CHAPTER 4

ENVIRONMENTAL IMPACTS OF CONSTRUCTION

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
$\mu gm/m^3$	micrograms per cubic meter
/Q	relative air concentration
AADT	annual average daily traffic
A/B	auxiliary building
ac	acre
AC	alternating current
ac-ft	acre-feet
ACFT	acre-feet
ACRS	advisory committee on reactor safeguards
ACSR	aluminum-clad steel reinforced
ADFGR	Alaska Department of Fish and Game Restoration
AEA	Atomic Energy Act
AEC	U.S. Atomic Energy Commission
AHD	American Heritage Dictionary
agl	above ground level
ALA	American Lifelines Alliance
ALARA	as low as reasonably achievable
AMUD	Acton Municipal Utility District
ANL	Argonne National Laboratory
ANSI	American National Standards Institute
AOO	anticipated operational occurrences
APE	areas of potential effect
APWR	Advanced Pressurized Water Reactor

ACRONYMS AND ABBREVIATIONS

ARLIS	Alaska Resources Library and Information Services
ARRS	airborne radioactivity removal system
AS	ancillary services
ASCE	American Society of Civil Engineers
AVT	all volatile treatment
AWG	American wire gauge
BAT	best available technology
bbl	barrel
BC	Business Commercial
BDTF	Blowdown Treatment Facility
BEA	U.S. Bureau of Economic Analysis
BEG	U.S. Bureau of Economic Geology
bgs	below ground surface
BLS	U.S. Bureau of Labor Statistics
BMP	best management practice
BOD	Biologic Oxygen Demand
BOP	Federal Bureau of Prisons
BRA	Brazos River Authority
bre	below reference elevation
BRM	Brazos River Mile
BSII	Big Stone II
BTI	Breakthrough Technologies Institute
BTS	U.S. Bureau of Transportation Statistics
BTU	British thermal units
BUL	Balancing Up Load

ACRONYMS AND ABBREVIATIONS

BW	Business Week
BWR	boiling water reactor
CAA	Clean Air Act
CBA	cost-benefit analysis
CBD	Central Business District
CCI	Chambers County Incinerator
CCTV	closed-circuit television
CCW	component cooling water
CCWS	component cooling water system
CDC	Centers for Disease Control and Prevention
CDF	Core Damage Frequency
CDR	Capacity, Demand, and Reserves
CEC	California Energy Commission
CEDE	committed effective dose equivalent
CEED	Center for Energy and Economic Development
CEQ	Council on Environmental Quality
CESQG	conditionally exempt small quantity generator
CFC	chlorofluorocarbon
CFE	Comisin Federal de Electricidad
CFR	Code of Federal Regulations
cfs	cubic feet per second
CFS	chemical treatment system
CG	cloud-to-ground
CGT	Cogeneration Technologies
CHL	Central Hockey League

ACRONYMS AND ABBREVIATIONS

CO	carbon monoxide
CO_2	carbon dioxide
COD	Chemical Oxygen Demand
COL	combined construction and operating license
COLA	combined construction and operating license application
CORMIX	Cornell Mixing Zone Expert System
CPI	Consumer Price Index
CPP	continuing planning process
CPS	condensate polishing system
CPNPP	Comanche Peak Nuclear Power Plant
CPSES	Comanche Peak Steam Electric Station
CRDM	control rod drive mechanism cooling system
CRP	Clean Rivers Program
CS	containment spray
Cs-134	cesium-134
Cs-137	cesium 137
CST	Central Standard Time
CST	condensate storage tank
CT	completion times
CT	cooling tower
cu ft	cubic feet
C/V	containment vessel
CVCS	chemical and volume control system
CVDT	containment vessel reactor coolant drain tank
CWA	Clean Water Act

ACRONYMS AND ABBREVIATIONS

CWS	circulating water system
DAW	dry active waste
dBA	decibels
DBA	design basis accident
DBH	diameter at breast height
DC	direct current
DCD	Design Control Document
DDT	dichlorodiphenyltrichloroethane
DF	decontamination factor
DFPS	Department of Family and Protective Services
DFW	Dallas/Fort Worth
DO	dissolved oxygen
DOE	U.S. Department of Energy
DOL	Department of Labor
DOT	U.S. Department of Transportation
DPS	Department of Public Safety
D/Q	deposition
DSHS	Department of State Health Services
DSM	Demand Side Management
DSN	discharge serial numbers
DSWD	Demand Side Working Group
DVSP	Dinosaur Valley State Park
DWS	demineralized water system
DWST	demineralized water storage tank
E	Federally Endangered

