10.4 Benefit-Cost Balance

The benefits and costs of constructing and operating STP 3 & 4 are discussed in the following paragraphs. The results are summarized in Table 10.4-2. Costs are given as monetary (where feasible), quantitative, or qualitative.

A summary of the overall benefits and costs of the proposed project and the comparison to the alternative sites, discussed in Section 9.3, is included in Subsection 10.4.3. Table 10.4-3 is a comparative summary of the benefits of the proposed project and alternative sites. Table 10.4-4 summarizes the unavoidable adverse impacts, which could be considered qualitative costs, of the proposed project at the alternative sites and measures and controls to reduce environmental impacts.

10.4.1 Benefits

10.4.1.1 Need for Power

STP 3 & 4 will each generate approximately 1350 MWe for a total of approximately 2700 MW. Assuming a reasonably low capacity factor of 85%, the two-unit plant average annual electrical-energy generation would be more than 20,000,000 MW-hours. A reasonably high capacity factor of 93% would result in approximately 22,000,000 MW-hours of electricity.

As discussed in Chapter 8, the Electric Reliability Council of Texas (ERCOT), the independent system operator for the electric grid for most of Texas, conducted several studies on the need for power in their service area. ERCOT has concluded that a significant amount of new generation will be needed to meet the demand projected for 2016 along with maintaining the recommended minimum of a 12.5% reserve margin. The addition of 20,000,000 to 22,000,000 MW-hours of electricity from STP 3 & 4 will help maintain system reliability by increasing the availability of baseload power in the ERCOT distribution area.

10.4.1.2 Fuel Diversity and Natural Gas Alternative

Fuel diversity is the key to affordable and reliable electricity. A diverse fuel mix protects electric companies and consumers from contingencies such as fuel unavailability, price fluctuations, and changes in regulatory practices (Reference 10.4-1). Experience has shown that it is risky to develop an over-reliance on any one energy source. In fact, a balanced energy portfolio has been the key to providing the United States with a growing supply of affordable electricity for the past 30 years (Reference 10.4-2).

Nuclear power plants currently generate approximately 20% of the electricity produced in the United States; however, recent electric generating capacity additions and projected future additions are primarily fueled by natural gas. According to the Department of Energy, an over-reliance on a single fuel source, like natural gas, is a potential vulnerability to the long-term security of our nation's energy supply. Additional new nuclear plants must be built in the next decade to address increasing concerns over air quality and to ease the pressures on natural gas supply (Reference 10.4-3). The ERCOT region fuel mix consists of approximately 46.6% natural gas, 37.4% coal,

13.6% nuclear, 1.9% renewables and 0.4% from other sources (actual energy production values June 2005–May 2006) (Reference 10.4-4).

Maintaining fuel diversity is a matter of maintaining a balance of fuel mixes. Relying heavily on natural gas is a matter of choosing a limited resource over more abundant fuels. High prices for natural gas and the intense, recurring periods of price volatility experienced over the last several years are influenced partly by demand for natural gas in the electric generation sector. Electric sector demand for natural gas is being driven by new gas-fired electric generating capacity built in the United States during the last decade. More than 90% of all new electric generating capacity added over the past 5 years is fueled with natural gas. New nuclear plants provide forward price stability that is not available from generating plants fueled with natural gas. The intense volatility in natural gas prices experienced over the last several years is likely to continue, and leaves the U.S. economy vulnerable. Although nuclear plants are capital-intensive to build, the operating costs are stable and dampen the volatility elsewhere in the electricity market (Reference 10.4-5). Natural gas has uses that are not readily served by other fuel choices, such as many manufacturing processes. This led the U. S. House of Representatives to prepare a Majority Staff report that included the following findings (Reference 10.4-6):

- To enhance competitiveness and protect American jobs, natural gas must not be used for baseload electricity generation or for new generating capacity. Natural gas should be reserved for industries that use it as a feedstock or for primary energy—and cannot substitute for it by fuel-switching.
- Nuclear energy must become the primary generator of base load electricity, thereby relieving the pressure on natural gas prices and dramatically improving atmospheric emissions.

For Texas, the addition of STP 3 & 4 would represent a step towards maintaining what has been a successful mix of fuel types for generating electricity. STP 3 & 4 will help maintain the state's fuel diversity while meeting state and national goals of creating new baseload generation that would not use natural gas as a fuel.

10.4.1.3 Emissions Reduction

Nuclear generation contributes considerable air quality benefits to the nation. Unlike electricity generated from coal and natural gas, nuclear energy does not result in significant emissions of air pollutants associated with global warming and climate change (e.g., nitrogen oxides, sulfur dioxide, carbon dioxide) or methyl mercury (Reference 10.4-6). Fossil fuel-fired power plants are responsible for 64% of the nation's sulfur dioxide emissions, 26% of nitrogen oxide emissions, 33% of mercury emissions, and 36% of man-made carbon dioxide emissions. The majority of the industry's emissions are from coal-fired plants (Reference 10.4-6).

Subsections 9.2.3.1 and 9.2.3.2 analyze coal- and gas-fired alternatives to STP 3 & 4, respectively. Air emissions from these alternatives and for nuclear power are summarized in Table 10.4-1.

Regardless of which reasonable alternative one compares to nuclear power, STP 3 & 4 would represent a substantial benefit in emission reduction, or emission avoidance, assuming that an alternative power source would be constructed if STP 3 & 4 were not.

10.4.1.4 Advantages of Nuclear Power

Concerns about global warming and climatic change make it reasonable to expect that, eventually, the United States may have to strictly curb emissions from fossil-fuel electric generation plants, conceivably to the point of displacing coal- and gas-fired electricity generation. If environmental policies greatly restrict carbon emissions in the future, the cost of building and operating fossil-fired plants could increase by 50% to 100%. Nuclear power is the only technology currently available that is a viable alternative to fossil-fired plants for baseload generation. In view of the time that it takes the nuclear industry to regain its capacity for construction and operation, the prospect of needing nuclear power to displace fossil-fuel power is one of the reasons for national concern with maintaining a nuclear energy capability (Reference 10.4-7).

10.4.1.5 Licensing Certainty

The regulatory scheme used for the existing domestic fleet of nuclear plants, under 10 CFR 50, was a two-step process that resulted in much uncertainty about cost projections and, in retrospect, final costs. This was due, in part, to the fact that the industry had to make large capital investments before resolving licensing issues. In large, capital-intensive construction projects, interest costs are a significant portion of the project cost. Interest charges on overnight capital costs account for a quarter of the levelized cost of electricity from nuclear power plants (Reference 10.4-7). For existing nuclear power plants built under 10 CFR 50, licensing delays quickly and substantially increased project cost. Design changes, whether driven by licensing concerns, backfit requirements, or other factors, had similar effects.

STPNOC is looking to NRC's 10 CFR 52 process to increase the licensing certainty of proposed new nuclear power plants. This new regulatory process provides for early resolution of siting issues before making large investments of financial capital and human resources in new plant design and construction, early resolution of issues on the environmental impacts of construction and operation of proposed reactors, the ability to bank sites on which nuclear plants may be located, and the facilitation of future decisions on whether to build new nuclear plants. STPNOC believes that the resultant increase in licensing certainty will reduce project costs by decreasing premiums associated with uncertainty and making licensing and construction scheduling more controllable and reliable.

10.4.1.6 Tax Payments

During construction, STPNOC has projected the sales tax payments to be an estimated $23.9 million per unit, with $5.8 million due to Bay City and $18.1 million to the state of Texas over the construction period. These payments would provide a total of $11.6 million to Bay City over the 7-year construction period. Increased tax revenues will also come from housing purchases by the incoming workforce and increased school and property taxes as a result of the construction of STP 3 & 4.

The owners will pay property taxes on STP 3 & 4 for the duration of the 40-year operating licenses. Matagorda County receives the taxes paid on STP property. As described in Subsection 5.8.2.2.2, over the life of the plant, annual franchise tax payments could range from approximately $4.7 million during initial operations to approximately $10 million in the last years of the 40-year operational life. Additional tax revenue would be generated from sales and use taxes, and property taxes on the operational workforce housing. Most people consider large tax payments a benefit to the taxing entity because they support the development of infrastructure which supports further economic development.

10.4.1.7 Local Economy

STP 3 & 4 would require a construction peak workforce of 5950 people. As presented in Subsection 4.4.2.2.1, 4790 direct and indirect jobs would be created during the 7-year construction period, assuming that 50% of the workforce migrates into the 50-mile region. The creation of these jobs could inject between $67.6 and $676 million dollars into the regional economy during the life of the construction project, reduce unemployment by up to 20%, and create business opportunities for housing and service-related industries.

STP 3 & 4 would require an operations workforce of about 888 people. Of this total, 444 are assumed to migrate into the 50-mile region. According to the multiplier effect, for every one job at STP 3 & 4, an estimated 1.47 jobs would be created within the 50-mile region. This would result in the creation of 653 additional indirect jobs. In total, 1097 new jobs within about a 50-mile radius of the plant (Subsection 5.8.2.2.1) would be created by the startup of STP 3 & 4 and would be maintained throughout the life of the plant. Many of these indirect jobs would be in the service sector and could be filled by local residents, lessening demands on social service agencies in addition to strengthening the economy. The economic multiplier effect of the increased spending by the direct and indirect labor force created as a result of STP 3 & 4 would increase the economic activity in the region, most noticeably in rural Matagorda County. The dollar impact of these jobs, as discussed in Subsection 5.8.2.2.1, would be approximately $45,000,000 to $55,000,000 per year within the 50-mile region.

Nuclear plants such as the STP site are estimated to generate approximately $350 million in total output for the local community and roughly $60 million in total labor income. The Southern States Energy Board reference (Reference 10.4-8) does not provide specific years for the $350 and $60 million figures, nor does it specifically identify the studies done by the NEI to support this statement. However, the Southern States Energy Board is considered a reliable source of data. STPNOC believes that the Southern States Energy Board's interpretation of NEI's data is correct, reasonably current (within the late 1990s to early 2000s), and useful for this analysis, even if the exact years of the data cannot be determined. These figures include direct effects, which reflect expenditures for goods, services, and labor, and indirect effects, which include subsequent spending in the community. The economic multiplier effect is one way of measuring indirect effects. Every dollar spent by nuclear plants results in the creation of an additional $1.13 in the community (Reference 10.4-8).

