eagle locations are obtained on a volunteer basis in Mississippi. No field surveys of potential nest trees, nesting or roosting eagles, or foraging concentrations of eagles have been conducted at the Grand Gulf site or along its transmission line rights-of-way. Thus, bald eagles could potentially use the Grand Gulf site and the environs along the Baxter-Wilson

Construction Impacts at the Proposed Site

| transmission line right-of-way. Before beginning construction activities on the Grand Gulf site, especially those occurring in the bottomlands (e.g., construction of pipeline and intake structures), the adjacent Mississippi River shoreline should be surveyed for potential nest trees (dominant living pine [*Pinus* spp.] or bald cypress [*Taxodium distichum*]) and nesting eagles during the reproductive season (September to January). Any eagles observed in the area should be reported to the FWS and Mississippi Museum of Natural Science (MMNS) in Jackson, Mississippi prior to commencing construction activities. In the event the Baxter-Wilson transmission line right-of-way is widened in support of the Grand Gulf ESP facility, any bald eagles observed in the area should likewise be reported to the FWS and MMNS prior to nearby construction.

Interior Least Tern - Endangered

Least terns (*Sterna antillarum*) on the Mississippi River (whether nesting, foraging, or loafing) generally are not disturbed by operation of machinery (including dredges, tow boats, etc.) in the near vicinity. Generally, least terns are disturbed only by activities that take place on the sand bar they occupy (ACE 2004b).

| The nearest areas occupied by least terns upstream and downstream of the Grand Gulf site (RM 405 (SERI 2005)) were at Yucatan Dikes (RM 409.8) (loafing area for 28 birds on the Louisiana side of the river), Togo Island Dikes (RM 413.6) (nesting colony of 395 birds on the Mississippi side of the river), and Below Bondurant Towhead Dikes (RM 393.0) (nesting colony of 59 birds on the Louisiana side of the river) (ACE 2004a). These three areas are all located at least 6.4 km (4 mi) from the Grand Gulf site, far enough distant to preclude disturbance of terns from construction activities at the site. Further, the nearest potential (currently unoccupied) tern nesting habitat is at about RM 402 on the Louisiana side of the Mississippi River, about 4.8 km (3 mi) south of the Grand Gulf site (ACE 2004b), well outside the range of disturbance from construction activities at the site.

| The point at which the Baxter-Wilson transmission line right-of-way is nearest the Mississippi River is at the Baxter-Wilson Substation, located about 0.75 km (0.47 mi) from the river at RM 433.1. The nearest areas occupied by terns downstream and upstream of the Baxter-Wilson Substation were at Below Racetrack Dikes (RM 429.0) (nesting colony of 91 adults on the Mississippi side of the river) and at Milliken Bend (RM 456.0) (one adult tern observed on the Louisiana side of the river) (ACE 2004b). These two areas are located at least 6.4 km (4 mi) from the Baxter-Wilson Substation, far enough distant to preclude disturbance of terns from right-of-way expansion activities in the vicinity of the substation.

| Between Togo Island Dikes and Below Racetrack Dikes there are two other areas occupied by terns: (1) Newton Bend Dikes (RM 419.5) (nesting colony of 14 birds on the Mississippi side of the river) and (2) Across from Logo Landing (RM 418.3) (nesting colony of 58 birds on the

Louisiana side of the river) (ACE 2004b). These two areas are estimated at being approximately 3.2 km (2 mi) from the Baxter-Wilson transmission line right-of-way, far enough distant to preclude disturbance of terns from right-of-way expansion activities.

Consequently, any impacts on interior least terns that could result from construction at the Grand Gulf ESP site and possible expansion of the Baxter-Wilson transmission line right-of-way would be considered negligible.

Red-Cockaded Woodpecker - Endangered

The red-cockaded woodpecker (*Picoides borealis*) is not known, either currently or historically, from Claiborne and Warren counties (Costa and Walker 1995). Thus, there would be no impacts on the species from construction at the Grand Gulf ESP site and possible expansion of the Baxter-Wilson transmission line right-of-way.

Six historic (inactive) red-cockaded woodpecker clusters (colonies) are located within 3.2 km (2 mi) of the Franklin transmission line right-of-way where it crosses the Homochitto National Forest in Franklin and Lincoln counties (USFS 2005a). Of the six, the closest to the Franklin right-of-way is about 1.2 km (0.75 mi) (USFS 2005a). The USFS is required to maintain foraging habitat in areas of historic clusters located outside Habitat Management Areas (HMA) designated for the recovery of the species (USFS 2005b). Thus, based on these distances and doubling the current right-of-way width of 61 m (200 ft) (Section 3.3), there would be no impacts on red-cockaded woodpecker foraging habitat from possible doubling of the width of the Franklin transmission line right-of-way where it crosses the Homochitto National Forest in Franklin and Lincoln counties.

The nearest and only HMA on the Homochitto National Forest is located about 16 km (10 mi) southwest of the Franklin transmission line right-of-way in Franklin County (USFS 2005a). Thus, based on the current distribution of the species (i.e., active clusters within the HMA), there would be no impacts on red-cockaded woodpeckers from possible expansion of the Franklin transmission line right-of-way where it crosses the Homochitto National Forest in Franklin County.

However, in the future red-cockaded woodpeckers could inhabit restored old-age longleaf pine (*Pinus palustris*) stands located outside the HMA that are currently being and will continue to be enhanced to attract the species (see Section 2.7.1.2) (USFS 2005c). Thus, in the event that the Franklin transmission line right-of-way is expanded, the USFS Homochitto National Forest in Meadville, Mississippi should be contacted to ascertain the proximity of red-cockaded woodpeckers prior to any forest clearing.

Construction Impacts at the Proposed Site

| In summary, potential impacts on red-cockaded woodpeckers that could result from
| construction at the Grand Gulf ESP site and possible expansion of the Franklin transmission
| line right-of-way would be considered negligible.

Louisiana Black Bear - Threatened

| The Louisiana black bear (*Ursus americanus luteolus*) is known to occur within 3.2 km (2 mi) of
| the Grand Gulf site (MNHP 2004a). The Louisiana black bear was reported on the Grand Gulf
| site in the late 1970s (NRC 1981) (see Section 2.7.1.2), but has not been documented on the
| site since that time (SERI 2004d). However, because the site and its immediate environs to the
| north and south provide a large block of remote habitat with relatively little human presence,
| Louisiana black bears may still exist onsite.

Preferred habitat for Louisiana black bears consists of bottomland hardwood forests. Upland
forests generally are not considered preferred habitat for the subspecies. Hence, the significant
population decline in Louisiana black bears is largely because of past conversion of bottomland
hardwood forests to agriculture. However, bears are somewhat nomadic (with very large home
ranges), and it is reasonable to assume they periodically use upland forests that are adjacent to
bottomland hardwoods (FWS 2004b).

| Consequently, the impacts of construction to bottomland forested wetland and upland
| hardwood forest on the Grand Gulf ESP site are integral to the evaluation of potential impacts
| on the Louisiana black bear. Seventeen hectares (43 ac) or 11 percent of the 162 ha (400 ac)
| of upland hardwood forest currently available onsite (Figure 2-5) could be lost to permanent
| structures for the Grand Gulf ESP facility. An estimated additional 41 ha (102 ac) of upland
| hardwood forest (see Section 4.4.1.1) would be temporarily disturbed for equipment staging
| and borrow areas, representing 26 percent of the upland hardwood forest currently available.
| Thus, a total of 37 percent of the upland hardwood forest currently available on the Grand Gulf
| site would be disturbed, and forest fragmentation would increase (Figure 2-5).

| Approximately 10 ha (25 ac) or 3 percent of the 358 ha (885 ac) of bottomland palustrine,
| forested, seasonally flooded wetland would be displaced by permanent structures. An
| additional 12 ha (30 ac) of bottomland palustrine, forested, seasonally flooded wetland would
| be temporarily disturbed for equipment staging and borrow areas, representing an additional
| 3 percent of the bottomland forested wetland currently available. Thus, a total of 6 percent of
| the bottomland forested wetland currently available onsite would be disturbed. This disturbance
| would widen a band of currently developed land that stretches from the base of the Loess Bluffs
| to the Mississippi River (Figure 2-5), but would not result in any further fragmentation of
| bottomland hardwood forest. This would not be expected to pose a barrier to potential bear
| movements in the bottomlands along the river.

The preponderance of habitat used by bears would be expected to occur in bottomland forested wetland, where there would be relatively minor habitat destruction and no additional fragmentation. Thus, impacts on the Louisiana black bear from construction at the Grand Gulf ESP site are expected to be minor, as long as this does not result in the mortality of individual bears. Prior to disturbance of any bottomland forested wetland or upland hardwood forest, a bear survey should be conducted to determine use of the area. If denning bears are present, construction activities should be prohibited during the denning season (from December through April) in order to avoid destruction of bears and possible abandonment of cubs. Further, actual den sites/trees or candidate trees (bald cypress [*Taxodium distichum*] and tupelo gum [*Nyssa* sp.]) with visible cavities, having a diameter at breast height of 0.9 m (3 ft) and occurring along river, lakes, streams, bayous, sloughs, or other water bodies in occupied habitat should not be harvested (FWS 2004e). If these measures are undertaken, mortality of individual bears would be considered unlikely.

The Louisiana black bear is known from counties other than Claiborne (Franklin, Jefferson, Warren) that are crossed by the transmission line rights-of-way (Baxter-Wilson and Franklin) (Section 2.7.1.2). The subspecies is known to occur only in the western most portion of Franklin County where hardwood forests are more prevalent (USFS 2005d). The subspecies is also known to occur only in the western most portion of Jefferson County near the Mississippi River (USFS 2005d). The Franklin transmission line right-of-way traverses the northeastern portions of Franklin and Jefferson counties and is thus at least 32 km (20 mi) distant from the nearest sighting of the Louisiana black bear in these counties. Thus, possible expansion of the Franklin transmission line right-of-way would be unlikely to impact the subspecies.

However, the Louisiana black bear is known to occur along the Mississippi River in Warren County (see Section 2.7.1.2), in the general area crossed by the Baxter-Wilson transmission line right-of-way. The point along the Baxter-Wilson transmission line right-of-way that is nearest the Mississippi River is a 1.6-km (1-mi) segment of right-of-way located about 0.75 km (0.47 mi) from the river. Elsewhere along the right-of-way, the closest the right-of-way comes to the Mississippi River is approximately 3.1 km (2 mi). Based on these distances, the majority of the Baxter-Wilson transmission line right-of-way appears to be located in upland hardwood forest (as opposed to bottomland hardwood forest, the Louisiana black bear's preferred habitat). Consequently, possible expansion of the Baxter-Wilson transmission line right-of-way would be unlikely to impact the subspecies.