ACRONYMS AND ABBREVIATIONS

EA	Environmental Assessment
EAB	exclusion area boundary
E. coli	Escherichia coli
EDC	Economic Development Corp.
EDE	effective dose equivalent
EEI	Edison Electric Institute
EERE	Energy Efficiency and Renewable Energy
EFH	Energy Future Holdings Corporation
EFW	energy from waste
EIA	Energy Information Administration
EIS	Environmental Impact Statement
EJ	environmental justice
ELCC	Effective Load-Carrying Capacity
EMFs	electromagnetic fields
EO	Executive Order
EOF	emergency operation facility
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
EPZ	emergency planning zone
ER	Environmental Report
ERA	Environmental Resource Associates
ERCOT	Electric Reliability Council of Texas
ESA	Endangered Species Act
ESP	Early Site Permit
ESRP	Environmental Standard Review Plan

ACRONYMS AND ABBREVIATIONS

ESW	essential service cooling water
ESWS	essential service water system
F&N	Freese & Nicholas, Inc.
FAA	U.S. Federal Aviation Administration
FAC	flow-accelerated corrosion
FBC	fluidized bed combustion
FCT	Fuel Cell Today
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FFCA	Federal Facilities Compliance Act
FLMNH	Florida Museum of Natural History
FM	farm-to-market
FP	fire protection
FPL	Florida Power and Light
FPS	fire protection system
FPSC	Florida Public Service Commission
FR	Federal Register
FSAR	Final Safety Analysis Report
FSL	Forecast Systems Laboratory
ft	feet
FWAT	flow weighted average temperature
FWCOC	Fort Worth Chamber of Commerce
FWS	U.S. Fish and Wildlife Service
gal	gallon
GAM	General Area Monitoring

ACRONYMS AND ABBREVIATIONS

GAO	U.S. General Accountability Office
GDEM	Governor's Division of Emergency Management
GEA	Geothermal Energy Association
GEIS	Generic Environmental Impact Statement
GEOL	overall geological
GFD	ground flash density
GIS	gas-insulated switchgear
GIS	Geographic Information System
GMT	Greenwich Mean Time
gpd	gallons per day
gph	gallons per hour
gpm	gallons per minute
gps	gallons per second
GRCVB	Glen Rose, Texas Convention and Visitors Bureau
GST	gas surge tank
GTC	Gasification Technologies Conference
GTG	gas turbine generators
GWMS	gaseous waste management system
H-3	radioactive tritium
HC	Heavy Commercial
HCl	Hydrochloric Acid
HCP	Ham Creek Park
HEM	hexane extractable material
HEPA	high efficiency particulate air
HIC	high integrity container

ACRONYMS AND ABBREVIATIONS

HL	high-level
HNO_3	Nitric Acid
hr	hour(s)
HRCQ	highway route-controlled quantity
H_2SO_4	Sulfuric Acid
HT	holdup tank
HTC	Historic Texas Cemetery
HUC	hydrologic unit code
HUD	U.S. Department of Housing and Urban Development
HVAC	heating, ventilating, and air-conditioning
I	Industrial
I-131	iodine-131
IAEA	International Atomic Energy Agency
I&C	instrumentation and control
IEC	Iowa Energy Center
IGCC	Integrated Gasification Combined Cycle
IH	Interim Holding
in	inch
INEEL	Idaho National Engineering and Environmental Laboratory
IOUs	investor-owned electric utilities
IPE	individual plant examination
ISD	Independent School District
ISFSI	independent spent fuel storage installation
ISO	independent system operator
ISO rating	International Standards Organization rating

ACRONYMS AND ABBREVIATIONS

ISU	Idaho State University
JAMA	Journal of the American Medical Association
K-40	potassium-40
KC	Keystone Center
JRB	Joint Reserve Base
km	kilometer
kVA	kilovolt-ampere
kWh	kilowatt hour
L	LARGE
LaaR	Load Acting as a Resource
LANL	Los Alamos National Laboratory
lb	pounds
LC	Light Commercial
LG	Lake Granbury
LL	low-level
LLD	lower limits of detection
LLMW	low-level mixed waste
LNG	liquid natural gas
LOCA	loss of coolant accident
LPSD	low-power and shutdown
LPZ	low population zone
LQG	large-quantity hazardous waste generators
LRS	load research sampling
LTSA	long term system assessment
Luminant	Luminant Generation Company LLC