10.4.1.8 Benefit Summary

Table 10.4-2 includes a summary of the benefits of the proposed project (STP Units 3 & 4). In ER Section 9.3, STPNOC evaluated environmental impacts of construction and operation of the proposed project at three alternate sites (Red 2 greenfield site, Allens Creek greenfield site, and Trinity 2 greenfield site). Two additional sites were previously selected and evaluated as alternate sites in other revisions of the ER: Malakoff and Limestone. For completeness, similar evaluations of these two sites are also included in ER Section 9.3. Table 10.4-3 provides a comparison of the benefits of construction and operation of STP Units 3 & 4 to those at the three alternate sites and the two additional sites.

10.4.2 Costs

10.4.2.1 Monetary–Construction

In evaluating the STP 3 & 4 monetary cost, STPNOC reviewed published literature, vendor information, internally generated general information, and internally generated site-specific information. There are many cost studies available in the literature with a wide range of cost estimates. STPNOC found four studies to be most authoritative due to the breadth and depth of their analyses and the fact that other studies tend to be based on them. These are:

- University of Chicago Study (Reference 10.4-7)
- MIT Study (Reference 10.4-9)
- OECD Study (Reference 10.4-10)
- EIA Study (Reference 10.4-11)

The phrase commonly used to describe the monetary cost of constructing a nuclear plant is “overnight capital cost.” The capital costs are those incurred during construction, when the actual outlays for equipment, construction, and engineering are expended. Overnight costs are exclusive of interest and include engineering, procurement, and construction costs, owner’s costs, and contingencies (Reference 10.4-7).

Estimates of overnight capital costs in 2003 dollars range from $1000 per kW to $2500 per kW (Reference 10.4-10), with $1500 to $2000 per kW being the most representative range (Reference 10.4-10). Many factors account for the range in cost, such as:

- The specific technology used
- Assumptions about the number of like-units built
- Allocation of first-of-a-kind cost
- Site location

- Parity adjustments to allow comparison between countries
- Allowances for contingencies

The estimates are not based on nuclear plant construction experience in this country, which is more than 20 years old. Actual construction costs overseas have been less than the most recent domestic construction, suggesting that the industry has learned from the domestic experience. There is an assumption that the overseas experience can be applied domestically and the studies have found the overseas experience to be most applicable to estimating the cost of new domestic nuclear plant construction (Reference 10.4-7). There is reason to believe that new reactors will be less expensive to build than those currently in operation in the United States. Over the past 30 years, there have been technological advances in construction techniques that would reduce costs. In addition, simplified, standardized, and pre-approved designs clearly result in cost savings. The newer plants have fewer components and therefore would be less expensive. Because the designs of advanced reactors are pre-approved by the NRC, much of the design work will be done before construction begins, and this will lower the costs (Reference 10.4-11)

The four studies tend to support $2000 per kW as a reasonable high-end overnight capital cost estimate. The $2500 value is based on construction in Japan. While no explanation is offered as to why the cost in Japan is so high in this study, it is reasonable to suggest that contributing factors are the high cost of living in Japan (labor accounts for more than 20% of costs) and difficulties associated with construction on an island. Construction experience with ABWR plants worldwide will be used to minimize First of a Kind Engineering (FOAKE) costs discussed in the studies. For the purposes of analysis in this environmental report, to avoid understating the cost, STPNOC has chosen to use the $2000 per kW value (year 2003 dollars). Together with an installed capacity of 2700 MWe, $2000 per kW results in a STP 3 & 4 construction cost of approximately $5.4 billion in 2003 dollars.

10.4.2.2 Monetary–Operation

The four studies discussed in Subsection 10.4.2.1 show a wide range of operation cost estimates. Operation costs are frequently expressed as levelized cost of electricity, which is the price at the busbar needed to cover operating costs and annualized capital costs. The levelized cost of a project is equivalent to the constant dollar (“real”) price of electricity that would be necessary over the life of the plant to cover all operating expenses, interest, and principal repayment obligations on project debt, taxes, and provide an acceptable return to equity investors over the economic life of the project (Reference 10.4-9). Overnight capital costs account for a third of the levelized cost, and interest costs on the overnight costs account for another 25%. Levelized cost estimates range from $36 to $65 per MW-hour (3.6 to 6.5 cents per kW hour) (Reference 10.4-7). Factors affecting the range include choices for discount rate, construction duration, plant lifespan, capacity factor, cost of debt and equity and split between debt and equity financing, depreciation time, tax rates, and premium for uncertainty. It is concluded that $65 per MW-hour (6.5 cents per kW-hour) is a reasonably conservative high-end levelized cost of electricity for nuclear generation. This includes nuclear fixed operation and maintenance and fuel costs of approximately

$60,000 per MW-hr ($60 per kW – hour) and $4.35 per MW-hr (0.435 cents per kW-hour), respectively. Decommissioning costs have been estimated for one reactor at STP to be approximately $517 million (in year 2006 dollars), consistent with the formula established by the NRC in 10 CFR 50.75.

In addition to nuclear plant costs, the four studies provide coal- and gas-fired generation costs for comparison to nuclear generation costs. One study shows nuclear costs competitive with coal and gas (Reference 10.4-10). The other studies show nuclear costs that exceed those of coal and gas. The MIT study indicates that new nuclear power is not economically competitive but goes on to suggest steps that the government could take to improve nuclear economic viability (Reference 10.4-9). Since this study, the government has undertaken those steps as follows:

- U. S. Department of Energy has provided financial support for plants testing the U. S. NRC licensing processes for early site permits and combined operating licenses.
- The U. S. government has endorsed nuclear energy as a viable carbon-free generation option.
- The Energy Policy Act of 2005 instituted a production tax credit for the first advanced reactors brought on line in the United States.

STPNOC has concluded that the government steps have negated the MIT study's conclusion that new nuclear power is not economically competitive.

10.4.2.3 Environmental and Material

Section 10.1 identifies unavoidable adverse impacts of the proposed action (i.e., impacts after consideration of proposed mitigation actions), and Section 10.2 identifies irretrievable commitments of resources. Table 10.4-2 includes these costs. The qualitative costs that are unavoidable impacts to the environment are in the general categories of land and water.

Environmental impacts of construction and operation of the proposed project at three alternate sites (Red 2 greenfield site, Allens Creek greenfield site, and Trinity 2 greenfield site) are discussed in ER Section 9.3. Two additional sites were previously selected and evaluated as alternate sites in other revisions of the ER: Malakoff and Limestone. For completeness, similar evaluations of these two sites are also included in ER Section 9.3. Table 10.4-4 describes the impacts of construction and operation of the proposed project at the three alternate sites and the two additional sites, and provides details regarding potential mitigation, and the unavoidable adverse impacts after mitigation has been considered.

Consistent with Regulatory Guide (RG) 4.2, each site was evaluated using publicly available and reconnaissance level information. Consequently, the costs of mitigation must be estimated. Many costs would be built into the project design (e.g., scheduling to ensure that construction is completed in the shortest possible time; using construction best management practices to limit erosion, fugitive dust, runoff, spills,

and air emissions; providing first aid stations at the construction site). Other cost categories would be dependent on communications between STPNOC and the affected communities to mitigate the impacts and associated costs.

10.4.3 Summary

Table 10.4-3 summarizes benefits of the proposed action in comparison to the benefits of constructing the units at alternate sites, as identified in Section 9.3. Table 10.4-4 summarizes the environmental costs (adverse impacts) associated with construction and operation of the proposed project at the three alternate sites. Most of the impacts associated with construction of the proposed project, particularly operational impacts, would be the similar regardless of the location of the site.

10.4.4 References

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10.4-3 "Nuclear Power 2010," U.S. Department of Energy, available at http://nuclear.energy.gov/np2010/neNP2010a.html, accessed March 22, 2007.

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10.4-6 "U. S. House of Representatives, Securing America's Energy Future, Majority Staff Report to Committee on Government Reform and Subcommittee on Energy and resources," Nuclear Energy Institute 2005, May 8, 2006. Available at http://www.nei.org/documents/House_Energy_Report_5-8-06.pdf, accessed March 19, 2007.

10.4-7 "The Economic Future of Nuclear Power; A Study Conducted at The University of Chicago," University of Chicago 2004, August 2004. Available at http://np2010.ne.doe.gov/reports/NuclIndustryStudy.pdf, accessed March 19, 2007.

10.4-8 "Nuclear Energy: Cornerstone of Southern Living, Today and Tomorrow," Southern States Energy Board 2006. Available at http://np2010.ne.doe.gov/ reports/NuclIndustryStudy.pdf, accessed March 19, 2007.

10.4-9 "The Future of Nuclear Power, An Interdisciplinary MIT Study," Massachusetts Institute of Technology 2003. Available at http://web.mit.edu/nuclearpower/, accessed March 19, 2007.

10.4-10 International Energy Agency, Organization for Economic Co-operation and Development, and International Energy Agency, Projected Costs of Generating Electricity; 2005 Update, available at http://www.iea/org/Textbase/ publications/free_new_Desc.asp?PUBS_ID=1472, accessed March 23, 2007.

10.4-11 "Annual Energy Outlook 2004,"Energy Information Administration. Available at http://www.eia.doe.gov/oiaf/archive/aeo04/pdf/0383(2004).pdf, accessed April 2, 2007.

Table 10.4-1 Avoided Air Pollutant Emissions

Pollutant	Coal Emissions (tons per year/ 2700 MWe) [1]	Gas Emissions (tons per year/ 2700 MWe) [1]	Nuclear Emissions (tons per year) [2]
Sulfur dioxide	2,900	41	0
Nitrogen oxides	2,000	680	0
Carbon monoxide	2,800	141	0
Carbon dioxide	27,000,000	6,900,000	0
Mercury	0.46	0	0
Particulates having a diameter of less than 10 microns	50	0	0
Particulates having a diameter of less than 2.5 microns	13	119	0

[1] Based on constructing two units to replace the power produced by STP 3 & 4 (gross power) (see Section 9.2).

[2] Nuclear power plants have emergency and auxiliary equipment that is fossil-fuel-fired and emits pollutants. The equipment is generally operated only for testing purposes for less than 250 hours per year. As such, the emissions are considered minimal and are excluded here.