In addition to habitat destruction, vehicle collisions with bears would likely increase. The most recent daily traffic count on the segment of Grand Gulf Road nearest to the Grand Gulf site is 940 to 1100 vehicles per day (see Section 4.5.4.1). This number is projected to increase during construction of the Grand Gulf ESP facility by 1100 vehicles per shift in a two-shift day (see Section 4.5.4.1). This would be expected to increase the likelihood of vehicle collisions with bears. However, such encounters would likely be so rare that the overall impact on the local

Construction Impacts at the Proposed Site

| population of Louisiana black bears would be expected to be negligible. In general, vehicle collisions are considered relatively minor compared to habitat destruction or modification.

Noise levels would increase from land-clearing equipment during construction at the Grand Gulf ESP site. Denning is the most critical period for bears, particularly pregnant females.

| Consequently, if bears are present, construction activities in the vicinity of a den tree should be limited during the denning season (December through April) (FWS 2004e). Construction noise outside the denning season may cause bears, if present, to use more remote forested areas. However, this would not be likely to adversely affect bears to any great degree. In general, construction noise is considered relatively minor compared to habitat destruction or modification.

| In summary, the potential impact on the Louisiana black bear from construction at the Grand Gulf ESP site and along the transmission line rights-of-way is considered negligible.

Gulf Sturgeon - Threatened

The gulf sturgeon (*Acipenser oxyrinchus desotoi*) has not been collected in the region of the Grand Gulf site. The Mississippi River is considered part of the historical range for the gulf sturgeon, therefore the reach of the river at the Grand Gulf site may be used by the sturgeon as it migrates up and down the river (68 FR 13370; NMFS 2004). Construction of the proposed intake and discharge structures would temporarily change the river bank environment (Section 4.4.2). Widening the transmission line right-of-way would bring the end of the Baxter-Wilson right-of-way in Warren County to within 0.6 km (0.4 mi) of the Mississippi River. Thus, the potential impacts from construction would have no effect on the Mississippi River and the Gulf sturgeon.

Bayou Darter - Threatened

The bayou darter (*Etheostoma rubrum*) is endemic to the Bayou Pierre and tributaries, which flow as close as 3 km (1.9 mi) east of the Grand Gulf site (40 FR 44149; FWS 1990, 2000, 2004a; Ross 2001). The construction of the proposed intake and discharge structures would not affect the regions where the bayou darter is found. The Franklin transmission line right-of-way crosses the Bayou Pierre. In the event the transmission line rights-of-way need to be widened, NRC expects that SERI would work with the appropriate Federal and State agencies and the transmission line owner, Entergy Mississippi, Inc., to develop and implement plans that would have minimal impacts on the bayou darter.

Fat Pocketbook Mussel - Endangered

The fat pocketbook mussel (*Potamilus capax*) was historically found throughout the Mississippi River drainage from Minnesota to Louisiana. In 2003, the mussel was found near Vicksburg in the Mississippi River, as well as south of the Grand Gulf Site (41 FR 24062; FWS 1989, 2004c, 2004d; MNHP 2004e). Widening of the transmission line right-of-way in Warren County near the Mississippi River would not affect mussel habitat because the habitat is no closer than 0.6 km (0.4 mi) to the Mississippi River. Construction of the proposed intake and discharge structures would temporarily change the nearby river bank environment, and increase turbidity downstream of the in-river activities; however, this is likely to be localized and temporary and could be minimized by use of best management practices (Section 4.4.2). Nevertheless, disrupted regions of river substrate could be habitat for the mussel. The shoreline where the intake and discharge structures are proposed have been disrupted in the past, yet the area may have been re-colonized by mussels. Impacts on the mussel from construction activities cannot be evaluated without conducting surveys to determine if the mussels are using the shoreline where the proposed intake and discharge structures will be located. Any specimens found could be relocated. However, the regions that would be disturbed are a small proportion of the total length of river bank along the Grand Gulf site, and the overall impact on the fat pocketbook mussel is likely to be minimal.

Pallid Sturgeon - Endangered

Pallid sturgeon (*Scaphirhynchus albus*) have been collected in the region of the Grand Gulf site. Adult pallid sturgeon have been caught in regions with moderate to strong currents, a sand or sand/gravel substrate, similar to the main channel of the Mississippi River as it passes by the Grand Gulf site. Spawning habitat may exist within 16 km (10 mi) upstream of the Grand Gulf site (MP&L 1973). Information on the spawning and juvenile use of the Mississippi River near the Grand Gulf site is sparse (55 FR 36641; FWS 1993, 2000, 2004a; Ross 2001; Hartfield 2003; LDOTD 2003; SERI 2005). Construction of the proposed intake and discharge structures would temporarily change the river bank environment (Section 4.4.2). During construction activities, sedimentation and turbidity would be controlled using standard construction practices. While these practices could limit the use of the region by adult pallid sturgeon in the immediate vicinity of the site, the impact would be minor and temporary, if at all. The timing for construction is also not likely to affect any spawning or use of the region by juvenile pallid sturgeon because of the size of the river, the location of shoreline activities, and the limited in-river activities associated with the construction of the intake and discharge structures. Widening the transmission line right-of-way would bring the end of the Baxter-Wilson right-of-way in Warren County to within 0.6 km (0.4 mi) of the Mississippi River. Consequently, impacts on pallid sturgeon resulting from construction of the proposed Grand Gulf ESP facility would be unlikely.

Construction Impacts at the Proposed Site

4.4.3.2 Federally Listed Plant Species

- | No impacts on Federally listed or proposed threatened or endangered plant species either terrestrial or aquatic are anticipated because none of these species are known to occur on or within 16 km (10 mi) of the Grand Gulf site (MNHP 2004a, 2004b; FWS 2004a).

4.4.3.3 Threatened and Endangered Species Impact Summary

- | Because SERI is not planning any preconstruction ground disturbing activities as a result of the ESP, no Section 7 consultation with FWS or NOAA Fisheries is required at this time. However, the issuance of a CP or COL is a separate action requiring a consultation with the appropriate agency, pursuant to Section 7 of the Endangered Species Act.
- | Based on the information provided by SERI, Entergy, and the NRC staff's independent review, the staff concludes the impacts of construction at the Grand Gulf ESP site on terrestrial and aquatic Federally listed species would be SMALL, and additional mitigation would not be warranted beyond that identified in this section. The conclusion of SMALL impacts by the NRC staff is predicated on certain assumptions made by the staff. These include the current occurrence of Federally listed threatened and endangered species and critical habitat in the project area, the current listing status of such species, and the current designation of critical habitat.

4.5 Socioeconomic Impacts

Construction activities could affect individual communities, surrounding region, and minority and low-income populations. To assess the impacts of construction activities for the Grand Gulf ESP site, the staff evaluated the physical impacts, population, and community characteristics.

4.5.1 Physical Impacts

- | Construction activities at the Grand Gulf ESP site may cause temporary and localized physical impacts including, but not limited to, noise, odor, vehicle exhaust emissions, and dust. This section addresses the potential impacts that may affect people, buildings, roads, and recreational facilities.

4.5.1.1 Workers and the Local Public

The Grand Gulf site is located in an area zoned for industrial use. The site is bounded by agricultural and recreational areas. The recreational area likely to be most affected by

construction on the Grand Gulf site would be the Grand Gulf Military Park because of an increase in traffic, noise, and dust from construction activities. However, peak park use is on the weekend when construction activity would likely be reduced.

All construction activities would occur within the Grand Gulf site boundary. Offsite areas that would support construction activities (such as borrow pits, quarries, and disposal sites) would already be permitted and operational. Therefore, impacts on those facilities from constructing new units would be small incremental impacts associated with their normal operation.

Construction workers would have adequate training and personal protective equipment to minimize the risk of potentially harmful exposures. Services would be provided for emergency first-aid care, and regular health and safety monitoring would be conducted during construction. However, during construction activities, the employees working the day shift at GGNS Unit 1 could be subjected to noise, dust, and gaseous pollutants associated with construction events. People living near the Grand Gulf ESP site would not experience any physical impacts greater than what would be considered an annoyance or nuisance. These activities would be performed in compliance with local, State, and Federal regulations, and site-specific permit conditions.

During construction, noise would increase with the operation of vehicles, earthmoving equipment, materials-handling equipment, impact equipment, and other stationary equipment (such as pumps and compressors), and the increase of human activity. The surrounding counties are predominantly rural tracts. However, areas that are subject to farming are prone to seasonal noise-related events, such as planting and harvesting. Wooded areas provide natural noise abatement. Noise level also attenuates with distance.

At this time, it is not known if blasting would be necessary during the construction of a new facility. Because people are more sensitive to changes in noise levels at night, any blasting, along with other excessively loud construction activities, would be conducted during daytime hours.

During a series of five bimonthly noise surveys that were conducted at various phases of the existing GGNS Unit I construction, the impact of construction noise was considered to be small and of a temporary nature. Noise levels during construction at the site boundaries are expected to be below the regulatory guidance of 65 dBA stated in NUREG-1555 (NRC 2000). A construction noise abatement and protection program would provide required mitigative measures for noise. On a short-term basis, noise may exceed this guidance; however, it is expected that noise from construction equipment would have no discernible impacts on the local noise level. All equipment would be operated in accordance with local, State, and Federal noise requirements.

Construction Impacts at the Proposed Site

The Noise Control Act of 1972 gives authority to the EPA to determine the limits of noise and to set noise emission standards for major sources of noise in the environment, including construction equipment. Federal regulations exist for noise emitted from construction equipment (40 CFR Part 204) and Occupational Safety and Health Administration provides regulations to deal with occupational exposure in the construction environment (29 CFR 1910.95). In addition to the local ordinances and permitted noise restrictions, SERI states that a restriction on noise-related activities (for example, blasting) to daylight hours could also be incorporated into activity planning (SERI 2005).

Physical impacts from air pollutants such as engine exhaust and fugitive dust would be limited. Therefore, no modeling was undertaken for this analysis. Temporary and minor effects on local ambient air quality occur as a result of normal construction activities. Emissions of fugitive dust and fine particulate matter, including those smaller than 10 micrometers (PM₁₀) in size, are generated during earth-moving and material-handling activities. Construction equipment and offsite vehicles used for hauling debris, equipment, and supplies also produce emissions during construction. The pollutants of primary concern include PM₁₀ fugitive dust, reactive organic gases, oxides of nitrogen, carbon monoxide, and, to a lesser extent, sulfur dioxides. Because of the uncertainty of the variables affecting construction (for example, type of construction vehicles, timing and phasing of construction activities, and haul routes), precise estimates of emissions cannot be determined until the project is ready for construction, and no reasonable estimate of construction emissions can be undertaken. However, construction would be conducted in accordance with all Federal, State, and local regulations that govern construction activities and emissions from construction vehicles.

Specific mitigation measures to control fugitive dust would be identified in a dust control plan or similar document, prepared prior to project construction. SERI states that air pollution mitigation measures would include any or all of the following (SERI 2005):

- Wetting for dust suppression on unpaved construction roads and disturbed areas
- Maintain vegetative cover to minimize the area of disturbed soils
- Maintain construction vehicles properly to maximize efficiency and minimize emissions
- Re-vegetate temporarily impacted land
- Place emission controls on the onsite concrete batching plant
- Use technology designed for open burning (if needed) to increase the efficiency of combustion while reducing smoke levels, and conduct burning in compliance with applicable air-permitting requirements established by MDEQ.