ACRONYMS AND ABBREVIATIONS

LVW	low volume waste
LWA	Limited Work Authorization
LWMS	liquid waste management system
LWPS	liquid waste processing system
LWR	light water reactor
M	MODERATE
ma	milliamperes
MACCS2	Melcor Accident Consequence Code System
MCES	Main Condenser Evacuation System
Mcf	thousand cubic feet
MCPE	Market Clearing Price for Energy
MCR	main control room
MD-1	Duplex
MDA	minimum detected activity
MDCT	mechanical draft cooling tower
MEIs	maximally exposed individuals
MF	Multi-Family
mG	milliGauss
mg/l	milligrams per liter
mg/m^3	milligrams per cubic meter
MH	Manufactured Housing
MHI	Mitsubishi Heavy Industries
mi	mile
mi^2	square miles
MIT	Massachusetts Institute of Technology

ACRONYMS AND ABBREVIATIONS

MMbbl	million barrels
MMBtu	million Btu
MNES	Mitsubishi Nuclear Energy Systems Inc.
MOU	municipally-owned utility
MOV	motor operated valve
MOX	mixed oxide fuel
mph	miles per hour
MSDS	Materials Safety Data Sheets
msl	mean sea level
MSR	maximum steaming rate
MSW	municipal solid waste
MT	Main Transformer
MTU	metric tons of uranium
MW	megawatts
MW	monitoring wells
MWd	megawatt-days
MWd/MTU	megawatt–days per metric ton uranium
MWe	megawatts electrical
MWh	megawatt hour
MWS	makeup water system
MWt	megawatts thermal
NAAQS	National Ambient Air Quality Standards
NAPA	Natural Areas Preserve Association
NAP	National Academies Press
NAR	National Association of Realtors

ACRONYMS AND ABBREVIATIONS

NARM	accelerator-produced radioactive material
NAS	Naval Air Station
NASS	National Agricultural Statistics Service
NCA	Noise Control Act
NCDC	National Climatic Data Center
NCDENR	North Carolina Department of Environmental and Natural Resources
NCES	National Center for Educational Statistics
NCI	National Cancer Institute
NCTCOG	North Central Texas Council of Governments
ND	no discharge
NDCT	natural draft cooling towers
NEI	Nuclear Energy Institute
NELAC	National Environmental Laboratory Accreditation Conference
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation/Council
NESC	National Electrical Safety Code
NESDIS	National Environmental Satellite, Data, and Information Service
NESW	non-essential service water cooling system
NESWS	non-essential service water system
NETL	National Energy Technology Laboratory
NHPA	National Historic Preservation Act
NHS	National Hurricane Center
NINI	National Institute of Nuclear Investigations
NIOSH	National Institute for Occupational Safety and Health

ACRONYMS AND ABBREVIATIONS

NIST	U.S. National Institute of Standards and Technology
NJCEP	NJ Clean Energy Program
NLDN	National Lightning Detection Network
NOAA	National Oceanic and Atmospheric Administration
NOAEC	no observable adverse effects concentration
NOI	Notice of Intent
NOIE	non-opt-in entities
NO_x	oxides of nitrogen
NP	Nacogdoches Power
NPDES	National Pollutant Discharge Elimination System
NPS	nonpoint source
NR	not required
NRC	U.S. Nuclear Regulatory Commission
NREL	U.S. National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NRRI	National Regulatory Research Institute
NSPS	New Source Performance Standards
NSSS	nuclear steam supply system
NTAD	National Transportation Atlas Database
NVLAP	National Voluntary Laboratory Accreditation Program
NWI	National Wetlands Inventory
NWS	National Weather Service
NWSRS	National Wild and Scenic Rivers System
O_2	Oxygen
O_3	Ozone