Table 10.4-2 Benefit-Cost Summary

Benefit-Cost Category	Description
Benefits	
Electricity generated	20,000,000 (85% capacity) to 22,000,000 (93% capacity) MW-hours per year
Generating capacity	2700 MW (gross)
Fuel diversity and natural gas alternative	Nuclear option to coal- and gas-fired baseload generation
Emissions reduction	Avoidance of 41 to 2900 tons per year sulfur dioxide Avoidance of 680 to 2000 tons per year nitrogen oxides Avoidance of 141 to 2800 tons per year carbon monoxide Avoidance of 6,900,000 to 27,000,000 tons per year carbon dioxide Avoidance of 13 to 119 tons per year fine particulates
Advanced Light Water Reactor development	Maintaining domestic nuclear technology capability as hedge against possible need to control global warming
Tax payments (construction and operation)	Projected sales tax payments on construction goods at an estimated $23.9 million per unit, with $5.8 million due to Bay City and $18.1 million to the State of Texas over the 7 yr construction period. $4.7 to $5.4 million in franchise taxes in 2015, the first year of operation for STP 3, and an estimated $8.6 to $10.0 million in 2016, when STP 4 comes on line, and in subsequent years.
Socioeconomics	2975 direct and 1815 indirect jobs added to local economy during construction. 444 direct jobs and 653 indirect jobs added to local economy during operation. The creation of jobs during construction could inject between $67.6 and $676 million dollars into the regional economy during the life of the construction project, reduce unemployment by up to 20 percent, and create business opportunities for housing and service-related industries. The operations workforce impact on the regional economy would be estimated at between approximately $45,000,000 to $55,000,000 per year in the 50-mile region.

Table 10.4-2 Benefit-Cost Summary (Continued)

Benefit-Cost Category	Description
Costs	
Construction cost	$5.4 billion dollars (overnight capital cost)
Operating cost	6.5 cents per kW-hour (levelized cost of electricity) $60 per kW fixed O&M cost 0.435 cents per kW hour nuclear fuel cost $517 million for decommissioning of one reactor
Land use	90 acres (excluding the Main Cooling Reservoir [MCR]) occupied on long-term basis by STP 3 & 4 and associated infrastructure. On-site landfill may restrict future uses of that land. Total annual land requirements for fuel cycle support would be 21 permanently committed acres and 160 temporarily committed acres per unit.
Hydrology - Groundwater use	During operations, the expected average rate of groundwater removal for STP 3 & 4 would be ~~1077~~975 gpm for normal operations and ~~3935~~3434 gpm for maximum (peak) operations. During the construction period, dewatering of shallow, water-table aquifer would have only small, local ~~affect~~effect.
Hydrology - Surface water use	The expected rate of withdrawal of Colorado River water to replace water losses from the MCR(attributable to STP Units 3 & 4) will be ~~42,604~~22,799 ~~gallons per minute (~~gpm~~)~~ for normal two-unit operations and ~~44,779~~47,489 gpm during maximum (peak) use operations
Material (per reactor building)	240,000 yards concrete 13,000 tons structural steel 2,500,000 linear feet cable for reactor building 6,500,000 linear feet of cable for a single reactor 55,000 feet of piping having diameter >2.5 inches 17,000 metric tons of uranium

Table 10.4-3 Benefits of the Proposed Project

Benefit Category	Project as Proposed	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**STP Units 3 & 4**	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Monetary Benefits						
Electricity Generated	The following description applies to all proposed/alternate/additional sites. 20,000,000 to 22,000,000 MW-hours per year					
Generating Capacity	The following description applies to all proposed/alternate/additional sites. 2,700 MW					
State and Local Tax Payments						
During Construction	During the 7-year construction period for STP 3&4, NRG would not pay franchise tax, but would pay additional property taxes, and state will see an increase in sales tax revenues. Projected sales tax payments on construction goods at an estimated $23.9 million per unit, with $5.8 million due to Bay City and $18.1 million to the State of Texas.	During the 7-year construction period, additional property tax will be paid to Fannin County and the state will see an increase in sales tax revenues.	During the 7-year construction period, additional property tax will be paid to Austin County and the state will see an increase in sales tax revenues.	During the 7-year construction period, additional property tax will be paid to Freestone County and the state will see an increase in sales tax revenues.	During the 7-year construction period, additional property tax will be paid to Henderson County and the state will see an increase in sales tax revenues.	During the 7-year construction period, additional property tax will be paid to Freestone County and the state will see an increase in sales tax revenues.

Table 10.4-3 Benefits of the Proposed Project (Continued)

Benefit Category	Project as Proposed	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**STP Units 3 & 4**	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
During Operations	$4.7 to $5.4 million in franchise taxes in 2015, the first year of operation for STP 3, and an estimated $8.6 to $10.0 million in 2016, when STP 4 comes on line, and in subsequent years.	During operation, tax payments for the 2 new units will be made to Fannin County.	During operation, tax payments for the 2 new units will be made to Austin County.	During operation, tax payments for the 2 new units will be made to Freestone County.	During operation, tax payments for the 2 new units will be made to Henderson County.	During operation, tax payments for the 2 new units will be made to Freestone County.
Effects on Regional Productivity						
During Construction	The following description applies to all proposed/alternate/additional sites. 5,950 direct jobs (2,975 would in-migrate) and 1,815 indirect jobs added to local economy. The creation of jobs during construction could inject between $67.6 and $676 million dollars into the regional economy during the life of the construction project.					
During Operation	The following description applies to all proposed/alternate/additional sites. 888 direct jobs and 1,305 indirect jobs added to local economy. The operations workforce impact on the regional economy is estimated at between $45,090,864 to $55,064,880 per year.					
Technical and Other Non-Monetary Benefits						
Fuel Diversity	The following description applies to all proposed/alternate/additional sites. Nuclear option to coal- and gas-fired baseload generation.					
Emissions Reduction	The following description applies to all proposed/alternate/additional sites. Avoidance of 41 to 2,900 tons per year sulfur dioxide, 680 to 2,000 tons per year nitrogen oxides; 141 to 2,800 tons per year carbon monoxide; 6,900,000 to 27,000,000 tons per year carbon dioxide; 13 to 119 tons per year fine particulates.					
Advanced Light Water Reactor Development	The following description applies to all proposed/alternate/additional sites. Maintaining domestic nuclear technology capability as hedge against possible need to control global warming.					

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	Proposed Project at Red 2 Site (Greenfield)	Proposed Project at Allens Creek Site (Greenfield)	Proposed Project at Trinity 2 Site (Greenfield)	Proposed Project at Malakoff Site (Greenfield)	Proposed Project at Limestone Site (Greenfield)
Construction-Related					
Land Use	Adverse Impact – Approximately 2,500 acres of the site would be disturbed during construction (including construction of a cooling reservoir up to 1,700-acres in size, based on existing topography). Land devoted to construction of access roads (20 acres), rail spur line (26 acres), and makeup water intake line (35 acres) would not be available for other uses. Mitigation Measure – Comply with applicable laws, regulations, zoning and permit requirements and use good engineering construction practices (Best Management Practices or BMP). Implement environmental controls required in a Stormwater Pollution Protection Plan (SWPPP) such as weekly compliance inspections, documentation of runoff controls, etc. Restrict	Adverse Impact – Approximately 10,300 acres of the site would be disturbed during construction. This includes 9,500 acres (cumulative) for a cooling water reservoir to support the nuclear plant combined with a water supply reservoir currently planned for the same location by the Brazos River Authority to supply future water supply needs of the City of Houston; the proposed reservoir size is based in part on existing topography. Land devoted to construction of access roads (11 acres), rail spur line (5 acres), and makeup water intake line (36 acres) would not be available for other uses. Mitigation Measure – Comply with applicable laws, regulations, zoning and permit requirements and use good engineering construction practices (Best	Adverse Impact – Approximately 2,500 acres of the site would be disturbed during construction (including construction of a cooling reservoir up to 1,700-acres in size, based on existing topography). Land devoted to construction of access roads (27 acres), rail spur line (120 acres), and makeup water intake line (36 acres), would not be available for other uses. Mitigation Measure – Comply with applicable laws, regulations, zoning and permit requirements and use good engineering construction practices (Best Management Practices or BMP). Implement environmental controls required in a Stormwater Pollution Protection Plan (SWPPP) such as weekly compliance inspections, documentation of runoff controls, etc. Restrict	Adverse Impact – Approximately 3,100 acres of the site would be disturbed during construction (including construction of a cooling reservoir up to 2,300-acres in size, based on existing topography). Land devoted to construction of access roads (29 acres), rail spur line (16 acres), and makeup water intake line (42 acres) would not be available for other uses. Mitigation Measure – Comply with applicable laws, regulations, zoning and permit requirements and use good engineering construction practices (Best Management Practices or BMP). Implement environmental controls required in a Stormwater Pollution Protection Plan (SWPPP) such as weekly compliance inspections, documentation of runoff controls, etc. Restrict	Adverse Impact – Approximately 4,000 acres of the site would be disturbed during construction (including construction of a cooling reservoir up to 3,200-acres in size, based on existing topography). Land devoted to construction of makeup water intake line (582 acres) would not be available for other uses. Mitigation Measure – Comply with applicable laws, regulations, zoning and permit requirements and use good engineering construction practices (Best Management Practices or BMP). Implement environmental controls required in a Stormwater Pollution Protection Plan (SWPPP) such as weekly compliance inspections, documentation of runoff controls, etc. Restrict construction to designated areas within the site. Re-