While emissions from construction activities and equipment would be unavoidable, a mitigation plan would minimize impact on local ambient air quality and the nuisance impact on the public near the project. Other mitigation measures would include temporary storm water management and erosion and sediment control strategies.

4.5.1.2 Buildings

Construction activities would not affect any offsite buildings. Onsite buildings have been constructed to withstand safely any possible impact, including shock and vibration, from construction activities associated with the proposed activity. Except for GGNS Unit 1 structures, no other industrial, commercial, or residential structures would be directly affected by the construction of a new facility.

4.5.1.3 Roads

The use of public roadways and railways would 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. However, no extensive work is planned for the existing roads to support construction. The rail line that extended from Vicksburg, Mississippi, to the site and beyond and the spur constructed to the site to support GGNS Unit 1 construction have since been abandoned. No reconstruction of rail tracks along the former rights-of-way or construction of new rail lines is planned (SERI 2004d), but future consideration and evaluation of rail service is not precluded, and a rebuilt line may be required (SERI 2005). If rail service is needed at the CP or COL stage, NRC staff will evaluate the impact of restoring rail service on the Grand Gulf ESP site.

The transportation network at the Grand Gulf site in Claiborne County and in the surrounding counties of Copiah, Hinds, Jefferson, and Warren Counties in Mississippi and Tensas Parish across the Mississippi River in Louisiana is a well-developed system and would not be significantly affected as a result of construction activities. Several upgrades are planned or already underway that will lessen impacts (Section 2.8.2.2). Traffic on Grand Gulf Road will increase substantially during the peak construction period and will be at its peak during the morning and evening shift changes. Noise in the general area will increase from the larger volume of traffic, but the increases will be temporary and will only occur twice per day during the work week.

4.5.1.4 Aesthetics

An estimated 162 ha (400 ac) of the 850-ha (2100-ac) Grand Gulf site would be affected by construction of a new facility. Some areas of the site proposed for the new construction have

Construction Impacts at the Proposed Site

been previously developed or altered for use by the existing GGNS Unit 1. New construction would have little impact in these areas. Of the roughly 162 ha (400 ac) estimated for the construction of a new facility, the staff estimates that 49 ha (120 ac) overlap currently undeveloped or unaltered areas (SERI 2004e, SERI 2005). It is estimated that 51 ha (125 ac) would contain permanent structures (primarily a power block area, cooling tower area, and bottomland pipeline and intake areas). Some construction activities for the new facility may be visible from the Mississippi River (for example, the embayment and intake structure, and cooling towers) and from Grand Gulf Military Park. However, much of the construction activity at the site would be masked by woods and the 20-m (65-ft) bluff to the east of the site. Because the Grand Gulf ESP site is already aesthetically altered by the presence of an existing nuclear power plant with a 158-m (520-ft) natural draft cooling tower, and because construction impacts would be temporary, adverse impacts on visual aesthetics of the site and vicinity are not expected from the construction of a new facility.

Water turbidity could temporarily increase in the immediate construction area during construction and localized dredging. Measures to control turbidity include permit conditions, use of best management practices, and, if necessary, installing a barrier (for example, silt curtain) to prevent the migration of a turbid water plume into Hamilton and Gin Lakes (SERI 2005).

Construction activities would include limited in-water activity to construct the intake structure and local dredging. The work would be executed in accordance with applicable regulations and permit conditions (SERI 2005).

4.5.1.5 Summary of Physical Impacts

Based on the information provided by SERI in its environmental report (SERI 2005) and the NRC staff's independent review, the staff concludes that the overall physical impacts of construction on workers and the local public, buildings, roads, and aesthetics would be SMALL as long as the mitigative actions, such as noise, dust, and traffic control and possible management measures identified by SERI are undertaken.

The conclusion of SMALL impacts by the NRC staff is predicated on certain assumptions made by the staff. These include no building of new roads or the former railroad line into the site, and carrying out mitigative actions to reduce physical impacts, such as limiting in-water activity, implementing measures to control noise, dust, and traffic, and other possible management measures identified by SERI.

4.5.2 Demography

The evaluation of the economic and social impacts on the immediate vicinity and surrounding region during construction of new units addresses both the potential impact that could result from the construction-related activities at the Grand Gulf ESP site and the activities and demands of the workforce on the surrounding region.

Construction of each new unit is estimated to occur over a 5-year period and may lag behind the preceding unit by a year or more. Because a specific reactor design has not been selected, the peak workforce estimate does not include consideration of reactor-specific approaches, which could limit the types of activities and reduce the length of time onsite.

Mississippi occupational employment statistics for the period 2002 to 2012 for the Hinds-Utica Community College district, which includes Hinds, Rankin, Warren, and Claiborne Counties, currently show over 10,700 workers in the construction occupations; over 10,000 maintenance, installation and repair workers; 420 plant and system operators; 8000 truckers; 1100 security guards; and 46,400 clerical and administrative workers (MDES 2005). All of these groups of occupations are forecasted to grow by about 10 percent to 20 percent by the year 2012. More workers also would be available from nearby counties. While these are currently employed workers, not all of whom would be available for construction and operation of a new nuclear plant, it does represent a significant pool of workers in the occupations that would be needed for construction and operation. Several of the highly specialized occupations such as pipe fitters, nuclear operators, engineers, technicians, and supervisors with specific nuclear experience would have to be recruited outside of the area, although some of these occupations might also be trained locally, given appropriate lead time and planning for educational programs. SERI assumed that 50 percent of the workforce would come from the region. The staff has examined SERI's assumption using occupational statistics and finds it reasonable.

The peak workforce is estimated by SERI (2005) to be 3150 people, a number that would be maintained for a large part of the construction period(s). SERI expects that the majority of construction workers and their families would settle into larger cities in the area or their associated suburbs, such as Vicksburg (Warren County), Natchez (Adams County), and Clinton/Jackson (Hinds County) (SERI 2005). According to the 2000 U.S. Census, these three counties have a combined population of more than 300,000 people (USCB 2004). Assuming that 50 percent of the construction workforce with an average family size of four would move into the region, an estimated 6300 people would move into the area within 80 km (50 mi) of the proposed Grand Gulf ESP site. This represents approximately 2 percent of the year 2000 population for Adams, Hinds, and Warren counties. If such a large workforce were introduced

Construction Impacts at the Proposed Site

into the region, it could affect traffic, taxes, housing, and public services. Much of the workforce would probably be selected from the population currently within 80 km (50 mi) of the Grand Gulf ESP site. The magnitude of the impact is dependent on two considerations:

- The percentage of the workforce that would be existing residents of the region
- Where those who have to relocate to the region would reside. If substantial numbers of the workforce migrated into rural and small-town Claiborne and Jefferson counties, for example, the socioeconomic impacts generally would be larger than if they moved to the larger population centers.

| Using information provided by SERI in its environmental report, the staff assumed that 50 percent of the construction workers would be expected to come from within the region and the number of construction workers who might relocate to the region would be a small percentage of the larger communities' population base, the staff concludes that the likely outcome is the impacts of construction on increases in population within most of the region would be SMALL, and additional mitigation would not be warranted. However, the possibility of a LARGE demographic impact in Claiborne County cannot be excluded. Impacts on the economy, taxes, infrastructure, and public services are covered in Sections 4.5.3 and 4.5.4.

| The range of impacts estimated by the NRC staff is predicated on certain assumptions made by the staff. These include not more than 3150 construction workers would be employed at the Grand Gulf ESP site; not less than 50 percent of the construction workers would come from the region within 80 km (50 mi) of the Grand Gulf ESP site; and any new workers would choose to live in the larger cities within the region, such as Vicksburg and Jackson, rather than in smaller communities that have less available housing, such as Port Gibson and Fayette.

4.5.3 Social and Economic

| This section evaluates the social and economic impacts on the surrounding region as a result of constructing additional nuclear units at the Grand Gulf ESP site. The evaluation assesses the impacts of construction and demands placed by the larger workforce on the surrounding region. Construction activities are expected to last 5 years and employ up to 3150 workers. SERI expects this size workforce to be maintained for a large part of the construction period (SERI 2005). This number is in addition to the 750 permanent and a variable number of contract personnel currently employed at the existing site (SERI 2005).

4.5.3.1 Economy

The impacts of construction of the new units on the local and regional economy are based on the region’s current and projected economy and population. In addition to the 3150 direct construction jobs, spending in the region by these workers and purchase of non-labor goods and services to support construction would result in a “multiplier effect” within the counties surrounding the Grand Gulf ESP site. The multiplier effect describes the situation in which each dollar spent regionally on goods and services by construction workers and contractors becomes income to a regional recipient who saves some but spends the rest. This creates income for someone else, who in turn saves part and spends the rest. The number of times the final increase in spending in the region exceeds the initial dollar spent is called the regional “multiplier.”

Based on the positive aspects of station construction on the regional economies (mostly in Warren County) and the workforce availability, the staff concludes that the impacts on the economy are generally beneficial and could reach the moderate level in Warren County.

The conclusion of beneficial moderate impacts in Warren County and small impacts elsewhere by the NRC staff is predicated on certain assumptions made by the staff. These include not more than 3150 construction workers would be employed at the Grand Gulf ESP site; not less than 50 percent of the construction workers would come from the region within 80 km (50 mi) of the Grand Gulf ESP site; and any new workers would choose to live in the larger cities within the region, such as Vicksburg and Jackson, rather than in smaller communities that have less available housing, such as Port Gibson and Fayette.

4.5.3.2 Taxes

The actual monetary value of the revenues generated from the construction of the new units cannot be estimated with precision because the type of reactor has not been selected. This decision would affect the size of the workforce and the percentage of the workforce that could come from outside the region. Therefore, at this time it is not possible to estimate the value of taxes that could be paid to the regional governments, nor expenditures that the regional governments would have to incur to accommodate the workforce.

Sales, Use, Income, and Franchise Taxes

The state of Mississippi and counties surrounding the Grand Gulf ESP site would experience an increase in the amount of taxes collected from labor, services, construction materials, and supplies purchased for the project. Mississippi would collect franchise taxes paid by contractors during construction of the additional units. State franchise taxes would be collected at the rate

Construction Impacts at the Proposed Site

of \$2.50 per \$1000 on the capital value of equipment at the Grand Gulf ESP site (MSTC 2003a). The tax would be based on the value of property owned by the contractors that operate in Claiborne County during the construction period. Mississippi also collects a 3.5 percent contractors' tax on the total contract amount (including the tax itself) (MSTC 2003b). Additionally, sales, use, and income taxes would be generated by retail expenditures (restaurants, hotels, merchant sales) of construction workers. Although there is a small local sales and use tax, the State would collect most of these both from individual workers and from corporate entities in the general region of the site. No estimate is available of the day-to-day expenditures during construction that would occur in the region.