ACRONYMS AND ABBREVIATIONS

ODCM	Off-site Dose Calculation Manual
OECD	Organization for Economic Co-operation and Development
O&M	operations and maintenance
ORNL	Oak Ridge National Laboratory
ORP	oxidation-reduction potential
OSHA	Occupational Safety and Health Act
OW	observation well
P&A	plugging and abandonment
PAM	primary amoebic meningoencephalitis
PD	Planned Development
PDL	Proposed for Delisting
PE	probability of exceedances
percent g	percent of gravity
PET	Potential Evapotranspiration
PFBC	pressurized fluidized bed combustion
PFD	Process Flow Diagram
PGA	peak ground acceleration
PGC	power generation company
PH	Patio Home
P&ID	piping and instrumentation diagram
PM	particulate matter
PM_{10}	particulate matter less than 10 microns diameter
$PM_{2.5}$	particulate matter less than 2.5 microns diameter
PMF	probable maximum flood
PMH	probable maximum hurricane

ACRONYMS AND ABBREVIATIONS

PMP	probable maximum precipitation
PMWP	probable maximum winter precipitation
PMWS	probable maximum windstorm
PPE	plant parameter envelope
ppm	parts per million
PPS	preferred power supply
PRA	probabilistic risk assessment
PSD	Prevention of Significant Deterioration (permit)
PSWS	potable and sanitary water system
PUC	Public Utility Commission
PUCT	Public Utility Commission of Texas
PURA	Public Utilities Regulatory Act
PWR	pressurized water reactors
QA	quality assurance
QC	quality control
QSE	qualified scheduling entities
R10	Single-Family Residential
R12	Single-Family Residential
R7	Single-Family Residential
R8.4	Single-Family Residential
RAT	Reserve Auxiliary Transformer
RB	reactor building
R/B	reactor building
RCDS	reactor coolant drain system
RCDT	reactor coolant drain tank

ACRONYMS AND ABBREVIATIONS

RCRA	Resource Conservation and Recovery Act
RCS	reactor coolant system
RDA	Radiosonde Database Access
REC	renewable energy credit
REIRS	Radiation Exposure Information and Reporting System
RELFRC	release fractions
rem	roentgen equivalent man
REMP	radiological environmental monitoring program
REP	retail electric providers
REPP	Renewable Energy Policy Project
RFI	Request for Information
RG	Regulatory Guide
RHR	residual heat removal
RIMS II	regional input-output modeling system
RMR	Reliability Must-Run
Rn_{222}	Radon-222
RO	reverse osmosis
ROI	region of interest
ROW	right of way
RPG	regional planning group
RRY	reactor reference year
RTHL	Recorded Texas Historic Landmarks
RTO	regional transmission organization
Ru-103	ruthenium-103
RW	test well

ACRONYMS AND ABBREVIATIONS

RWSAT	refueling waste storage auxiliary tank
RWST	refueling water storage tank
RY	reactor-year
S	SMALL
SACTI	Seasonal/Annual Cooling Tower Impact Prediction Code
SAL	State Archaeological Landmark
SAMA	severe accident mitigation alternative
SAMDA	severe accident mitigation design alternative
SB	Senate Bill
SCR	Squaw Creek Reservoir
SCDC	Somervell County Development Commission
scf	standard cubic feet
SCWD	Somervell County Water District
SDS	sanitary drainage system
SECO	State Energy Conservation Office
SER	Safety Evaluation Report
SERC	SERC Reliability Corporation
SERI	System Energy Resources, Inc.
SFPC	spent fuel pool cooling and cleanup system
SG	steam generator
SGBD	steam generator blow-down
SGBDS	steam generator blow-down system
SGs	steam generators
SGTR	steam generator tube rupture
SH	State Highway

ACRONYMS AND ABBREVIATIONS

SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SMP	State Marketing Profiles
SMU	Southern Methodist University
SOP	Standard Operations Permit
SO_2	sulfur dioxide
SO_x	sulfur
SPCCP	Spill Prevention Control and Countermeasures Plan
SPP	Southwest Power Pool
SQG	small-quantity generators
sq mi	square miles
SRCC	Southern Regional Climate Center
SRP	Standard Review Plan
SRST	spent resin storage tank
SSAR	Site Safety Analysis Report
SSC	structures, systems, and components
SSI	Safe Shutdown Impoundment
SSURGO	Soil Survey Geographic
SWATS	Surface Water and Treatment System
SWMS	solid waste management system
SWPC	spent fuel pool cooling and cleanup system
SWP3	Storm Water Pollution Prevention Plan
SWS	service water system
SWWTS	sanitary wastewater treatment system
T	Federally Threatened