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Land Use (continued)	construction to designated areas within the site. Re-contour and re-vegetate land used for temporary construction purposes. Identify and avoid wetlands to the extent possible (although no high quality wetlands were identified on the site). Install fencing around wetlands during construction to protect against inadvertent excursion into the area. Stabilize and contour permanently disturbed locations in accordance with design specifications. Unavoidable Adverse Environmental Impacts – Areas within the exclusion zone would be excluded from future agricultural and recreational use. Small to moderate unavoidable adverse impacts would be expected during construction of the plant.	Management Practices or BMP). Implement environmental controls required in a Stormwater Pollution Protection Plan (SWPPP) such as weekly compliance inspections, documentation of runoff controls, etc. Restrict construction to designated areas within the site. Re-contour and re-vegetate land used for temporary construction purposes. Identify and avoid wetlands to the extent possible (high quality wetlands would be affected by reservoir construction). Install fencing around wetlands during construction to protect against inadvertent excursion into the area. Stabilize and contour permanently disturbed locations in accordance with design specifications. Unavoidable Adverse Environmental Impacts – Areas within the exclusion zone (if necessary) would be excluded from future agricultural and recreational	construction to designated areas within the site. Re-contour and re-vegetate land used for temporary construction purposes. Identify and avoid wetlands to the extent possible (high quality wetlands would be impacted by reservoir construction). Install fencing around wetlands during construction to protect against inadvertent excursion into the area. Stabilize and contour permanently disturbed locations in accordance with design specifications. Unavoidable Adverse Environmental Impacts – Areas within the exclusion zone would be excluded from future agricultural and recreational use. Small to moderate unavoidable adverse impacts would be expected during construction of the plant.	construction to designated areas within the site. Re-contour and re-vegetate land used for temporary construction purposes. Identify and avoid wetlands to the extent possible (although no high quality wetlands were identified on the site). Install fencing around wetlands during construction to protect against inadvertent excursion into the area. Stabilize and contour permanently disturbed locations in accordance with design specifications. Unavoidable Adverse Environmental Impacts – Areas within the exclusion zone would be excluded from future agricultural and recreational use. Small to moderate unavoidable adverse impacts would be expected during construction of the plant, depending on final size of reservoir and extent to which forested areas are affected.	contour and re-vegetate land used for temporary construction purposes. Identify and avoid wetlands to the extent possible (although no high quality wetlands were identified on the site). Install fencing around wetlands during construction to protect against inadvertent excursion into the area. Stabilize and contour permanently disturbed locations in accordance with design specifications. Unavoidable Adverse Environmental Impacts – Areas within the exclusion zone would be excluded from future agricultural and recreational use. Small unavoidable adverse impacts would be expected during construction within immediate site footprint (since most of area has been previously disturbed); small to moderate adverse impacts at reservoir site depending on final size of reservoir and extent to which forested areas are

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Land Use (continued)		use. Moderate to large unavoidable adverse impacts would be expected during construction of the plant (considering cumulative impacts from planned construction of water supply reservoir at same location).			affected.
Land Use (Transmission)	Adverse Impact – Three new 345-kilovolt transmission lines would be required in a new 200-foot wide corridor. Construction of new transmission line corridor (120 acres) would occur in an area consisting primarily of pasture and crops. Mitigation Measure – Where possible select corridors that follow existing rights-of-way. Avoid impacts to streams, ponds, reservoirs and wetlands. If required, conduct siting study that takes into account environmental impacts. Incorporate recommendations of federal and state agencies into route selection decisions. Route new corridors to avoid state or federal parks, and critical or sensitive	Adverse Impact – Three new 345-kilovolt transmission lines would be required, each in a new 200-foot wide corridor. Construction of new transmission line corridors (2,060 acres) would be required. Mitigation Measure – Where possible select corridors that follow existing rights-of-way. Avoid impacts to streams, ponds, reservoirs and wetlands. If required, conduct siting study that takes into account environmental impacts. Incorporate recommendations of federal and state agencies into route selections. Site new corridors to avoid state or federal parks, and critical or sensitive habitats or species as much as possible.	Adverse Impact – Three new 345-kilovolt transmission lines would be required in a new 200-foot wide corridor. Construction of new transmission line corridor (120 acres) would occur in area consisting primarily of open pasture and woodland. Mitigation Measure – Where possible select corridors that follow existing rights-of-way. Avoid impacts to streams, ponds, reservoirs and wetlands. If required, conduct siting study that takes into account environmental impacts. Incorporate recommendations of federal and state agencies into route selection decisions. Route new corridors to avoid state or federal parks, and critical or sensitive	Adverse Impact – Three new 345-kilovolt transmission lines would be required, each in a new 200-foot wide corridor. Construction of new transmission line corridors (total of 970 acres) would require new right-of-way, and would occur in an area consisting primarily of farmland and woodlands. Mitigation Measure – Where possible select corridors that follow existing rights-of-way. Avoid impacts to streams, ponds, reservoirs and wetlands. If required, conduct siting study that takes into account environmental impacts. Incorporate recommendations of federal and state agencies into route selection decisions. Route new corridors to	Adverse Impact – Three new 345-kilovolt transmission lines would be required in a new 200-foot wide corridor. Construction of new transmission lines corridors (total of 24 acres) would be required. Mitigation Measure – The proposed site is approximately 1 mile east of the existing Limestone power plant where multiple 345 kV connections exist. Once at the Limestone plant, it is assumed that the lines could parallel existing ROW (with potential need for expansion). Minimal impact given the short distance between site and transmission tie-in, and area has been previously disturbed. Additional siting study not expected to be required. Restrict

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Land Use (Transmission) (continued)	habitats or species as much as possible. Restrict construction activities to transmission corridors and access roads. Before site disturbance, conduct archaeological and ecological surveys and determine site-specific erosion control measures. Comply with all applicable laws, regulations, permits, zoning requirements, good engineering, environmental management, and construction practices. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts of new transmission lines on land use.	Restrict construction activities to transmission corridors and access roads. Before site disturbance, conduct archaeological and ecological surveys and determine site-specific erosion control measures. Comply with all applicable laws, regulations, permits, zoning requirements, good engineering, environmental management, and construction practices. Unavoidable Adverse Environmental Impacts – Moderate unavoidable adverse impacts of new transmission lines on land use.	habitats or species as much as possible. Restrict construction activities to transmission corridors and access roads. Before site disturbance, conduct archaeological and ecological surveys and determine site-specific erosion control measures. Comply with all applicable laws, regulations, permits, zoning requirements, good engineering, environmental management, and construction practices. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts of new transmission lines on land use.	avoid state or federal parks, and critical or sensitive habitats or species as much as possible. Restrict construction activities to transmission corridors and access roads. Before site disturbance, conduct archaeological and ecological surveys and determine site-specific erosion control measures. Comply with all applicable laws, regulations, permits, zoning requirements, good engineering, environmental management, and construction practices. Unavoidable Adverse Environmental Impacts – Moderate unavoidable adverse impacts of new transmission lines on land use, based on assumption that portion would be in previously undisturbed rights-of-way.	construction activities to transmission corridors and access roads. Sensitive resources not expected to be found within the corridors; however, before site disturbance, conduct archaeological and ecological surveys and determine site-specific erosion control measures. Comply with all applicable laws, regulations, permits, zoning requirements, good engineering, environmental management, and construction practices. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts of new transmission lines on land use.
Land Use (Waste Management)	The following description applies to all alternate/additional sites. Adverse Impact – Construction debris would be disposed in onsite and/or offsite landfills. Mitigation Measure – Use waste minimization to reduce volume of debris. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts to land use. Landfill space would be consumed for disposal of construction debris and would not be available for disposal of other wastes.				

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Land Use (Cultural Resources)	The following description applies to all alternate/additional sites. Adverse Impact – Potential to disturb buried historic, archaeological, or paleontological resources. Mitigation Measure – Consult State Historic Preservation Officer. Before site disturbance, conduct archaeological surveys. Develop and implement procedures that include actions to protect or recover cultural, historic, or paleontological resources. Unavoidable Adverse Environmental Impacts – Potential for destruction of unanticipated historic, cultural, or paleontological resources. Small unavoidable adverse impacts to cultural resources from construction.				
Hydrology and Water Use	The following description applies to all alternate/additional sites. Adverse Impact – Construction would require up to ~~1,200~~approximately 600 gpm (normalized) of groundwater for use during construction. Mitigation Measure – Comply with applicable water rights requirements, laws, regulations, and permit requirements. Practice water conservation as practical. No other measures or controls would be necessary. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Install excavation dewatering wells for use during construction. Mitigation Measure – Install drainage system to divert dewatering runoff to settling basin before discharge through a permitted TPDES outfall. Follow best management practices for erosion control. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Construction along river banks or stream banks could introduce sediments into waterways. Mitigation Measure – Develop and implement a construction Storm Water Pollution Prevention Plan (SWPPP); conduct monitoring as required by the storm water general permit. Stabilize upslope areas and adjacent to shoreline construction sites with erosion control devices and after construction, re-seed the areas. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Use of heavy equipment introduces the possibility of petroleum spills that could enter surface water. Mitigation Measure – Use good maintenance practices to maintain equipment, and prevent spills and leaks. Prepare and implement Spill Prevention Control and Countermeasures (SPCC) Plan for construction activities. Restrict activities using petroleum products that are equipped with spill containment. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts.				

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Aquatic Ecology	Adverse Impact – Reservoir construction would inundate the natural aquatic habitat along existing streams in the area (e.g., Bushy Creek). Construction/ dredging along the reservoir shoreline, including an intake structure, would cause the loss of some organisms, and temporary degradation of habitat. However, no Federally listed aquatic species are found in Fannin County/Red River. Transmission line and rail construction could require crossing of waterbodies or erection of towers within waterbodies and would cause the loss of some organisms and temporary degradation of habitat. Mitigation Measure – Install cofferdam and store excavated sediment and soils in spoils area designed to prevent loading in wetlands and watercourses; use storm water retention basins as needed; re-seed spoils area after construction. Develop and implement a construction	Adverse Impact – Reservoir construction would inundate the natural aquatic habitat along existing streams in the area (e.g., Allens Creek). Construction/ dredging along the reservoir shoreline, including an intake structure, would cause the loss of some organisms, and temporary degradation of habitat. There are no Federally listed aquatic species in Austin County; however, a candidate species (sharpnose shiner) has potential to occur in the Brazos River. Transmission line and rail construction could require crossing of waterbodies or erection of towers within waterbodies and would cause the loss of some organisms and temporary degradation of habitat. Mitigation Measure – Install cofferdam and store excavated sediment and soils in spoils area designed to prevent loading in wetlands and watercourses; use storm water retention	Adverse Impact – Reservoir construction would inundate the natural aquatic habitat along existing streams in the area (e.g., Tehuacana Creek and Big Brown Creek). Construction/ dredging along the reservoir shoreline, including an intake structure, would cause the loss of some organisms, and temporary degradation of habitat. However, no Federally listed aquatic species are found in Freestone County/Trinity River. Transmission line and rail construction could require crossing of waterbodies or erection of towers within waterbodies and would cause the loss of some organisms and temporary degradation of habitat. Mitigation Measure – Install cofferdam and store excavated sediment and soils in spoils area designed to prevent loading in wetlands and watercourses; use storm water retention basins as needed; re-seed spoils area after	Adverse Impact – Reservoir construction would inundate the natural aquatic habitat along existing streams in the area (Cedar Creek and Walnut Creek). Some high quality wetlands are in the site area. Construction/dredging along the reservoir shoreline, including an intake structure, would cause the loss of some organisms and temporary degradation of habitat. However, no Federally listed aquatic species are found in Henderson County. Transmission line and rail construction could require crossing of waterbodies or erection of towers within waterbodies and would cause the loss of some organisms and temporary degradation of habitat. Mitigation Measure – Install cofferdam and store excavated sediment and soils in spoils area designed to prevent loading in wetlands and watercourses; use storm water retention basins as needed; re-seed	Adverse Impact – Reservoir construction would inundate the natural aquatic habitat along existing streams in the area (Red Hollow Channel and Lynn Creek). Some high quality wetlands along Lynn Creek are in the potential reservoir area. Construction/dredging along the reservoir shoreline, including an intake structure, would cause the loss of some organisms, and temporary degradation of habitat. However, no Federally listed aquatic species are found in Freestone County/Trinity River. Construction of water intake line could require crossing of waterbodies and would cause temporary degradation of habitat. Mitigation Measure – Install cofferdam and store excavated sediment and soils in spoils area designed to prevent loading in wetlands and watercourses; use storm water retention basins as needed; re-seed spoils area after construction. Develop and