Property Taxes

Mississippi would benefit from additional property tax revenue for the incremental increase in value to the entire Grand Gulf site from the additional units. During the construction phase, this tax would be levied only on the value of the tangible personal property to become part of the additional units. Currently, it has not been decided whether the new facility would be treated for tax purposes as a "merchant plant" selling electric power to the eastern United States as a whole, whereupon it could be exempt from the special treatment in Mississippi tax law that taxes the GGNS property at the state level, allocates these funds by formula, and prevents the county from taxing the facility.

If the facility were treated as an ordinary industrial asset, the property tax would be a significant benefit to Claiborne County. If the final capital cost were in the range of \$1000 per installed kilowatt, the maximum capacity 3000-MW(e) facility would (at completion) have an approximate capital value of \$3 billion.

At Claiborne County's current average property tax rate of 65.01 mills and an assessment ratio of 15 percent of true market value for non-residential property (SERI 2004a), the tax yield would be about \$29 million per year, a large beneficial impact. During the assumed construction period of 5 years, about \$6 million in tax yield would be added to the base each year. If the new facility were not exempt, this tax base would instead go to the State. However, based on the current law, at least \$7.8 million per year of the tax yield would be returned to the county, which would also be a large beneficial impact.

4.5.3.3 Summary of Social and Economic

Based on the information provided by SERI, staff interviews with local public officials, and their own independent review of data on the regional economy and taxes, the staff concludes that the impacts on the regional economy of constructing the new unit or units at the Grand Gulf ESP site on most of the region would be SMALL, with a possible MODERATE beneficial impact

in Warren County. Under current Mississippi tax law, it appears that Claiborne County would receive property taxes or payments in lieu of taxes that in the last year of construction would approach at least an increase of \$7.8 million (83 percent of the current county budget) and perhaps much more, depending how the new plant would be treated for tax purposes. Taken together with the jobs created in the region, this would be a LARGE beneficial impact.

The conclusion of LARGE beneficial impacts by the NRC was predicated on certain assumptions made by the staff; these include: that there would be no more than 3150 new construction workers at the Grand Gulf ESP site, that no less than 50 percent of these workers would come from the 80-km (50-mi) region surrounding the site, that new workers would tend to live in the larger communities in the region, and that there are no significant changes in Mississippi tax law, especially the terms and conditions for taxability of real property. The NRC staff would have to confirm these assumptions at the CP or COL stage and determine whether there would be any new and significant information that would change this conclusion.

4.5.4 Infrastructure and Community Services

Infrastructure and community services include transportation, recreation, housing, public services, and education.

4.5.4.1 Transportation

Most of the larger pieces of equipment or structures and bulk materials would probably be brought to the site by barge. However, the transport of such large pieces of equipment would be an infrequent occurrence. No adverse impact on existing railway service in the area would occur from new facility construction activities at the Grand Gulf ESP site. The nearest active, regularly used railroad is operated by Kansas City Southern, which has freight train service that passes within 45 km (28 mi) northeast of the site. No new rail service is planned to support materials deliveries and new facility construction activities although it was not excluded (SERI 2004d) and may be necessary (SERI 2005).

The number of traffic accidents on Grand Gulf Road increased during the construction of GGNS Unit 1. In the 4 years preceding construction (1971 to 1974), the average number of traffic accidents on Grand Gulf Road was five per year. During construction (1975 to 1978), an average of 30 accidents per year occurred on Grand Gulf Road. Traffic counts conducted during the construction of the GGNS Units 1 and 2 (GGNS Unit 2 was not completed) indicated the roadways were not overloaded. Temporary traffic overloads were reported during morning and evening shift changes (SERI 2005). Combined with regular daily traffic to the existing GGNS Unit 1 facility, the large volume of construction workers could put stress on the existing road net.

Construction Impacts at the Proposed Site

Improvements were made to local roads and bridges leading to GGNS during construction of the existing facility. It should be noted that U.S. Highway 61, now a four-lane highway, was a two-lane highway from Vicksburg to Port Gibson and south to Natchez during the GGNS Units 1 and 2 construction peak. Although traffic was heavy during the morning and evening commutes, the highway was adequate with only two lanes.

A highway construction project to extend State Highway 18 is in the advanced planning stages (Section 2.8.2.2). This proposed extension would connect State Highway 18 from Port Gibson to Grand Gulf Road near the site, providing additional access to the Grand Gulf ESP site (SERI 2004a). The section of U.S. Highway 61 from Natchez Trace Parkway south through Claiborne and Jefferson Counties to the Jefferson/Adams County line is currently being widened from two to four lanes (SERI 2004a). The sections of U.S. Highway 61 to the north and south of the proposed construction are already four lanes. Therefore, U.S. Highway 61 is expected to accommodate the increased traffic created by construction workers headed to the Grand Gulf ESP site (SERI 2004a). New road construction beyond this should not be necessary.

Table 4-1 shows current daily traffic counts and estimated hourly capacity of the primary roads in Claiborne County. The information shows the primary access routes, including Grand Gulf Road, have sufficient capacity to handle the projected increase in traffic resulting from the construction workforce for a new facility, which would be about 1100 vehicles per shift. This value is based on 3150 workers, divided into two shifts, with 300 workers living close by, and 20 percent of the workers carpooling (SERI 2005).

Based on the information provided by SERI, interviews, and the NRC staff's independent review, the staff concludes that the offsite impacts of construction of the new units on transportation could be managed so they would be small. No additional mitigative actions beyond those identified above appear to be warranted.

4.5.4.2 Recreation

A description of local tourism and recreation is provided in Section 2.8.2.4. The only access to Grand Gulf Military Park to the north of the Grand Gulf site is via Grand Gulf Road; therefore, increased traffic resulting from the transportation of machinery and the construction workforce would affect the traffic flow to Grand Gulf Military Park. This impact would be expected to occur during periods of heavy traffic, primarily in the morning and in the evening when shift change takes place and generally only during the week (SERI 2005). The majority of visitors frequent the Grand Gulf Military Park on the weekends. The effect on the recreation experience (access, aesthetics) at Grand Gulf Military Park would be temporary because construction activities are temporary. The overall impacts of construction on recreation would be small.

Table 4-1. Road Analysis in Claiborne County

Primary Route	Roadway Description and Improvements	Average Daily Traffic Count (vehicles/day)	Estimated Roadway Capacity (vehicles/hour)
Grand Gulf Nuclear Station to U.S. 61	2-lane Grand Gulf Road - no significant changes	940 to 1100	1100
U.S. 61 N to Vicksburg	U.S. 61 between Port Gibson and Vicksburg is a modern 4-lane, divided freeway	6800	1900 per lane (total 3800 for 2 northbound lanes)
U.S. 61 N and MS 462 E to Vicksburg	MS 462 re-paved and re-signed - added a span in the Kennison Creek bridge	600	1300
MS 18 W to Utica	MS 18 was re-paved in 2002 and brought up to MDOT standards with 12-foot wide lanes	2500	1300
MS 547 E to Hazelhurst	MS 547 re-surfaced in 2002	2900	1300
MS 552 S to U.S. 61 S to Natchez	MS 552 S is a 4-lane divided freeway from Alcorn State University to U.S. 61 S	360, then 2800 South of Alcorn	1900 per lane (total 3800 for 2 southbound lanes)
Westside to U.S. 61 S to Natchez	U.S. 61 S is a 2-lane improved roadway - will be a 4-lane, divided freeway within 2 years like U.S. 61 N from Port Gibson	No MDOT data available for Westside Rd. - U.S. 61 S is 5500	>1400
MS 552 S to U.S. 61 S to Natchez	MS 552 S is a 4-lane divided freeway from Alcorn State University	2800	3800 for 4-lane freeway
	U.S. 61 S is a 2-lane road	5500	1900 for U.S. 61 S

MDOT = Mississippi Department of Transportation
MS = Mississippi State (Highway)
Source: SERI 2005

4.5.4.3 Housing

If the entire construction workforce of 3150 originated within 80 km (50 mi) of the Grand Gulf ESP site, there would be no impact on housing demand. However, based on prior experience with projects of similar size, up to 50 percent of the workforce could come from beyond the 80-km (50-mi) region (SERI 2005). Most, if not all, of these workers from outside the region would be expected to relocate to the region at least during the work week. If up to 1600 workers were to come from outside the region, there would be a demand for up to that many housing units, mainly apartments, although some single-family residences might be required if construction workers decide to relocate with their families. A review of the vacant

Construction Impacts at the Proposed Site

housing available in the year 2000 (Section 2.8.2.5) shows enough vacancies in the region to absorb the in-migrating construction workforce. Claiborne County has seen relatively limited new housing and slow price increases in the last five years (Section 5.1.1). Only small numbers of units would be expected to be available in Claiborne County.

Some relocated construction workers might bring mobile homes for the duration of their employment. SERI's environmental report assumed about 300 workers would live in nearby manufactured home parks (SERI 2005). If this is the case, an influx of construction workers into the local area could compete with recreational users for spaces at existing manufactured home and recreational vehicle parks. Alternatively, if the incoming construction force were to generate demand for additional private manufactured home and/or recreational vehicle parks, this demand could lead to an increase in spaces being made available. If, for example, the same percentage of in-migrating construction workers were to choose Port Gibson as a residence as has the current workforce (14.6 percent see Table 4-2), the construction workers would need 230 local housing units, equal to about twice the vacant housing stock in the city at the 2000 U.S. Census (USCB 2004). However, SERI believes as many as 300 construction workers might live in manufactured homes or recreational vehicle parks near the site (SERI 2005). If construction workers concentrate in the county, the impact on the local Claiborne County rental housing market could be moderate. A similar situation might prevail in Fayette in

Table 4-2. Potential Increase in Resident Population Resulting from Construction at the Grand Gulf Early Site Permit Site

Jurisdiction	Percent of Current Workforce by Location	Facility-Related Increase in Population	Year 2000 U.S. Census Population	Percentage Increase	Facility-Related Households	Year 2000 Vacant Housing Units
Vicksburg	46.4	2925	26,407	11.1	731	1290
Port Gibson	14.6	918	1,840	49.9	230	95
Other Locations:						
Clinton	7.3	459	23,347	2.0	115	571
Fayette	3.9	243	2,242	10.8	61	68
Natchez	3.3	207	18,464	1.1	52	888
Brookhaven	2.7	171	9,861	1.7	43	430
Jackson	2.7	171	184,256	0.1	43	7837
Wesson	2.3	144	1,693	8.5	36	41
Hazelhurst	1.7	108	4,400	2.5	27	158
All Other:	15.1	951	NA	NA	239	NA
Total	100	6300			1577 ^(a)	

(a) Difference from 1575 in SERI (2005) due to rounding.

Source of Resident Locations: SERI 2004a

Source of Year 2000 U.S. Census Population: USCB 2004

Jefferson County, but the impact likely would be minimal in the surrounding counties, which have larger housing markets and most likely would experience a smaller influx of workers. If, as expected, many of the in-migrating construction workforce live in larger towns and cities of the region, then the impacts on housing would be small.