ACRONYMS AND ABBREVIATIONS

t	ton
TAC	technical advisory committee
TAC	Texas Administrative Code
TB	turbine building
Tc_{99}	Technetium-99
TCEQ	Texas Commission on Environmental Quality
TCPS	Texas Center for Policy Studies
TCR	transmission congestion rights
TCS	turbine component cooling water system
TCWC	Texas Cooperative Wildlife Collection
T&D	transmission and distribution utility
TDCJ	Texas Department of Criminal Justice
TDOH	Texas Department of Health
TDOT	Texas Department of Transportation
TDPS	Texas Department of Public Safety
TDS	total dissolved solids
TDSHS	Texas Department of State Health Services
TDSP	transmission and distribution service provider
TDWR	Texas Department of Water Resources
TEDE	total effective dose equivalent
TGLO	Texas General Land Office
TGPC	Texas Groundwater Protection Committee
TH	Townhome
THC	Texas Historical Commission
THPOs	tribal historic preservation officers

ACRONYMS AND ABBREVIATIONS

TIS	Texas Interconnected System
TLD	Thermoluminescence Dosemeter
TMDLs	total maximum daily loads
TMM	Texas Memorial Museum
TOs	Transmission Owners
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
tpy	tons per year
TRAGIS	Transportation Routing Analysis Geographic Information System
TRB	Transportation Research Board
TRC	total recordable cases
TRE	Trinity Railway Express
TSC	technical support center
TSD	thunderstorm days per year
TSD	treatment, storage, and disposal
TSDC	Texas State Data Center
TSHA	Texas State Historical Association
TSP	transmission service provider
TSWQS	Texas Surface Water Quality Standards
TSS	total suspended sediment
TTS	The Transit System (Glen Rose)
TUGC	Texas Utilities Generating Company
TUSI	Texas Utilities Services Inc.
TWC	Texas Workforce Commission
TWDB	Texas Water Development Board

ACRONYMS AND ABBREVIATIONS

TWR	Texas Weather Records
TWRI	Texas Water Resources Institute
TxDOT	Texas Department of Transportation
TXU	Texas Utilities Corporation
TXU DevCo	TXU Generation Development Company LLC
UC	University of Chicago
UFC	uranium fuel cycle
UHS	Ultimate Heat Sink
UIC	Uranium Information Center
UO_2	uranium dioxide
USACE	U.S. Army Corps of Engineers
US-APWR	(MHI) United States-advanced pressurized water reactor
USC	U.S. Census
USCA	United States Court of Appeals
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	U.S. Geological Survey
USHCN	United States Historical Climatology Network
USHR	U.S. House of Representatives
USNPS	U.S. National Park Service
UTC	Universal Time Coordinated
UV	ultra-violet
VCIS	Ventilation Climate Information System

ACRONYMS AND ABBREVIATIONS

VCT	volume control tank
VERA	Virtus Energy Research Associates
VFD	Volunteer Fire Department
VOC	volatile organic compound
VRB	variable
WB	Weather Bureau
WBR	Wheeler Branch Reservoir
WDA	work development area
WDFW	Washington Department of Fish and Wildlife
weight percent	wt. percent
WHT	waste holdup tank
WMT	waste monitor tank
WNA	World Nuclear Association
WPP	Watershed Protection Plan
WQMP	Water Quality Management Plan
WRE	Water Resource Engineers, Inc.
WWS	wastewater system
WWTP	wastewater treatment plant
yr	year

CHAPTER 4

ENVIRONMENTAL IMPACTS OF CONSTRUCTION

4.0 ENVIRONMENTAL IMPACTS OF CONSTRUCTION

Chapter 4 presents the potential impacts from construction of Units 3 and 4 at the Comanche Peak Nuclear Power Plant (CPNPP) Site. In accordance with Title 10 Code of Federal Regulations (CFR) Part 51, effects are analyzed, and a single significance level of potential impact to each resource (i.e., SMALL, MODERATE, or LARGE) is assigned consistent with the criteria that the Nuclear Regulatory Commission (NRC) established in 10 CFR Part 51, Appendix B, Table B-1, Footnote 3. Unless the significance level is identified as beneficial, the impact is adverse, or in the case of SMALL, may be negligible. The definitions of significance are as follows:

SMALL Environmental impacts are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the NRC has concluded that those impacts that do not exceed permissible levels in the NRC's regulation are considered small.