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Aquatic Ecology (continued)	SWPPP; conduct monitoring as required by the storm water general permit. Stabilize upslope areas and adjacent to shoreline construction sites with erosion control devices and after construction, re-seed the areas. Avoid wetlands and water bodies and sensitive areas when possible; plan transmission routes to minimize impacts to wetlands and water bodies that must be crossed; use equipment specifically designed for work around wetlands and streams, install erosion controls, and implement best management practices to minimize impacts to aquatic systems. Before transmission line construction, conduct ecological surveys and determine site-specific erosion control measures. If there is potential for construction of a new transmission line to degrade habitat of a listed aquatic species, work closely with the state agency to develop	basins as needed; re-seed spoils area after construction. Develop and implement a construction SWPPP; conduct monitoring as required by the storm water general permit. Stabilize upslope areas and adjacent to shoreline construction sites with erosion control devices and after construction, re-seed the areas. Avoid wetlands and water bodies and sensitive areas when possible; plan transmission routes to minimize impacts to wetlands and water bodies that must be crossed; use equipment specifically designed for work around wetlands and streams, install erosion controls, and implement best management practices to minimize impacts to aquatic systems. Before transmission line construction, conduct ecological surveys and determine site-specific erosion control measures. If there is potential for construction of a new	construction. Develop and implement a construction SWPPP; conduct monitoring as required by the storm water general permit. Stabilize upslope areas and adjacent to shoreline construction sites with erosion control devices and after construction, re-seed the areas. Avoid wetlands and water bodies and sensitive areas when possible; plan transmission routes to minimize impacts to wetlands and water bodies that must be crossed; use equipment specifically designed for work around wetlands and streams, install erosion controls, and implement best management practices to minimize impacts to aquatic systems. Before transmission line construction, conduct ecological surveys and determine site-specific erosion control measures. If there is potential for construction of a new transmission line to degrade habitat of a listed aquatic	spoils area after construction. Develop and implement a construction SWPPP; conduct monitoring as required by the storm water general permit. Stabilize upslope areas and adjacent to shoreline construction sites with erosion control devices and after construction, re-seed the areas. Avoid wetlands and water bodies and sensitive areas when possible; plan transmission routes to minimize impacts to wetlands and water bodies that must be crossed; use equipment specifically designed for work around wetlands and streams, install erosion controls, and implement best management practices to minimize impacts to aquatic systems. Before transmission line construction, conduct ecological surveys and determine site-specific erosion control measures. If there is potential for construction of a new transmission line to degrade	implement a construction SWPPP; conduct monitoring as required by the storm water general permit. Stabilize upslope areas and adjacent to shoreline construction sites with erosion control devices and after construction, re-seed the areas. Avoid wetlands and water bodies and sensitive areas when possible; plan water intake pipeline routes to minimize impacts to wetlands and water bodies that must be crossed; use equipment specifically designed for work around wetlands and streams, install erosion controls, and implement best management practices to minimize impacts to aquatic systems. Before water intake line construction, conduct ecological surveys and determine site-specific erosion control measures. If there is potential for construction of new pipeline to degrade habitat of a listed aquatic species, work closely with the state agency to develop a

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Aquatic Ecology (continued)	a construction schedule and construction techniques that are protective of the habitat and species in question. Unavoidable Adverse Environmental Impacts – Moderate unavoidable adverse impacts.	transmission line to degrade habitat of a listed aquatic species, work closely with the state agency to develop a construction schedule and construction techniques that are protective of the habitat and species in question. Unavoidable Adverse Environmental Impacts – Large unavoidable adverse impacts (considering cumulative impacts of larger reservoir compared to other sites; and potentially more waterbody crossings due to longer transmission line length).	species, work closely with the state agency to develop a construction schedule and construction techniques that are protective of the habitat and species in question. Unavoidable Adverse Environmental Impacts – Moderate unavoidable adverse impacts.	habitat of a listed aquatic species, work closely with the state agency to develop a construction schedule and construction techniques that are protective of the habitat and species in question. Unavoidable Adverse Environmental Impacts – Moderate unavoidable adverse impacts at the reservoir location; small unavoidable adverse impacts at power plant site.	construction schedule and construction techniques that are protective of the habitat and species in question. Unavoidable Adverse Environmental Impacts – Moderate unavoidable adverse impacts at the reservoir location; small unavoidable adverse impacts at power plant site.
Terrestrial Ecology	Adverse Impact – Habitat loss, and potential impacts to threatened or endangered animals at the site or in the vicinity. Construction activities would result in a permanent loss of 2,000 acres of habitat, including the proposed reservoir. Displacement of animals from the construction site, loss of less mobile individual animals, and the potential degradation of wetlands could also occur.	Adverse Impact – Habitat loss, and potential impacts to threatened or endangered animals at the site or in the vicinity. Construction activities would result in a permanent loss of up to 9,800 cumulative acres of habitat, including the proposed reservoir(s) (to support the plant and provide public water supply). Displacement of animals from the construction site, loss of less mobile	Adverse Impact – Habitat loss, and potential impacts to threatened or endangered plants or animals at the site or in the vicinity. Construction activities would result in a permanent loss of 2,000 acres of habitat, including the proposed reservoir. There would also be a potential loss of over 300 acres of high quality habitat at reservoir site. Moderate to large (permanent) impacts to habitat and	Adverse Impact – Habitat loss, and potential impacts to threatened or endangered animals at the site or in the vicinity. Construction activities would result in a permanent loss of up to 2,600 acres of habitat, including the proposed reservoir. Displacement of animals from the construction site, loss of less mobile individual animals, and the potential degradation of forested lands and high	Adverse Impact – Habitat loss, and potential impacts to threatened or endangered plants or animals at the site or in the vicinity. Construction activities would result in permanent loss of up to 3,500 acres of habitat, including the proposed reservoir. Displacement of animals from the construction site, loss of less mobile individual animals, and the potential degradation of forested

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Terrestrial Ecology (continued)	Mitigation Measures – Land clearing would be conducted according to federal and state regulations and permits, zoning requirements, good construction practices, and established best management practices. Schedule equipment maintenance procedures to minimize emission and spills. Minimize fugitive dust by watering. Delineate wetlands and determine impacts and mitigation prior to beginning construction activities (no high quality wetlands identified). Restrict construction to designated areas. Unavoidable Adverse Environmental Impacts – Small temporary impact to habitat and wildlife at immediate plant site during the construction phase of the project. Moderate (permanent) impacts to habitat and wildlife at reservoir site.	individual animals, and the potential degradation of wetlands could also occur. Mitigation Measures – Land clearing would be conducted according to federal and state regulations and permits, zoning requirements, good construction practices, and established best management practices. Schedule equipment maintenance procedures to minimize emission and spills. Minimize fugitive dust by watering. Delineate wetlands and determine impacts and mitigation prior to beginning construction activities (no high quality wetlands identified). Restrict construction to designated areas. Unavoidable Adverse Environmental Impacts – Small temporary impact to habitat and wildlife at immediate plant site during the construction phase of the project. Large (permanent) impacts to habitat and wildlife at reservoir site. Moderate to large impacts along	wildlife at reservoir site given potential for impacting high quality habitat during the construction phase of the project. Displacement of animals from the construction site, loss of less mobile individual animals, and the potential degradation of wetlands could also occur. Mitigation Measures – Land clearing would be conducted according to federal and state regulations and permits, zoning requirements, good construction practices, and established best management practices. Schedule equipment maintenance procedures to minimize emission and spills. Minimize fugitive dust by watering. Delineate wetlands and determine impacts and mitigation prior to beginning construction activities (no high quality wetlands identified). Restrict construction to designated areas. Unavoidable Adverse Environmental Impacts – Small temporary impact to	quality wetlands could also occur. Mitigation Measures – Land clearing would be conducted according to federal and state regulations and permits, zoning requirements, good construction practices, and established best management practices. Schedule equipment maintenance procedures to minimize emission and spills. Minimize fugitive dust by watering. Delineate wetlands and determine impacts and mitigation prior to beginning construction activities (no high quality wetlands identified). Restrict construction to designated areas. Unavoidable Adverse Environmental Impacts – Small temporary impact to habitat and wildlife at immediate plant site during the construction phase of the project. Large (permanent) impacts to habitat and wildlife at reservoir site given potential to impact high quality habitat in Cedar	lands and high quality wetlands could also occur. Mitigation Measures – Land clearing would be conducted according to federal and state regulations and permits, zoning requirements, good construction practices, and established best management practices. Schedule equipment maintenance procedures to minimize emission and spills. Minimize fugitive dust by watering. Delineate wetlands and determine impacts and mitigation prior to beginning construction activities (no high quality wetlands identified). Restrict construction to designated areas. Unavoidable Adverse Environmental Impacts – Small temporary impact to habitat and wildlife at immediate plant site during the construction phase of the project. Moderate to large (permanent) impacts to habitat and wildlife at reservoir site. Potential for more forested areas to be disturbed than at Malakoff,