4.5.4.4 Public Services

This section describes the public services available and discusses the impacts of construction at the Grand Gulf ESP site on water supply and waste treatment, police, fire and medical services, and social services in the region.

Water Supply and Waste Treatment

A detailed description of construction-related water requirements and the impact is presented in Section 4.3.1 of this document. According to the SERI environmental report, construction activities for the existing GGNS Unit 1 required approximately 1,900,000 L/d (500,000 gal/d) of water for concrete batch plant operation, dust suppression, and sanitary needs (SERI 2005). It is anticipated that construction of a new facility would require at least this quantity of water. The amount of water used for construction of a new facility may be reduced if portable toilet facilities are used for sanitary needs. The recommended planning number for potable water consumption for workers in hot climates is 11 L/d (3 gal/d) for each worker (EPA 1997). Based on the maximum construction worker population of 3150 workers, the potable water consumption is estimated at 35,770 L/d (9450 gal/d). Three wells completed within the Catahoula Formation are currently used to supply water for general site purposes. Two of these wells are in routine use, and the third well is a backup. During GGNS Unit 1 refueling outages, the two wells operate at near full capacity. Therefore, these existing wells would not have adequate production to supply the continuous construction water needs for a new facility, and the installation of an additional well or wells would likely be required for construction purposes. SERI did not expect that the new wells, with the capacity to supply the above construction needs, would have any significant impact on the local aquifer or on offsite water users (SERI 2005). The staff determined that not enough information is available to support this conclusion (see Section 4.3.2). However, if later information shows that the Catahoula formation in the vicinity of the Grand Gulf ESP site is not able to support additional wells without adverse impact, the staff concluded that the facility could instead use treated Mississippi River water, which would minimize the impact on offsite users.

Because the new facility, like GGNS Unit 1, would use an independent onsite water supply and water and sewer treatment facilities, Port Gibson water and sewer services would not be burdened by construction of a new facility at the Grand Gulf ESP site. The short-term influx to the area of a construction-related population (workers and their families) of as many as

Construction Impacts at the Proposed Site

6300 persons (one-half the expected number of construction workers, times four persons per household) would not be expected to over-burden local sewer and water utilities in surrounding communities because the construction workforce would be spread over a large geographic area. The commuting construction workforce would commute from the surrounding Mississippi counties but would likely concentrate in larger population centers such as Vicksburg, Natchez, and Clinton/Jackson because of the services available in these developed, more populous areas.

Water and sewer availability and capacity information obtained from the Mississippi Development Authority was reviewed for the communities of Vicksburg and Jackson, Mississippi. The current water consumption in the community of Vicksburg is below the reported capacity. The water and sewer services in Vicksburg are currently at 70 percent of total capacity (SERI 2004a). Municipal water and sewer services in Jackson are reported at 85 percent of total capacity (SERI 2004a). Based on utility capacity information for the communities of Vicksburg and Jackson, cities typical of the population centers that would be utilized by construction workers, the influx of construction workers would not overburden public utilities in surrounding communities. Costs incurred by local utilities for increased water use and sewer treatment supplies would be offset by revenues paid by the new users and by increased commercial retail demand and by property, sales, and income tax revenues generated by the in-migration of construction workers. In Port Gibson, where water use is 34 L (90 gal) per capita per day (USGS 2005), the potential increase of 918 residents would increase demand by 313,000 L/d (82,600 gal/d), close to the excess capacity of the local water system. The impact on water and sewer systems could, therefore, be significant.

Police, Fire, and Medical

The temporary increase in the construction workforce and the construction operations for a new nuclear facility can increase the burden on local fire and police departments. The impact on any one community would be minimized by the dispersal of the construction workforce in the more populous areas of surrounding communities. The impact on the local police and fire departments could result in the need for local communities to hire additional police or fire department staff, buy additional vehicles, build new facilities, and improve existing facilities. The additional tax revenues from the influx of construction staff would, in part, help offset the cost to expand local police and fire departments. The impact would further be offset by the benefits provided to local residents because of improvements in public safety departments and in increased employment in these departments. There are significant local concerns that the current tax structure, which provides a fixed dollar amount to Claiborne County from taxes on GGNS Unit 1, will not provide enough funds to offset the increased demand on local public resources, which would lead either to local tax increases, a deterioration in service, or both (Scott 2004).

Eleven hospitals with a total capacity of about 3000 hospital beds are located in Claiborne and the surrounding Mississippi counties. It is expected that minor injuries to construction workers can be treated or assessed by onsite medical personnel and supplies. Other injuries would be treated at one of eleven hospitals located in the contiguous Mississippi counties, depending on capacity and ability to treat specific injuries. Detailed information concerning the capacity of the hospitals in Claiborne County and the adjacent Mississippi counties is provided in Section 2.8.2.6 of this document. Specific agreements have been established with local medical care suppliers to support emergency planning (SERI 2005). It is expected that these arrangements would be updated to support the new facility. A new medical center has recently been constructed in Vicksburg (56 km/35 mi from the site on Highway 61 North) with a full range of major medical capability. It is anticipated that Port Gibson Hospital would accept construction injuries. However, more serious injuries would be routed to medical centers more capable of handling severe injuries, including River Regional Medical Center and Parkview Hospital (SERI 2005). Based on the size and availability of medical services in Claiborne and especially the immediate surrounding counties, the temporary construction workers would not overburden existing medical services.

Social Services

Under the assumption that the construction workforce would come from the region, the main social impact of the proposed construction would be most related to the transportation network in the vicinity of the Grand Gulf ESP site. If it is assumed that workers who relocate would settle in the more urban nearby communities of Vicksburg, Natchez, and Jackson, Mississippi, then the relative social impact of such an in-migration to these areas would not be noticeable, given the population of the areas. Overall, the impact of construction on social services should be small.

Summary of Public Services

SERI stated that it expects only about half of the construction workforce to come from outside the region, and it is likely that in-migrating workers would choose to live in the larger cities of the region and would, therefore, have a dispersed effect on public services. Although some water and sewer systems are reaching capacity, it is likely that they would have to be expanded anyway to meet normal growth. While there are limited police, fire, and medical facilities in the vicinity of the plant, the cooperative operational linkages between many of the local governments provides a considerable backup capability. Taken together, the impacts on public services likely would be small.

Construction Impacts at the Proposed Site

4.5.4.5 Education

Assuming that 3150 construction workers would be required for a new nuclear power plant at the Grand Gulf ESP site, and if the construction-related population increase of 6300 distributed itself in the same way as the current GGNS-related population, the impacts could be considerable in Port Gibson, which could experience an increase of 460 children (230 households times two students per household) in a district that has only 2011 total students (see Table 2-18). In that case, the impacts of building and staffing additional school facilities likely would be moderate, assuming some level of State impact assistance. However, if, as expected, most of the construction workforce lives outside of Claiborne County, the other school districts in the region likely to receive students are larger than Port Gibson or have sufficient capacity planned to absorb the potential increases in enrollment related to construction. The impacts on these other districts likely would be small (Scott 2004).

4.5.4.6 Summary of Infrastructure and Community Services

Based on information supplied by SERI, staff interviews conducted with public officials in Claiborne, Jefferson, and Warren counties, and staff review of data concerning the current availability of services and current state and community planning efforts, the staff concludes that the construction impacts on the regional infrastructure and community services would be SMALL in most of the region. The estimated workforce of 3150 would have a SMALL effect on the transportation network in the vicinity and region because several permanent transportation mitigation measures are being implemented that will remove most remaining bottlenecks. The site is relatively isolated, industrial in nature, and well masked by forest in most directions so the impacts on aesthetics would be SMALL, as would the impacts on recreation. The impacts on public services and infrastructure would be SMALL throughout the region, unless Claiborne County draws a substantial share of the in-migrating construction workforce, which is not expected. In that case, the impacts on housing and education in Claiborne County could be MODERATE.

The conclusion of MODERATE impacts by the NRC was predicated on certain assumptions made by the staff; these include: that there would be no more than 3150 new construction workers at the Grand Gulf ESP site, that no less than 50 percent of these workers would come from the 80-km (50-mi) region surrounding the site, that new workers would tend to live in the larger communities in the region (but could still result in a significant relative increase of population in Claiborne County), and that the state would provide some financial help if the school system were seriously affected by in-migration. The NRC staff would have to confirm these assumptions at the CP or COL stage and determine whether there would be any new and significant information that would change this conclusion.

4.5.5 Summary of Socioeconomic Impacts

Based on information supplied by SERI; staff interviews conducted with public officials in Claiborne, Jefferson, and Warren counties; and the current availability of services and additional taxes that would likely compensate the need for additional services, the staff concludes the construction impacts on the local economy would be beneficial and SMALL in most of the region and probably MODERATE in Warren County (Vicksburg). The effect on tax revenues would be beneficial and SMALL, except for property tax receipts in Claiborne County, which would be LARGE and beneficial. The impacts on transportation would be SMALL. The site is relatively isolated, industrial in nature, and well masked by forest in most directions so the impacts on aesthetics would be SMALL, and the impacts on recreation would be SMALL as well. The impacts on public services would be SMALL throughout the region, unless Claiborne County draws a substantial share of the in-migrating construction workforce, which is not expected. In that case, the impacts on housing and education in Claiborne County could be MODERATE. The overall range of impacts on infrastructure and community services would be SMALL to MODERATE.

Given the assumptions made in the previous subsections, the staff concludes that the overall tax benefit would be much larger than any adverse impacts and the net socioeconomic impact would be LARGE and beneficial. These conclusions are predicated on a number of assumptions made by the applicant and the staff. The NRC staff would have to confirm these assumptions at the CP or COL stage and determine whether there is any new and significant information that would change these conclusions.

4.6 Historic and Cultural Resource Impacts

The National Environmental Policy Act of 1969 (NEPA) requires Federal agencies to take into account the potential effects of their undertakings on the cultural environment, which includes archaeological sites, historic buildings, and traditional places important to local populations. The National Historic Preservation Act of 1966 (NHPA), as amended, also requires Federal agencies to consider the impact on those resources if they are eligible for listing on the National Register of Historic Places (such resources are referred to as "Historic Properties" in the NHPA). As outlined in "Coordination with the National Environmental Policy Act," 36 CFR 800.8, the NRC is coordinating compliance with Section 106 of the NHPA in meeting the requirements of NEPA.

The NRC determined that construction, operation, and decommissioning of new nuclear units at the Grand Gulf ESP site is an undertaking that could possibly affect either known or potential historic properties. Therefore, in accordance with the provisions of the NHPA and NEPA, the NRC is required to make a reasonable and good-faith effort to identify historic properties in the

Construction Impacts at the Proposed Site

areas of potential effect and, if present, determine if any significant impact is likely to occur. Identification is to occur in consultation with the State Historic Preservation Officer, American Indian Tribes, interested parties, and the public. If significant impact is possible, efforts should be made to mitigate it.