MODERATE Environmental impacts are sufficient to alter noticeably, but not to destabilize any important attribute of the resource.

LARGE Environmental impacts are clearly noticeable and are sufficient to destabilize any important attributes of the resource.

This chapter is divided into eight sections:

- Land use Impacts (Section 4.1).
- Water-related Impacts (Section 4.2).
- Ecological Impacts (Section 4.3).
- Socioeconomic Impacts (Section 4.4).
- Radiation Exposure to Construction Workers (Section 4.5).
- Measures and Controls to Limit Adverse Impacts During Construction (Section 4.6).
- Cumulative Impacts Related to Construction Activities (Section 4.7).
- Nonradiological Health Impacts - Construction (Section 4.8).

The definitions and figures are provided as additional information related to the content of Chapter 4 sections:

CPNPP region - The area within the 50-mile (mi) radius from the centerpoint of CPNPP Units 3 and 4 (Figure 1.1-1).

CPNPP vicinity - The area within the 6-mi band from the site boundary (Figure 1.1-2).

CPNPP site – The 7950-acre (ac) area identified by the site boundary (Figure 1.1-3).

4.1 LAND-USE IMPACTS

The following subsections describe the effects of site preparation and construction of the CPNPP site and the surrounding areas. Subsection 4.1.1 describes effects to the site and vicinity. Subsection 4.1.2 describes impacts to land use during construction of transmission lines. Subsection 4.1.3 describes effects to historic properties at the site and along water pipeline and transmission corridors. Section 4.2 describes potential impacts to water associated with construction activities including intake and discharge structures.

4.1.1 THE SITE AND VICINITY

The following subsections describe the effects of construction on land use within the site and vicinity.

4.1.1.1 The Site

The CPNPP generation units and support facilities are located on the 7950-ac CPNPP site located in Hood and Somervell counties, Texas. The site boundary encompasses the operating nuclear CPNPP Units 1 and 2, the proposed location for CPNPP Units 3 and 4, the support structures and facilities, and the entire SCR (Subsections 1.1.2 and 2.2.1.1). Plant structures are discussed in Section 3.1. Figure 4.1-1 shows the detailed site plot plan including construction laydown areas.

The total area to be disturbed is 675 ac and includes permanent structures, the Blowdown Treatment Facility (BDTF) area, and construction laydown areas. Temporary construction laydown areas are portions of the site that are temporarily disturbed during construction. Although some laydown areas may also be used to support operations. Permanent structures are buildings, roads, walls, etc., expected to be built during the construction period and remain once construction is completed. Construction on the CPNPP site is scheduled to be completed as stated in Section 1.1.

Land use within the site boundary is detailed in Subsection 2.2.1.1 and can also be found in Table 2.2-1 and Figure 2.2-1. As stated in Subsection 4.2.1.1.4, approximately 123 ac are disturbed for construction of Units 3 and 4 while an additional 152 ac are disturbed for the cooling towers. The majority of the area where Units 3 and 4 are constructed has been previously disturbed. However, a large portion of the area where the cooling towers are constructed consists of undisturbed woodland and is expected to require clearing. Additional land disturbances are anticipated due to construction of some of the support buildings and refurbishment of existing and permanent roadways. Placement of a BDTF to support the CPNPP Units 3 and 4 operations is planned for an area southwest of the SCR Dam and due south of existing CPNPP Units 1 and 2 (Figure 1.1-4). Approximately 400 ac is expected to be disturbed for construction of the BDTF. Disturbed acreage to support construction activities is reclaimed to grassland, native scrub-shrub, or native forest trees consistent with erosion control, traffic safety, and plant security needs.