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Terrestrial Ecology (continued)		transmission depending on percentage of right-of-way that is undisturbed.	habitat and wildlife at immediate plant site during the construction phase of the project. Moderate to large (permanent) impacts to habitat and wildlife at reservoir site. Small impacts are expected at the plant site; and moderate to large impacts at the reservoir site, because of high quality habitat.	Creek/Walnut Creek area, and potential for protected species to be present; small impact in area of facility footprint; and large impact from transmission lines assuming a significant portion of the 970 acres would be in previously undisturbed rights-of-way.	but much of site area has been previously disturbed (industrial area that includes lignite mine) with good existing infrastructure (i.e., minimal to no acreage required for rail, transmission and access road).
Socioeconomic	Adverse Impact – Construction-related population influx of 9,616 into the region would increase the demand for housing, add to school enrollment and increase the need for public services. Mitigation Measure – Project-related employment would increase gradually. An increased demand for local services and more classroom space/teachers would be offset by increased property and sales/use tax revenues generated by the construction project, which counties and cities could use to add staff, facilities, equipment, and services.	Adverse Impact – Construction-related population influx of 9,616 into the region would increase the demand for housing, add to school enrollment and increase the need for public services. Mitigation Measure – Project-related employment would increase gradually. An increased demand for local services and more classroom space/teachers would be offset by increased property and sales/use tax revenues generated by the construction project, which counties and cities could use to add staff, facilities, equipment, and services.	Adverse Impact – Construction-related population influx of 9,616 into the region would increase the demand for housing, add to school enrollment and increase the need for public services. Mitigation Measure – Project-related employment would increase gradually. An increased demand for local services and more classroom space/teachers would be offset by increased property and sales/use tax revenues generated by the construction project, which counties and cities could use to add staff, facilities, equipment, and services.	Adverse Impact – Construction-related population influx of 9,616 into the region would increase the demand for housing, add to school enrollment and increase the need for public services. Mitigation Measure – Project-related employment would increase gradually. An increased demand for local services and more classroom space/teachers would be offset by increased property and sales/use tax revenues generated by the construction project, which counties and cities could use to add staff, facilities, equipment, and services.	Adverse Impact – Construction-related population influx of 9,616 into the region would increase the demand for housing, add to school enrollment and increase the need for public services. Mitigation Measure – Project-related employment would increase gradually. An increased demand for local services and more classroom space/teachers would be offset by increased property and sales/use tax revenues generated by the construction project, which counties and cities could use to add staff, facilities, equipment, and services.

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Socioeconomic (continued)	Discuss construction plans and anticipated influx of workers with community leaders. Builders and developers would meet the demand for additional housing. Because the project has a long lead time, it is likely that if the community anticipates the increase in population, adequate affordable housing, classroom space, and public services would be available. Unavoidable Adverse Environmental Impacts – Large impacts to host county if majority of in-migrating population resides there. Small to moderate impacts on two-county area, given proximity to Sherman-Denison metropolitan area in adjacent Grayson County. Small impacts to region. Adverse Impact – Increased traffic on local roads. Mitigation Measure – Develop construction management traffic plan prior to the start of construction. Add turn lanes at construction entrance and possible	Discuss construction plans and anticipated influx of workers with community leaders. Builders and developers would meet the demand for additional housing. Because the project has a long lead time, it is likely that if the community anticipates the increase in population, adequate affordable housing, classroom space, and public services would be available. Unavoidable Adverse Environmental Impacts – Large impacts to host county if majority of in-migrating population resides there. Small impacts to two-county area and region given site's proximity to large metropolitan area of Houston and the ability of Houston to easily absorb a population influx. Adverse Impact – Increased traffic on local roads. Mitigation Measure – Develop construction management traffic plan prior to the start of construction. Add turn lanes at construction	Discuss construction plans and anticipated influx of workers with community leaders. Builders and developers would meet the demand for additional housing. Because the project has a long lead time, it is likely that if the community anticipates the increase in population, adequate affordable housing, classroom space, and public services would be available. Unavoidable Adverse Environmental Impacts – Large impacts to host county if majority of in-migrating population resides there. Small to moderate impacts on two-county area. Small impacts to region. Adverse Impact – Increased traffic on local roads, especially combined with workers commuting to nearby Big Brown coal plant and lignite mining operation. Mitigation Measure – Develop construction management traffic plan prior to the start of construction. Add turn lanes at construction	Discuss construction plans and anticipated influx of workers with community leaders. Builders and developers would meet the demand for additional housing. Because the project has a long lead time, it is likely that if the community anticipates the increase in population, adequate affordable housing, classroom space, and public services would be available. Unavoidable Adverse Environmental Impacts – Moderate impacts to host county if majority of in-migrating population resides there. Small impacts on two-county area, given proximity to Dallas metropolitan area; Ellis County includes southern suburbs of Dallas and can readily absorb a population influx. Adverse Impact – Increased traffic on local roads. Mitigation Measure – Develop construction management traffic plan prior to the start of construction. Add turn	Discuss construction plans and anticipated influx of workers with community leaders. Builders and developers would meet the demand for additional housing. Because the project has a long lead time, it is likely that if the community anticipates the increase in population, adequate affordable housing, classroom space, and public services would be available. Unavoidable Adverse Environmental Impacts – Large impacts to host county if majority of in-migrating population resides there. Large impacts to two-county area, since area is very rural; small impacts to the region. Note that impacts could be alleviated to a certain extent if the construction workforce supporting the planned Unit 3 expansion at the Limestone coal plant (estimated at 1,000 workers who would already be living in the area) would be available to support construction of the new

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Socioeconomic (continued)	second entrance. Install traffic-control lighting and directional signage. Post signs near construction entrances and exists to make the public aware of potentially high construction traffic areas. Encourage carpooling, offer shuttle service to workers to and from site, and stagger shifts to avoid traditional congestion time periods. Unavoidable Adverse Environmental Impacts – Small to moderate adverse impacts during construction due to increased traffic on local roads.	entrance and possible second entrance. Install traffic-control lighting and directional signage. Post signs near construction entrances and exists to make the public aware of potentially high construction traffic areas. Encourage carpooling, offer shuttle service to workers to and from site, and stagger shifts to avoid traditional congestion time periods. Unavoidable Adverse Environmental Impacts – Small to moderate adverse impacts during construction due to increased traffic on local roads.	entrance and possible second entrance. Install traffic-control lighting and directional signage. Post signs near construction entrances and exists to make the public aware of potentially high construction traffic areas. Encourage carpooling, offer shuttle service to workers to and from site, and stagger shifts to avoid traditional congestion time periods. Unavoidable Adverse Environmental Impacts – Small to moderate adverse impacts during construction due to increased traffic on local roads.	lanes at construction entrance and possible second entrance. Install traffic-control lighting and directional signage. Post signs near construction entrances and exists to make the public aware of potentially high construction traffic areas. Encourage carpooling, offer shuttle service to workers to and from site, and stagger shifts to avoid traditional congestion time periods. Unavoidable Adverse Environmental Impacts – Moderate to large adverse impacts during construction due to increased traffic on local roads which also appear to support area recreation. Primary site access would be SH-31 which is also part of the Texas Lakes Heritage Trails System, and also provides access to Cedar Creek and Richland Chambers Reservoirs.	nuclear facility; this would depend on final scheduling for the two construction projects. Adverse Impact – Increased traffic on local roads, especially combined with workers commuting to nearby Limestone plant (including new Unit 3 which is assumed to be constructed well before peak construction for nuclear plant). Mitigation Measure – Develop construction management traffic plan prior to the start of construction. Add turn lanes at construction entrance and possible second entrance. Install traffic-control lighting and directional signage. Post signs near construction entrances and exists to make the public aware of potentially high construction traffic areas. Encourage carpooling, offer shuttle service to workers to and from site, and stagger shifts to avoid traditional congestion time periods.

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Socioeconomic (continued)					Unavoidable Adverse Environmental Impacts – Large unavoidable adverse impacts during construction due to increased traffic on local roads.
Environmental Justice	The following description applies to all alternate/additional sites. Adverse Impact – No disproportionately high or adverse impact on minority or low-income populations from construction of the proposed new units have been identified. Mitigation Measure – None required. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts.				
Physical and Non-Radiological	The following description applies to all alternate/additional sites. Adverse Impact – Temporary and localized noise, fugitive dust, and exhaust emissions during construction. Mitigation Measure – Train and appropriately protect construction workers to reduce the risk of potential exposure to noise, dust and exhaust emissions. Make public announcements or prior notification of atypically loud construction activities. Regularly inspect and maintain equipment to include exhaust and noise aspects. Operate equipment in accordance with federal, state and local emission requirements. Phase construction to minimize daily emissions. Restrict noise-related activities to daylight hours. Restrict delivery times to daylight hours. Develop and implement a dust control plan that includes mitigation measures such as watering unpaved roads, stabilizing construction roads, phasing grading activities and ceasing them during high winds, etc. Unavoidable Adverse Environmental Impacts – Small temporary and localized noise, fugitive dust, and exhaust emissions during construction. Adverse Impact – Construction workers could experience occupational illnesses, injuries, or death. Mitigation Measure – Train contractors on safety requirements. Require construction contractors and subcontractors to develop and implement safety procedures. Provide onsite services for emergency first aid; conduct regular health and safety monitoring. Unavoidable Adverse Environmental Impacts – Small, temporary impacts during the construction phase of the project.				
Radiological	The following description applies to all alternate/additional sites. Adverse Impact – None. Mitigation Measure – No mitigation required. Unavoidable Adverse Environmental Impacts – No unavoidable adverse impacts.				