To determine if significant archaeological and historic resources have been identified or may exist at the Grand Gulf ESP site, the NHPA Section 106 process is being integrated with the NEPA process, in accordance with 36 CFR 800.8. As part of this integration, an Area of Potential Effect, that is, the area within which cultural and historical sites could be affected by the proposed nuclear facility construction, was defined as

...the area at the power plant site and its immediate environs which may be impacted by land-disturbing activities associated with the construction and operation of the new unit(s) and construction of new transmission lines that may follow parallel with some of the existing transmission line systems now serving GGNS (NRC 2004q).

As part of the NEPA/NHPA integration, the NRC initiated consultation with the Advisory Council on Historic Preservation (NRC 2004q), the Mississippi Department of Archives and History (NRC 2004r), the Mississippi Band of Choctaw Indians (NRC 2004s), the Choctaw Nation of Oklahoma (NRC 2004t), and the Tunika Biloxi Indian Tribe of Louisiana (NRC 2004u). A public scoping meeting on the proposed project was held on January 21, 2004. See Section 2.9.3 of this document for additional information on these efforts.

Prior to defining the Area of Potential Effect, consideration was given to including the Grand Gulf Military Park, located adjacent to GGNS Unit 1 site, in the Area of Potential Effect because of possible visual effects from the proposed cooling tower. The park was not included because the cooling tower would not be visible from the main portions of the park. This was confirmed by an onsite visit on April 14, 2004, and discussions with park personnel (Stapp 2004).

The Area of Potential Effect includes the areas where new facilities and associated infrastructure are planned, including all areas where construction laydown yards may be located. Because laydown yards and, in some cases, associated infrastructure have yet to be determined, the Area of Potential Effect is the current Grand Gulf site boundary (see Figure 2-1). Disturbed areas within the Area of Potential Effect are considered because the extent of disturbance in many areas is not known. Previous laydown yards, for example, are clearly disturbed at the surface, but that disturbance may be relatively shallow. Some areas, primarily the area around the weather station and adjacent to Grand Gulf Mound (22-Cb-522) were farmed previously, causing significant disturbance within the plow zone. However, undisturbed deposits exist below the plow zone.

Within the Area of Potential Effect, previous cultural resource efforts have identified the presence of several archaeological sites and the potential for additional sites, as explained in Section 2.9 of this document. None of the known sites, however, are considered significant, and most are generally located away from the areas targeted for new construction. The Mississippi Department of Archives and History has identified two areas of the site where cultural resource surveys should be conducted if they are selected for construction “due to the possibility that unrecorded sites may exist” (see Figure 4-1) (SERI 2005). If these areas are selected, prior to construction these areas will be further investigated using appropriate methods such as tilling, survey, and shovel testing.

As indicated in Section 2.9.2 of this document, the Callendar House and the segment of the Grand Gulf and Port Gibson Railroad bed are not considered significant and are not located in areas planned for construction. Also, literature reviews and consultations with regional Native American tribes have not identified any traditional cultural properties in the vicinity of the proposed ESP construction area.

No analysis of cultural and historic resources was conducted for the transmission line rights-of-way. The full extent of potential land-use impacts in the transmission line rights-of-way can be estimated only after following the Federal Energy Regulatory Commission process for connecting new large generation to the grid. This process is detailed more specifically in Section 3.3. Once this process is completed, the appropriate cultural resources studies would be undertaken to ensure that resources are identified and addressed prior to construction.

In addition to assessing the known and potential occurrence for cultural resources, SERI would include cultural resource-specific written directions in their site-wide Excavation and Backfill Work Procedures, which would call for an immediate stop-work order should archaeological, historical, or other cultural resources be uncovered during excavation. The construction supervisor would be responsible for ensuring the work stoppage and for notifying the Environmental Compliance Coordinator of an inadvertent discovery. In the event that an inadvertent discovery is made, site personnel would be instructed to notify the State Historic Preservation Officer and would consult with them in conducting an assessment of the discovery to determine if additional work is needed.

The NRC staff concludes, based on the cultural resource analysis and consultation, that the potential impacts on historic and cultural resources would be SMALL. The conclusion of SMALL impacts by the NRC staff is predicated on certain assumptions made by the staff. These include the commitment made by SERI to develop procedures to provide immediate reaction and notification in the event of inadvertent discovery of cultural resources and to conduct surveys prior to construction of new transmission lines and areas identified in Figure 4-1. The procedures will be included in the site-wide Excavation and Backfill Work Procedures and will involve an immediate stop work order should archaeological, historical, or

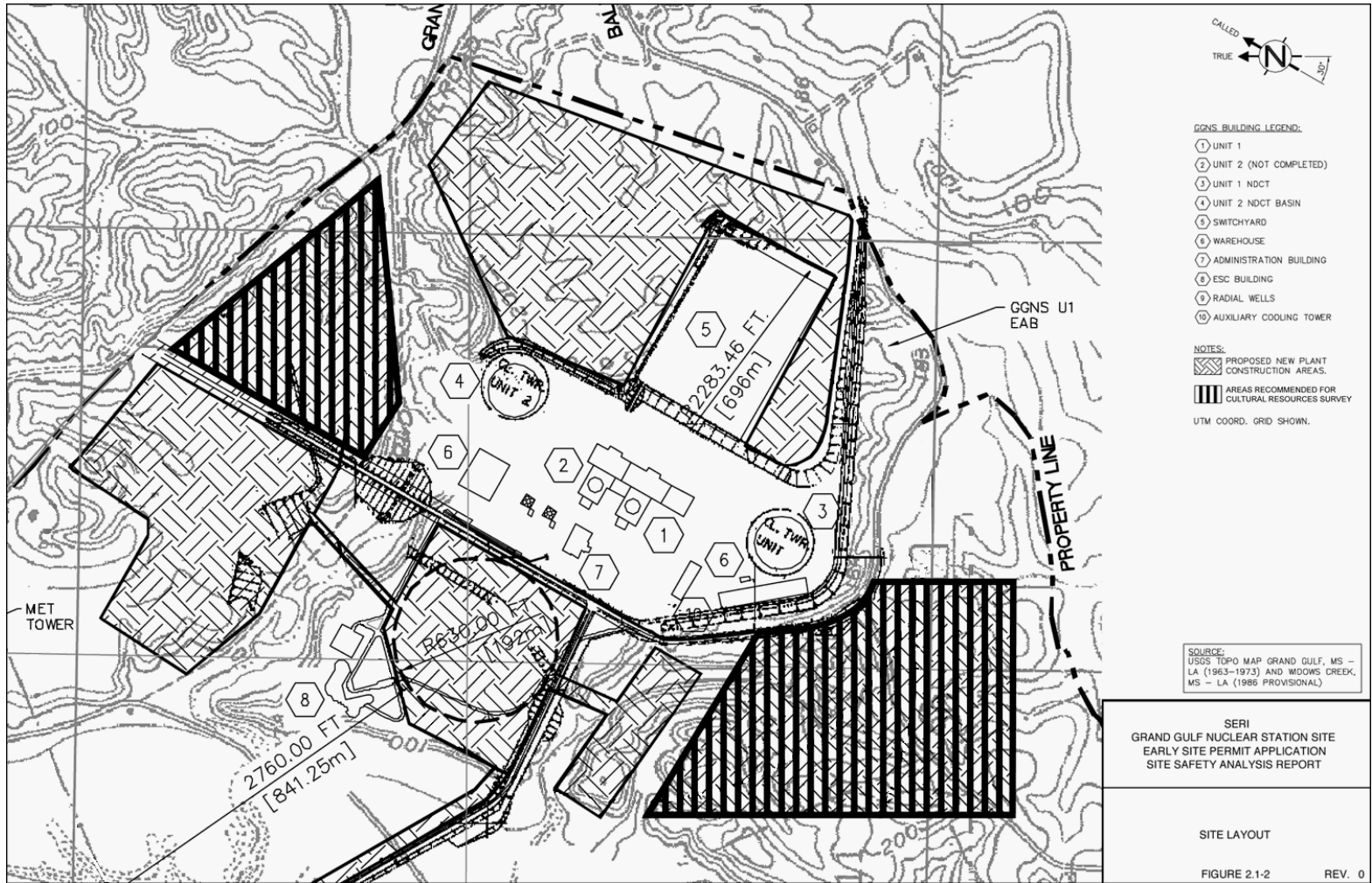


Figure 4-1. Map of Grand Gulf Site Showing Proposed Construction Areas and Locations Recommended by Mississippi Department of Archives and History for Cultural Resources Survey if Selected for Construction (adapted from SERI 2005, Figure 2.2-1)

other cultural resources be uncovered during excavation. The construction supervisor would be responsible for ensuring the work stoppage and for notifying the Environmental Compliance Coordinator of an inadvertent discovery. If such a discovery is made, site personnel would be instructed to notify the State Historic Preservation Officer and would consult with him or her in conducting an assessment of the discovery to determine if additional work is needed. If an applicant submits a CP or COL application referencing this ESP, the NRC staff's review of such an application would be a separate undertaking requiring further consultation pursuant to Section 106 of the NHPA.

4.7 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. On August 24, 2004, the Commission issued its policy statement on the treatment of environmental justice matters in licensing actions (69 FR 52040). Figures 2-12 and 2-13 in this document show the locations of minority and low-income populations around the Grand Gulf ESP site and within 80 km (50 mi) of the site.

The pathways through which the environmental impacts associated with the construction of new units at the Grand Gulf ESP site could affect human populations were ascertained. The staff then evaluated whether minority and low-income populations could be disproportionately affected. The staff found no unusual resource dependencies or practices, such as subsistence agriculture, hunting, or fishing through which the populations could be disproportionately affected. In addition, the staff did not identify any location-dependent disproportionate impacts affecting these minority and low-income populations.

4.7.1 Environmental Impacts

Based on information provided by SERI and the NRC staff's independent review, the staff concludes that construction of new units at the Grand Gulf ESP site would not result in disproportionate and adverse offsite environmental impacts on minority and low-income populations and that mitigation is not warranted.

The conclusion of SMALL impacts by the NRC staff is predicated on certain assumptions made by the staff. These include no significant demographic changes before any additional units are added to the Grand Gulf site, and no significant resource dependencies or pre-existing conditions among the minority and low-income population that have not been identified.