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Atmospheric and Meteorological	The following description applies to all alternate/additional sites. Adverse Impact – Temporary and localized noise, fugitive dust, and exhaust emissions during construction. Mitigation Measures – Regularly inspect and maintain equipment. Phase construction to minimize daily emissions. Develop and implement a dust control plan that includes mitigation measures such as watering unpaved roads, stabilizing construction roads, phasing grading activities, and suspending grading/earthmoving during high winds and extreme air pollution events, covering truck loads and debris stockpiles, reducing material handling, limiting vehicle speed, re-vegetating medians and slopes, visually inspecting emission control equipment, etc. Unavoidable Adverse Environmental Impacts – Small, temporary impacts from localized noise, fugitive dust, and exhaust emissions during construction.				
Operations-Related					
Land Use	Adverse Impact – Land occupied by plant facility and associated reservoir would be permanently dedicated to the plant until decommissioning. Operation and maintenance of transmission line and corridors would restrict land use within the transmission rights-of-way, but transmission operation would be potentially compatible with cultivation, grazing and hunting but preclude residential and industrial use. Mitigation Measure – No mitigation would be required for continued land use post construction. Unavoidable Adverse Environmental Impact – Small impacts: land will not be	Adverse Impact – Land occupied by plant facility and associated reservoir(s) would be permanently dedicated until decommissioning. Operation and maintenance of transmission line and corridors would restrict land use within the transmission rights-of-way, but transmission operation would be potentially compatible with cultivation, grazing and hunting but preclude residential and industrial use. Mitigation Measure – No mitigation would be required for continued land use post construction. Unavoidable Adverse Environmental Impact – Small impacts: land will not be available until	Adverse Impact – Land occupied by plant facility and associated reservoir would be permanently dedicated to the plant until decommissioning. Operation and maintenance of transmission line and corridors would restrict land use within the transmission rights-of-way, but transmission operation would be potentially compatible with cultivation, grazing and hunting but preclude residential and industrial use. Mitigation Measure – No mitigation would be required for continued land use post construction. Unavoidable Adverse Environmental Impact – Small impacts: land will not be available until	Adverse Impact – Land occupied by plant facility and associated reservoir would be permanently dedicated to the plant until decommissioning. Operation and maintenance of transmission line and corridors would restrict land use within the transmission rights-of-way, but transmission operation would be potentially compatible with cultivation, grazing and hunting but preclude residential and industrial use. Mitigation Measure – No mitigation would be required for continued land use post construction. Unavoidable Adverse Environmental Impact – Small impacts: land will not be available until	Adverse Impact – Land occupied by plant facility and associated reservoir would be permanently dedicated to the plant until decommissioning. Operation and maintenance of transmission line and corridors would restrict land use within the transmission rights-of-way, but transmission operation would be potentially compatible with cultivation, grazing and hunting but preclude residential and industrial use. Mitigation Measure – No mitigation would be required for continued land use post construction. Unavoidable Adverse Environmental Impact – Small impacts: land will not be available until

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Land Use (continued)	available until decommissioning of the plant.	decommissioning of the plant.	decommissioning of the plant.	decommissioning of the plant.	decommissioning of the plant.
Land Use (Waste Management)	The following description applies to all alternate/additional sites. Adverse Impact – Operating the new units would generate radioactive and non-radioactive wastes that are required to be disposed in permitted disposal facilities or permitted landfills. Generation of spent fuel will require disposal in accordance with federal requirements. Mitigation Measure – Implement waste minimization program. Disposal area(s) would be permitted waste disposal facility(ies) with a land use designated for such activities. Temporary spent fuel storage facilities would be operated under appropriate regulations and guidelines until such time a NRC licensed high-level waste disposal facility is constructed. At that time, the storage facility area could be restored for other uses. Unavoidable Adverse Environmental Impacts – Small unavoidable impacts. Some land would be dedicated to permitted landfills or licensed disposal facilities and would not be available for other uses.				
Hydrology and Water Use	The following description applies to all alternate/additional sites. Adverse Impact – The site is assumed to require construction of a cooling water reservoir. Makeup water would be withdrawn from the cooling water source to replace water lost to evaporation, drift, seepage, and blowdown. Mitigation Measure – Comply with surface water rights and water withdrawal requirements and restrictions. Design and operate intake structures based on best available technology. Monitor hydrological impacts as required by water permit(s). Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Operations would result in discharge of small amounts of chemicals to Texas waters. Water would be added back to the river through the blowdown discharge. Mitigation Measure – All discharges would comply with TPDES permit and applicable water quality standards. Prepare and implement a SWPPP to avoid/minimize releases of contaminated storm water. Prepare and implement a SPCC plan to prevent/minimize contamination from spills. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Operations may result in a small thermal plume discharged to Texas waters. Mitigation Measure – The differences between plume temperature and ambient water temperature would be maintained within limits set in the TPDES permit. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts.				

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Aquatic Ecology	The following description applies to all alternate/additional sites. Adverse Impact – Impacts to aquatic biota from impingement, entrainment and thermal discharges. Mitigation Measure – Intake structure designed to minimize impingement and entrainment mortality with the "Best Technology Available". Discharges would comply with USEPA and Texas regulations (e.g., TPDES permit conditions) addressing discharges to surface water. Use of cooling towers that minimize withdrawal of river water for plant operation. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Operations would result in discharge of small amounts of chemicals to Texas waters. Mitigation Measure – The TPDES permit limits are set to ensure that discharges do not significantly affect aquatic populations or water quality. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts on aquatic ecology. Adverse Impact – Potential impacts to aquatic ecology due to petroleum spills from routine maintenance activities near water. Mitigation Measure – Prepare and implement a SPCC Plan to avoid/minimize contamination from spills. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts.				
Terrestrial Ecology	The following description applies to all alternate/additional sites. Adverse Impact – No adverse impacts from cooling towers are anticipated. Mitigation Measures – None required. Unavoidable Adverse Environmental Impacts – No unavoidable adverse impacts. Adverse Impact – Episodic loud noises at the site or along lines could frighten animals. Mitigation Measure – Animal displacement due to noise would be temporary in nature. Unavoidable Adverse Environmental Impacts – Small temporary unavoidable adverse impacts. Adverse Impact – Potential impacts to vegetation and habitat within the transmission line rights-of-way from routine maintenance of woody vegetative growth by manual and mechanical methods and herbicides. Mitigation Measure – Implement existing procedures for transmission line maintenance designed to protect flora and fauna. Train personnel in the handling of fuel and lubricants and the clean-up and reporting of any incidental spills. Have adequate spill response equipment on hand during maintenance activities in the corridors. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts during the life of the plant.				
Socioeconomic	Adverse Impact – Operations-related direct and indirect workers (and their families) would increase demand for housing, classroom space,	Adverse Impact – Operations-related direct and indirect workers (and their families) would increase demand for housing, classroom space,	Adverse Impact – Operations-related direct and indirect workers (and their families) would increase demand for housing, classroom space,	Adverse Impact – Operations-related direct and indirect workers (and their families) would increase demand for housing, classroom space,	Adverse Impact – Operations-related direct and indirect workers (and their families) would increase demand for housing, classroom space,

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Socioeconomic (continued)	and public services within Fannin and Grayson Counties and the ROI over pre-construction conditions, but much less than the construction-related population. Mitigation Measure – Discuss anticipated influx of workers and schedule with community leaders, allowing local and regional officials the opportunity to plan for the influx. Builders and developers would meet the demand for additional housing. Increased tax revenues as a result of the project would fund additional school resources, and could be used to purchase additional facilities/equipment and hire train additional public service staff if necessary. Because the project has a long lead time, it is likely that if the community anticipates the increase in population, adequate affordable housing, classroom space, and public services would be available.	and public services within Austin and Fort Bend Counties and the ROI over pre-construction conditions, but much less than the construction-related population. Mitigation Measure – Discuss anticipated influx of workers and schedule with community leaders, allowing local and regional officials the opportunity to plan for the influx. Builders and developers would meet the demand for additional housing. Increased tax revenues as a result of the project would fund additional school resources, and could be used to purchase additional facilities/equipment and hire train additional public service staff if necessary. Because the project has a long lead time, it is likely that if the community anticipates the increase in population, adequate affordable housing, classroom space, and public services would be available.	and public services within Freestone and Henderson Counties and the ROI over pre-construction conditions, but much less than the construction-related population. Mitigation Measure – Discuss anticipated influx of workers and schedule with community leaders, allowing local and regional officials the opportunity to plan for the influx. Builders and developers would meet the demand for additional housing. Increased tax revenues as a result of the project would fund additional school resources, and could be used to purchase additional facilities/equipment and hire train additional public service staff if necessary. Because the project has a long lead time, it is likely that if the community anticipates the increase in population, adequate affordable housing, classroom space, and public services would be available.	and public services within Henderson and Ellis Counties and the ROI over pre-construction conditions, but much less than the construction-related population. Mitigation Measure – Discuss anticipated influx of workers and schedule with community leaders, allowing local and regional officials the opportunity to plan for the influx. Builders and developers would meet the demand for additional housing. Increased tax revenues as a result of the project would fund additional school resources, and could be used to purchase additional facilities/equipment and hire train additional public service staff if necessary. Because the project has a long lead time, it is likely that if the community anticipates the increase in population, adequate affordable housing, classroom space, and public services would be available.	and public services within Henderson and Ellis Counties and the ROI over pre-construction conditions, but much less than the construction-related population. Mitigation Measure – Discuss anticipated influx of workers and schedule with community leaders, allowing local and regional officials the opportunity to plan for the influx. Builders and developers would meet the demand for additional housing. Increased tax revenues as a result of the project would fund additional school resources, and could be used to purchase additional facilities/equipment and hire train additional public service staff if necessary. Because the project has a long lead time, it is likely that if the community anticipates the increase in population, adequate affordable housing, classroom space, and public services would be available.

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Socioeconomic (continued)	Unavoidable Adverse Environmental Impacts – Small to moderate unavoidable adverse impacts. Adverse Impact – Operation of two units would increase the traffic on local roads during shift change. Valley power plant is located adjacent to the site, although its workforce is expected to be significantly smaller given type of plant. Outages at the site would increase traffic even further. Mitigation Measure – Consider staggering outage shifts to reduce plant-associated traffic on local roads during shift changes; vanpooling and travel reduction incentives (currently in use at STP Units 1 & 2). Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Additional cooling towers may impact existing viewscape. Mitigation Measure – During	Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts given proximity to metropolitan area of Houston, which is expected to readily absorb population influx. Adverse Impact – Operation of two units would increase the traffic on local roads during shift change. Outages at the site would increase traffic even further. Mitigation Measure – Consider staggering outage shifts to reduce plant-associated traffic on local roads during shift changes; vanpooling and travel reduction incentives (currently in use at STP Units 1 & 2). Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Additional cooling towers may impact existing viewscape. Mitigation Measure – During plant layout, attempt to locate towers in an area	Unavoidable Adverse Environmental Impacts – Small to moderate unavoidable adverse impacts. Adverse Impact – Operation of two units would increase the traffic on local roads during shift change, especially if they coincided with operating shifts of workers at nearby Big Brown plant and lignite mining operations. Outages at the site would increase traffic even further. Mitigation Measure – Encourage carpooling/vanpooling, offer shuttle service to workers to and from site, and travel reduction incentives (currently in use at STP Units 1 & 2). Consider staggering outage shifts to reduce plant-associated traffic on local roads during shift changes. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Additional	Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts given site proximity to Dallas suburbs, which is expected to readily absorb population influx. Adverse Impact – Operation of two units would increase the traffic on local roads during shift change; Trinidad power plant is nearby although its workforce is expected to be significantly smaller given type of plant. Outages at the site would increase traffic even further. Mitigation Measure – Consider staggering outage shifts to reduce plant-associated traffic on local roads during shift changes; vanpooling and travel reduction incentives (currently in use at STP Units 1 & 2). Unavoidable Adverse Environmental Impacts – Small to moderate unavoidable adverse impacts. Adverse Impact – Additional cooling towers may impact	Unavoidable Adverse Environmental Impacts – Small to moderate unavoidable adverse impacts, given site's rural location. Adverse Impact – Operation of two units would increase the traffic on local roads during shift change, especially given site's close proximity to the existing Limestone coal plant and lignite mining operations. Outages at the site would increase traffic even further. Mitigation Measure – Consider staggering outage shifts to reduce plant-associated traffic on local roads during shift changes; vanpooling and travel reduction incentives (currently in use at STP Units 1 & 2). Unavoidable Adverse Environmental Impacts – Small to moderate unavoidable adverse impacts. Adverse Impact – Additional cooling towers may impact existing viewscape.

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Socioeconomic (continued)	plant layout, attempt to locate towers in an area isolated from area view points to maximum extent possible. Unavoidable Adverse Environmental Impacts – Small to moderate unavoidable adverse impacts. Adverse Impact – Consumption of fossil fuels during the fuel-cycle process would be small relative to the power production. Mitigation Measure – No mitigation needed. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts.	isolated from area view points to maximum extent possible. Unavoidable Adverse Environmental Impacts – Small to moderate unavoidable adverse impacts. Adverse Impact – Consumption of fossil fuels during the fuel-cycle process would be small relative to the power production. Mitigation Measure – No mitigation needed. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts.	cooling towers may impact existing viewscape. Mitigation Measure – During plant layout, attempt to locate towers in an area isolated from area view points to maximum extent possible. Unavoidable Adverse Environmental Impacts – Small to moderate unavoidable adverse impacts. Adverse Impact – Consumption of fossil fuels during the fuel-cycle process would be small relative to the power production. Mitigation Measure – No mitigation needed. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Site is in an area of historic and potential mineral development (evidence of oil and gas drilling and lignite mining operation nearby). Purchase of mineral rights to develop site for nuclear would result	existing viewscape, especially given heavy recreational use in the general area. Mitigation Measure – During plant layout, attempt to locate towers in an area isolated from area view points to maximum extent possible. Unavoidable Adverse Environmental Impacts – Small to moderate unavoidable adverse impacts. Adverse Impact – Consumption of fossil fuels during the fuel-cycle process would be small relative to the power production. Mitigation Measure – No mitigation needed. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Site is in an area of historic and potential mineral development (evidence of oil and gas drilling and lignite mining operation	Mitigation Measure – During plant layout, attempt to locate towers in an area isolated from area view points to maximum extent possible. Unavoidable Adverse Environmental Impacts – Site is located in an industrialized area. Small unavoidable adverse impacts. Adverse Impact – Consumption of fossil fuels during the fuel-cycle process would be small relative to the power production. Mitigation Measure – No mitigation needed. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Site is in an area of historic and potential mineral development (evidence of oil and gas drilling and lignite mining operation nearby). Purchase of mineral rights to develop site for nuclear would result

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Socioeconomic (continued)			in displacement or loss of active oil/gas wells; lost potential to expand lignite mining operations (if needed for nearby Big Brown coal plant); and potential loss of oil and gas exploration jobs. Mitigation Measure – Sufficient lead time for current mineral rights owners will allow them to plan for loss of mineral rights; workers could presumably find construction work at new nuclear plant. Unavoidable Adverse Environmental Impacts – Small unavoidable impact, including loss of access to potentially valuable minerals (coal, oil, gas).	nearby). Purchase of mineral rights to develop site for nuclear would result in displacement or loss of active oil/gas wells (or possible reopening of historic lignite mine at Malakoff); and potential loss of oil and gas exploration jobs. Mitigation Measure – Sufficient lead time for current mineral rights owners will allow them to plan for loss of mineral rights; workers could presumably find construction work at new nuclear plant. Unavoidable Adverse Environmental Impacts – Small unavoidable impact, including loss of access to potentially valuable minerals (coal, oil, gas).	in displacement or loss of active oil/gas wells; or prevent potential plans to expand existing lignite mining operations (if needed for Limestone plant); and potential loss of oil and gas exploration jobs. Mitigation Measure – Sufficient lead time for current mineral rights owners will allow them to plan for loss of mineral rights; workers could presumably find construction work at new nuclear plant. Unavoidable Adverse Environmental Impacts – Small unavoidable impact, including loss of access to potentially valuable minerals (coal, oil, gas).
Environmental Justice	The following description applies to all alternate/additional sites. Adverse Impact – No disproportionately high or adverse impacts on minority or low-income populations resulting from operation of the proposed new units have been identified. Mitigation Measure – No mitigation needed. Unavoidable Adverse Environmental Impact – No unavoidable adverse impacts.				

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Physical and Non-Radiological	Adverse Impact – Potential for occupational injuries and illnesses. Mitigation Measure – Implement industrial safety program. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – The plants emit low noise. Mitigation Measure – Noise levels would normally not be above background at the site boundary. No mitigation is necessary. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Episodic loud noises could annoy nearby residents. Mitigation Measure – Handle incidents on a case-by-case basis. Unavoidable Adverse Environmental Impacts – Small temporary unavoidable adverse impacts.	Adverse Impact – Potential for occupational injuries and illnesses. Mitigation Measure – Implement industrial safety program. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – The plants emit low noise. Mitigation Measure – Noise levels would normally not be above background at the site boundary. No mitigation is necessary. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Episodic loud noises could annoy nearby residents. Mitigation Measure – Handle incidents on a case-by-case basis. Unavoidable Adverse Environmental Impacts – Small temporary unavoidable adverse impacts.	Adverse Impact – Potential for occupational injuries and illnesses. Mitigation Measure – Implement industrial safety program. Unavoidable Adverse Environmental Impacts – Small to moderate unavoidable adverse impacts, depending on mineral reserves found beneath the site. Adverse Impact – The plants emit low noise. Mitigation Measure – Noise levels would normally not be above background at the site boundary. No mitigation is necessary. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Episodic loud noises could annoy nearby residents. Mitigation Measure – Handle incidents on a case-by-case basis. Unavoidable Adverse Environmental Impacts – Small temporary	Adverse Impact – Potential for occupational injuries and illnesses. Mitigation Measure – Implement industrial safety program. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – The plants emit low noise. Mitigation Measure – Noise levels would normally not be above background at the site boundary. No mitigation is necessary. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Episodic loud noises could annoy nearby residents. Mitigation Measure – Handle incidents on a case-by-case basis. Unavoidable Adverse Environmental Impacts – Small temporary unavoidable adverse impacts.	Adverse Impact – Potential for occupational injuries and illnesses. Mitigation Measure – Implement industrial safety program. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – The plants emit low noise. Mitigation Measure – Noise levels would normally not be above background at the site boundary. No mitigation is necessary. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts. Adverse Impact – Episodic loud noises could annoy nearby residents. Mitigation Measure – Handle incidents on a case-by-case basis. Unavoidable Adverse Environmental Impacts – Small temporary unavoidable adverse impacts.

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Physical and Non-Radiological (continued)	Adverse Impact – New transmission line has potential to induce electric shock in people standing near the line. Mitigation Measure – Build transmission line to NESC code to minimize noise and electric shock. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts.	Adverse Impact – New transmission line has potential to induce electric shock in people standing near the line. Mitigation Measure – Build transmission line to NESC code to minimize noise and electric shock. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts.	unavoidable adverse impacts. Adverse Impact – New transmission line has potential to induce electric shock in people standing near the line. Mitigation Measure – Build transmission line to NESC code to minimize noise and electric shock. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts.	Adverse Impact – New transmission line has potential to induce electric shock in people standing near the line. Mitigation Measure – Build transmission line to NESC code to minimize noise and electric shock. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts.	Adverse Impact – New transmission line has potential to induce electric shock in people standing near the line. Mitigation Measure – Build transmission line to NESC code to minimize noise and electric shock. Unavoidable Adverse Environmental Impacts – Small unavoidable adverse impacts.
Radiological	The following description applies to all alternate/additional sites. Adverse Impact – Potential doses to workers and members of the public from releases to air and surface water. Dose to terrestrial and aquatic ecosystems from chronic radiation exposure caused by the small discharges of radioactive liquids. Dose to public and workers due to transport of nuclear fuel. Mitigation Measure – Monitor radiological releases as required by radiological monitoring program. All releases would be well below regulatory limits. No further mitigation required. Unavoidable Adverse Environmental Impact – Small unavoidable adverse impacts. Adverse Impact – Fuel cycle activities would have liquid discharges. Mitigation Measure – Monitor radiological releases as required by radiological monitoring program. No further mitigation required. Unavoidable Adverse Environmental Impact – Small unavoidable adverse impacts.				

Table 10.4-4 Unavoidable Adverse Environmental Impacts of Proposed Project at Alternate Sites (Continued)

Category	Alternate Site #1	Alternate Site #2	Alternate Site #3	Additional Site #1	Additional Site #2
Description of Project	**Proposed Project at Red 2 Site (Greenfield)**	**Proposed Project at Allens Creek Site (Greenfield)**	**Proposed Project at Trinity 2 Site (Greenfield)**	**Proposed Project at Malakoff Site (Greenfield)**	**Proposed Project at Limestone Site (Greenfield)**
Atmospheric and Meteorological	The following description applies to all alternate/additional sites. Adverse Impact – Operation of cooling towers would result in noise, salt deposition, and a very small increase in precipitation. Noise attenuates quickly so noise levels would be minimal at the site boundary. Salt deposition of less than the amount necessary to result in damage to vegetation. Mitigation Measure –None required for cooling towers. Plant operation will comply with state permit limits and regulations for operating air emission sources. Unavoidable Adverse Environmental Impact – Small unavoidable adverse impacts. Adverse Impact – Emissions from intermittent operation of diesel generators and other emission emitting equipment. Mitigation Measure – Power facility must meet applicable federal, state (TCEQ), and local air quality permitting regulations for installing and operating air emission sources. Unavoidable Adverse Environmental Impact – Small unavoidable adverse impacts. Adverse Impact – Relatively small quantities of air pollutants would result from fuel cycle. Mitigation Measure – No mitigation required. Unavoidable Adverse Environmental Impact – Small unavoidable adverse impacts.				