4.7.2 Socioeconomic Impacts

Potential adverse socioeconomic impacts during construction of a new facility include potential adverse impacts on aesthetics, schools, transportation, public safety, social services, public utilities, and recreational resources. However, impacts during the construction period would be temporary, and are judged not to be significant. Facility construction, including temporary construction areas, would be accomplished within the boundaries of the current GGNS Unit 1 site. No additional land must be procured beyond the current site, and no relocations or major alterations to local offsite roads as a result of construction of a new facility would be expected.

| A LARGE beneficial socioeconomic impact, principally on Claiborne County through its tax base and a MODERATE beneficial impact on the larger Mississippi communities surrounding the site through increased employment opportunities, could be realized by the construction of a new facility at the Grand Gulf ESP site. Construction would increase employment opportunities, both directly and indirectly, for workers within the region of the proposed Grand Gulf ESP site, and increase tax revenues. See Section 2.8 of this document for additional discussion of special provisions for tax payments made directly to Claiborne County in recognition of its role as host county to the site. If additional tax payments and planned infrastructure improvements are not made to Claiborne County to compensate for the additional burden of construction traffic and possible new residents, the staff concludes that the socioeconomic burden on local taxpayers (largely minority, and a majority of whom are low income) may be adverse, disproportionate, and MODERATE.

| The range of impacts estimated by the NRC is predicated on certain assumptions made by the staff. These include no significant demographic changes before any additional units are added to the Grand Gulf site, no changes to the terms and conditions for taxability or real property under Mississippi tax law, not more than 3150 construction workers would be employed at the Grand Gulf ESP site, not less than 50 percent of the construction workers come from the region within 80 km (50 mi) of the Grand Gulf ESP site, and most workers would choose to live in the larger cities of the region.

4.7.3 Summary of Environmental Justice Impacts

| Taken together, the impacts of plant construction on environmental justice would be SMALL for environmental impacts because no environmental pathways or preconditions of the minority and low-income population were found that would lead to adverse and disproportionate impacts. The socioeconomic impacts could range from LARGE beneficial to MODERATE adverse because local tax burdens and access to public services in Claiborne County could either greatly improve or significantly deteriorate, depending on the level of public sector obligations imposed by new residents and the level of tax revenues provided by the new units.

The conclusion of LARGE beneficial to MODERATE adverse impacts by the NRC staff is predicated on certain assumptions made by the staff. These include not more than 3150 construction workers would be employed at the Grand Gulf ESP site, not less than 50 percent of the construction workers come from the region within 80 km (50 mi) of the Grand Gulf ESP site, most workers would choose to live in the larger communities in the region, there are no significant changes in the terms and conditions for taxability of real property under Mississippi tax law, and regional populations of minority and low-income populations will remain in the same geographic locations. The specific level within the wide range of possibilities depends largely on to what extent the local communities have access to the tax base represented by the new units. The NRC staff would have to confirm these assumptions at the CP or COL stage and determine whether there is any new and significant information that would change these conclusions.

4.8 Nonradiological Health Impacts

In the environmental report (SERI 2005), SERI indicated that the physical impacts associated with construction at the ESP site may include dust, smoke, engine exhaust, and concrete operations as sources of air pollution during construction of the new nuclear unit(s). The area around the Grand Gulf ESP site is predominantly rural with a population in 2002 of approximately 7250 people within a 16-km (10-mi) radius of the site. No significant industrial or commercial facilities are located or planned in this area. The following sections discuss the results of the staff's assessment of nonradiological health impacts for the Grand Gulf ESP site.

4.8.1 Public Health and Occupational Health

SERI stated in the environmental report (SERI 2005) that the public would not be close to the construction site and, therefore, it is unlikely that physical impact would be considered more than an annoyance or nuisance. No one lives within 300 m (1000 ft) of the site. In addition, the impact would be temporary. It is not expected that fugitive dust emissions or noise from construction equipment would reach local residents.

The staff expects construction workers and personnel working onsite to be exposed to fugitive dust, gaseous effluents, and noise resulting from construction activities. Operational controls would be imposed to mitigate dust, such as wetting unpaved roads and construction areas. Cleared areas would be mulched or seeded to reduce wind-blown dust. The concrete facility would be equipped with dust-control systems to minimize releases of concrete dust (SERI 2005). To prevent excessive exhaust emissions, construction equipment that uses gasoline or diesel fuel would be inspected and repaired or replaced routinely.

Construction Impacts at the Proposed Site

In general, human health risks for construction workers and personnel working onsite are expected to be dominated by occupational injuries (e.g., falls, electrocution, and asphyxiation) to workers engaged in activities such as construction, maintenance, and excavation. Historically, actual injury and fatality rates at nuclear reactor facilities have been lower than the average U.S. industrial rates. Occupational injury and fatality risks are reduced by adherence to NRC and Occupational Safety and Health Administration (OSHA) safety standards, practices, and procedures. Appropriate State and local statutes must also be considered when assessing the occupational hazards and health risks associated with construction. The staff assumes adherence to NRC, OSHA, and State safety standards, practices, and procedures during construction activities.

The staff reviewed the information in the SERI environmental report and concludes that nonradiological health impact on the site preparation and construction workers and local population would be SMALL, and additional mitigation would not be warranted.

4.8.2 Noise Impacts

Large construction projects involve many noise-generating activities. Regulations governing noise from construction activities are generally limited to worker health. Federal regulations governing construction noise are found in 29 CFR Part 1910 and 40 CFR Part 204. The regulations in 29 CFR Part 1910 deal with noise exposure in the construction environment, and the regulations in 40 CFR Part 204 generally govern the noise levels of compressors.

Activities associated with construction of a new nuclear power facility at the Grand Gulf ESP site would generate noise levels typical of larger construction projects. The PPE indicates that maximum construction noise would be between 76 and 101 dBA at a distance of 15 m (50 ft) from the source (SERI 2005). Noise levels for common construction activities are typically about 90 dBA at a distance of 3 m (10 ft). At 30 m (100 ft), the noise level would be about 70 dBA, and at a distance of 300 m (1000 ft), the noise level would be 50 dBA. A 10-dBA decrease in noise level is generally perceived as cutting the loudness in half. A few activities, such as jack hammers, have noise levels of about 110 dBA. The staff estimates that a 110-dBA noise level for a jack hammer would be reduced to about 70 dBA at 300 m (1000 ft) and would be even lower at the nearest residence.

Many of the construction activities at the Grand Gulf ESP site would take place near the existing GGNS Unit 1. Therefore, the potential for loud noises exists near the Unit 1 workforce. However, most of the workforce work indoors, which will reduce their exposure. For those Unit 1 workers who will be outside, training and noise protection would be provided. If it is necessary to do any blasting, the activity would be performed during the day to be less distracting to the local population.

4.8.3 Summary of Nonradiological Health Impacts

The staff reviewed the information in the SERI environmental report (SERI 2005) and concludes that nonradiological health impacts on construction workers, workers at the current GGNS Unit 1 facility, and the local population from fugitive dust, occupational injuries, and noise would be SMALL, and additional mitigation would not be warranted.

4.9 Radiological Health Impacts

The sources of radiation exposure to site preparation and construction workers include direct radiation and gaseous radioactive effluents from GGNS Unit 1 during the site preparation and construction phase. Exposure to liquid radioactive waste discharges is expected to be negligible. SERI (2005) noted that all major construction activities are expected to occur outside of the GGNS Unit 1 protected area boundary but inside the restricted site boundary (exclusion area).

4.9.1 Direct Radiation Exposures

In its environmental report, SERI (2005) identified two principal sources of direct radiation exposure from the GGNS Unit 1 facility. These sources are skyshine from the nitrogen-16 source from the main turbine steam cycle and exposure from the condensate water storage tank. A minor contributor to direct radiation would also be from airborne emissions released from the facility. The staff did not identify any additional sources of direct radiation during the site visit or during documentation reviews.

In its environmental report, SERI (2005) estimated direct radiation exposure to workers from measurements taken from thermoluminescent dosimeters (TLDs) used in the radiological environmental monitoring program (REMP). These TLDs are located on an inner ring around the general area of the GGNS boundary, at the protected area boundary surrounding the facility, and on an outer ring located approximately 4.8 to 8 km (3 to 5 mi) from the site (SERI 2005). SERI used the data from the *2001 Annual Radiological Environmental Operating Report* (Entergy 2002b). The TLDs are read quarterly. SERI compared data for the years 1999 through 2002 and determined that the data for 2001 were representative for the site for the purposes of the ESP evaluation based on the average annual capacity factor of 93.6 percent for 2001 (SERI 2004d).

The location of the proposed power block and the normal heat sink cooling towers is west/northwest of the existing unit. The radiation levels measured by TLDs on the protected area boundary (at the protected area fence) in the west/northwest sectors are approximately 10 mrem per quarter, or essentially background, because the proposed construction site is beyond

Construction Impacts at the Proposed Site

the protected area fence, the radiation levels at that location are also expected to be essentially background levels. Other proposed construction areas are located south and east of the operating unit, all more than 76 m (250 ft) beyond the TLDs on the protected area fence. SERI used the average reading of the 16 TLDs on the protected area fence (approximately 0.375 mSv [37.5 mrem] per quarter) to determine the average dose rate for all areas proposed for new construction. Based on an occupational exposure period of 2080 hours per year, the dose rate of 0.375 mSv (37.5 mrem) per quarter would result in a dose to a worker of 0.36 mSv (36 mrem) per year. Because the areas proposed for new construction are all located beyond the protected area fence line, the dose rates in these areas will be lower than those measured at the fence line, due to the increased distance from the existing unit. Most of the construction effort would be west of the operating unit. The reading from TLDs located on the west/northwest side of the protected area fence are essentially background levels (averaging approximately 0.1 mSv (10 mrem) per quarter). Proposed construction activities are planned east of the operating unit, where the protected-area-fence TLDs have higher readings. However, these activities would take place over 76 m (250 ft) beyond the protected area fence, resulting in lower dose rates than indicated by the protected-area-fence TLD readings.

SERI maintains that the direct-dose contribution from shynshine from nitrogen-16 and exposure from the condensate water storage tank would be accounted for in the protected-area-fence TLD readings. The annual site construction workforce dose is estimated to be 1.12 person-Sv (112 person-rem) (SERI 2005), based on an assumed construction workforce of 3150. Adjustments for background dose were not made for the assessment of dose to the workers.

The staff's evaluation included a review of the proposed construction areas and recent records of dose rates, the locations of the TLDs, and the procedure used for estimating doses to members of the public in controlled areas. Based on this review, the staff concludes that the method used to estimate doses to workers from direct radiation from the existing GGNS Unit 1 would be acceptable.

4.9.2 Radiation Exposures from Gaseous Effluents

Gaseous effluents from GGNS Unit 1 are released from four points: the radwaste building vent, the turbine building vent, the containment building vent, and the auxiliary building vent. The maximum total body dose rate from airborne releases for 2001 was 0.0013 mSv/yr (0.13 mrem/yr) based on data from the 2001 *Annual Radiological Effluent Release Report* (Entergy 2002a). SERI considers that, on an annual basis, the dose to workers from gaseous effluents would be insignificant (approximately 0.001 person-Sv or 0.1 person-rem) with respect to the dose from direct radiation and that this dose would be accounted for in the protected-area-fence TLD readings. This is based on an assumed construction workforce of 3150 persons and an occupational exposure period of 2080 hours per year.

The staff reviewed the data from the 2001 *Annual Radioactive Effluent Release Report* (Entergy 2002a) and from more recent years and found that 2001 data were typical of effluents in recent years. The staff also determined that the method for estimating dose from gaseous effluents was acceptable.

4.9.3 Radiation Exposures from Liquid Effluent

Liquid effluents from GGNS Unit 1 are combined with the cooling tower blowdown in the discharge basin and released to the Mississippi River at the existing barge slip. Any of the construction activities for the new facility would be upstream from the release point of the current plant. For 2001, the maximum individual whole body dose from liquid effluent was calculated to be 0.00018 mSv/yr (0.018 mrem/yr). SERI considers that, on an annual basis, the dose to site preparation and construction workers from liquid effluents would be insignificant (approximately 0.0006 person-Sv/yr (0.06 person-rem/yr)) with respect to the dose from direct radiation.

The staff reviewed the data from the 2001 *Annual Radioactive Effluent Release Report* (Entergy 2002a) and from more recent years and found that 2001 data were typical of effluents in recent years. The staff also determined that the method for estimating dose from liquid effluents was acceptable.

4.9.4 Total Dose to Construction Workers

SERI (2005) estimated an annual dose to a construction worker of 0.36 mSv (36 mrem) from the direct radiation pathway. Doses from liquid and gaseous releases are negligible compared to the dose from direct radiation. This estimate is well within both the dose limit to the public found in 10 CFR 20.1301 and occupational dose limits to construction workers found in 10 CFR 20.1201. The maximum estimated annual collective dose to workers, based on an annual individual dose of 0.36 mSv (36 mrem) and an estimated workforce of 3150 workers, is 1.12 person-Sv (112 person-rem). This compares to the approximately 9.5 person-Sv (950 person-rem) the workers would receive from natural background radiation (i.e., 3150 workers times 3 mSv/yr (300 mrem/yr)) (NCRP 1987). The annual dose limit to an individual member of the public is 1 mSv (100 mrem) total effective dose equivalent and less than 0.02 mSv (2 mrem) in any 1 hour. The annual occupational dose limit is 0.05 Sv (5 rem) total effective dose equivalent.

4.9.5 Summary of Radiological Health Impacts

Having reviewed SERI's estimate of dose to workers during site preparation and construction activities, the staff found the doses to be well within NRC exposure limits designed to protect

Construction Impacts at the Proposed Site

| the public health, even if workers exceed the 2080 hour per year occupancy factor. Assuming
| the location of the proposed new nuclear unit or units does not change, the staff concludes that
| the impact of radiological exposures to site preparation and construction workers would be
SMALL, and mitigation is not warranted. At the CP or COL stage, the staff will verify that the
location of the new unit(s) is/are in the location proposed in the ER.

4.10 Measures and Controls to Limit Adverse Impacts

| The staff relied, in their evaluation of environmental impacts during construction activities for
the proposed new units at the Grand Gulf ESP site, on SERI's compliance with the following
regulatory requirements:

- Compliance with applicable Federal, State, and local laws, ordinances, and regulations intended to prevent or minimize adverse environmental impacts (for example, solid waste management, erosion and sediment control, air emissions, noise control, storm water management, spill response and cleanup, and hazardous material management)
- Compliance with applicable requirements of existing permits and licenses (for example, NPDES permit and operating license) for the existing unit and other permits or licenses required for construction of the new units
- Obtaining a permit from MDEQ and compliance with county ordinances if burning of construction materials is required
- Obtaining an NPDES permit related to accidental spills and storm water runoff.

| The following plant species were not addressed in SERI's environmental report (SERI 2005),
but were identified by the staff in Section 2.7.1.2 as plants to be avoided if they are documented
in the area prior to construction: American bittersweet (*Celastrus scandens*), glade fern
(*Diplazium pycnocarpon*), hairy waterclover (*Marsilea vestita*), and jug orchid (*Platythelys
quercetica*).

| In the event that a new nuclear power plant were constructed at the Grand Gulf ESP site, the
staff assumed that local governments would need additional resources to provide public
services—especially safety, medical, and schools.

| SERI specifically identified the following general plans or specific mitigation measures in its
environmental report (SERI 2005, Table 4.6-1) upon which the staff relied in its evaluation:

Construction Impacts at the Proposed Site

- Minimizing land cover impact by careful construction techniques and reclaim land disturbed by construction to the maximum extent possible (environmental report, Sections 4.1.1, 4.3.1, 4.4.1) |
- Using standard noise protection and abatement procedures during construction. Provide hearing protection to onsite personnel if needed. Move excessively loud activities to daytime hours if necessary (environmental report, Sections 4.1.4, 4.4.1) |
- Surveying areas prior to disturbance for archaeological resources, followed by data recovery, if necessary (environmental report, Section 4.1.3) |
- Stabilizing embayment banks with riprap or other appropriate means during and following construction, and following requirements of ACE (environmental report, Sections 4.2.1, 4.2.2, 4.3.2) |
- Implementing site-specific storm water pollution prevention plans; maintaining vegetative cover on land not in active construction; routing runoff to existing sedimentation basins, and monitoring discharges in accordance with NPDES and State water-quality standards and requirements (environmental report, Sections 4.2.1, 4.2.2, 4.3.2) |
- Using tieback walls or similar control technology to limit effects of dewatering in accordance with applicable MDEQ regulations (environmental report, Sections 4.2.1, 4.2.2) |
- Preventing contaminants from entering the aquatic system through use of a Spill Prevention Control and Countermeasure Plan (environmental report, Section 4.3.2) |
- Segregating excavated topsoil for replacement in pipeline trench to allow wetland characteristics to be restored; confining construction to low-water periods to minimize disturbance of wetland soils; using low-weight construction equipment or operate from protective surfaces, and reseeded following construction (environmental report, Section 4.3.1) |
- Modifying construction activities as necessary to avoid nesting or similar critical life history periods (environmental report, Section 4.3.1) |
- Avoiding removal of isolated mixed hardwood-loblolly pine stand north of the switchyard (environmental report, Section 4.3.1) |

Construction Impacts at the Proposed Site

- Avoiding areas where square-stemmed monkeyflower (*Mimulus ringens*) occurs, if documented prior to construction (environmental report, Section 4.3.1)
- Conducting surveys for species of special concern prior to construction activities (environmental report, Section 4.3.1)
- Controlling air emissions, if necessary, to meet requirements of applicable air regulations and onsite permits. Open burning would be done in burn pits in compliance with MDEQ regulations (environmental report, Section 4.4.1)
- Controlling dust by water spray, reseeding, and mulching, as necessary; equipping concrete batch plant with dust suppression equipment (environmental report, Section 4.4.1)
- Implementing flexible construction shifts and Unit 1 operation shifts to minimize impact on local traffic (environmental report, Section 4.4.2).

4.11 Summary of Construction Impacts

Table 4-3 shows the staff's impact level characteristics as SMALL, MODERATE, or LARGE as a measure of their expected adverse environmental impacts, if any. A brief statement in the "Comments" column explains the basis for the impact level. Some impacts, such as the addition of tax revenue for the local economies, are beneficial. The beneficial aspect is also reflected in the "Comments" column.

Impacts related to land use (site and vicinity, transmission line rights-of-way), water use, and terrestrial ecology were estimated for the purpose of comparison to alternatives, but are not resolved because significant information on the proposed action is lacking at the ESP stage. An applicant for a CP or COL that references the Grand Gulf ESP would need to provide this information to enable analysis at that time.

Construction Impacts at the Proposed Site

Table 4-3. Characterization of Impacts from Construction of One or More Nuclear Units at the Grand Gulf Early Site Permit Site

Category	Comments	Impact Level
Land-use impacts		
Site and vicinity	Construction activities would take place within existing site boundaries.	Unresolved, likely to be SMALL
Transmission line rights-of-way	Additional capacity needed for full plant parameter envelope to be accommodated through upgrades of existing lines.	Unresolved, likely to be SMALL
Air quality impacts		
	Construction activities would be conducted in accordance with applicable Mississippi Department of Environmental Quality (MDEQ) requirements, and dust and emissions would be minimized through dust control measures.	SMALL
Water-related impacts		
Hydrological alterations	Impacts would be localized and temporary. MDEQ and U.S. Army Corps of Engineers permit processes would minimize impacts.	SMALL
Water use	Construction would require minimal water use.	Unresolved, likely to be SMALL
Water quality	Construction would be conducted using best management practices to control spills and storm water runoff.	Unresolved, likely to be SMALL
Ecological impacts		
Terrestrial ecosystems	Alterations to hardwood forest would be noticeable but not destabilizing.	Unresolved, likely to be MODERATE
Aquatic ecosystems	Construction impacts on aquatic resources would be temporary and spatially limited.	SMALL
Threatened and endangered species	Construction impacts on Federally listed and State-listed species and their habitat in the area would be minor.	SMALL

Construction Impacts at the Proposed Site

Table 4.3. (contd)

Category	Comments	Impact Level
Socioeconomic impacts		--
Physical impacts		SMALL
Workers/local public	Construction would take place within existing site boundaries, so impact on the public would be minimal. Impact on workers would be mitigated with training and protective equipment.	–
Buildings	Construction would not affect any offsite buildings, and onsite buildings were constructed to withstand vibration from construction activities.	–
Roads	Growth would put pressure on local road systems, but traffic control and management measures would protect any local roads during construction.	–
Aesthetics	Construction activities would be temporary and would occur on a site already occupied by a nuclear power facility.	–
Demography	Percentage of construction workers relocating to the region likely would be small relative to the existing population base unless concentrated in Claiborne County.	LARGE
Social and economic		LARGE Beneficial
Economy	Economic impact of construction overall would be beneficial to local economies.	–
Taxes	Degree of impact depends on the distribution of tax revenues to county or state; generally impact is beneficial, especially for property taxes. Under current tax laws, the beneficial impact of additional taxes would be large in Claiborne County.	–

Construction Impacts at the Proposed Site

Table 4.3. (contd)

Category	Comments	Impact Level
Infrastructure and community service		MODERATE
Transportation	Planned upgrades and traffic management plans would reduce temporary construction transportation impact.	–
Recreation	Visual impact of construction would be limited at the Grand Gulf Military Park.	–
Housing	Adequate housing is available in the greater Vicksburg area to handle construction workers. If workers concentrate in Claiborne County, the impact could be moderate.	–
Public services	Public services are adequate for any temporary influx of workers resulting from construction at the Grand Gulf ESP site.	–
Education	Adequate infrastructure exists to support the temporary influx of workers if they settle primarily outside of Claiborne County. If they settle in Port Gibson, however, impacts could be moderate.	–
Historic and cultural resource impacts	Proposed construction area is previously disturbed, and SERI would incorporate cultural resource protection directions in their site-wide excavation and backfill work procedures.	SMALL
Environmental justice impacts	Under current Mississippi tax law, adequate resources exist to accommodate changes required in Claiborne County.	LARGE Beneficial
Nonradiological health impacts	Emission controls and remote location of the proposed Grand Gulf ESP site would keep nonradiological health impacts small. Occupational health impacts related to construction would be within the bounds of other similarly sized construction projects.	SMALL
Radiological health impacts	Exposures would be below annual occupational and public dose limits.	SMALL

4.12 References

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29 CFR Part 1910. Code of Federal Regulations, Title 29, *Labor*, Part 1910, “Occupational Safety and Health Standards.”

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