The land-use needs for construction include transportation, laydown areas, water, electric, and communication service lines, and disposal. Transportation is needed for moving building materials and equipment to and from the site. The shipment of construction material to the site is expected to utilize local roadways and railroads. New roadways, either temporary or permanent, are planned for the CPNPP site. Established roadways provide access to various structures and are anticipated to be updated for transport of construction materials to and within the site. The use of the existing CPNPP railroad spur in support of material deliveries is expected. Additional information about railroads in the vicinity of the CPNPP site is located in Subsections 2.5.2.2.5 and 4.4.1.3. A heavy haul road from the end of the railroad spur to the construction areas is planned. Construction of this road occurs primarily on previously disturbed areas. Roads are illustrated in Figures 3.1-1 and 4.1-1. The laydown areas for staging building materials and equipment used for construction can be seen in Figure 4.1-1.

The majority of earthen debris (soil and rock) excavated during construction is to be utilized as fill material. Excess dirt and spoil materials are expected to be beneficially used on surface areas within the site boundaries. Any material that is contaminated from construction activities would be classified as hazardous or non-hazardous waste and disposed of at an approved off-site disposal facility. Construction debris; i.e., non-recyclable materials and other waste are removed from the site via roads or rail.

Construction activities on the site are not expected to include the construction of bridges, docks or any type of water transportation. Rail lines are anticipated to be modified on-site. New intake and discharge structures would be constructed on Lake Granbury.

No site construction activities are expected to be located in a floodplain, as discussed in Subsection 4.2.1.6. Site construction activities that are expected to be located in wetland habitats are discussed in Section 4.3.

There are four major pipelines that cross the site; three transport natural gas, one transports crude oil. There are plans for an additional natural gas pipeline parallel to the pipelines that traverse the northern portion of the site. The closest pipeline is located 0.42 mi west of the site center point. These pipelines are discussed in Subsection 2.2.1.2. No adverse impacts from construction are expected to affect pipelines located within the CPNPP site. There are mineral resources, including natural gas, within or adjacent to the site that are being exploited.

National Wild and Scenic Rivers, recreational opportunities, and zoning laws and ordinances are detailed in Subsection 2.2.1. There are no National Wild and Scenic Rivers or zoning laws ordinances otherwise affecting the site. SCR will be open to the public for full recreational uses, such as fishing and boating, with controlled access. Because lake and park access will be controlled and all public visitors will be required to follow applicable site safety rules, no adverse impacts are anticipated.

No identified historic properties or tribal lands on the CPNPP site would be impacted by construction activities as stated in Subsection 2.5.3.3. Appropriate tribal historic preservation officers (THPOs) have been contacted. No concerns have been raised by consulted tribal agencies as to construction of the CPNPP site. As a result, no adverse effects to tribal lands are anticipated.

The location and description of prime farmland is discussed in Subsection 2.2.1 and illustrated in Figure 2.2-1. There is a total of 1064 ac of prime farmland located on the site, the majority of which has not been disturbed. Approximately seven ac of prime farmland are located in the construction area and the majority of those seven ac are in previously disturbed areas.

Related federal activities are discussed in Section 2.8. No other federal projects are related to this COL application, therefore, there are no cumulative adverse effects anticipated.

4.1.1.2 The Vicinity

Land use in the vicinity of the CPNPP is described in detail in Subsection 2.2.1.2 and is shown in Table 2.2-1 and Figure 2.2-2. Adverse effects to land use in the vicinity of the site are confined to impacts to the roads (increase in traffic) during construction, impacts associated with the construction of the water pipelines from Lake Granbury, and impacts connected with construction of electric transmission lines. Impacts associated with the construction of transmission lines are discussed in Subsections 4.1.2 and 4.1.3.2.2 while impacts associated with the Lake Granbury water pipelines are discussed in Subsection 4.1.3.2.1.

Figure 2.5-5 illustrates the road and highway system in Somervell and Hood counties. Additional information on the road and highway system in Somervell and Hood counties can be found in Subsection 2.5.2.2. Information pertaining to the effects of construction and operational workers on the local road and highway system is presented in Subsections 4.4.1.3 and 5.8.1.3.

Because the existing railway spur has already been used by the CPNPP for plant operations, no adverse effects to existing railway service in the vicinity from the construction activities at the CPNPP site are expected. Additional information about railroads in the vicinity of the CPNPP site can be found in Subsection 2.5.2.2.5.

Nine major pipelines are located within the vicinity including the ones that cross the site as mentioned in Subsection 4.1.1.1; eight transport natural gas, one transports crude oil. These pipelines are described in Subsection 2.2.1.2. No adverse impacts from construction are expected to affect pipelines located within the vicinity of the CPNPP site. There are minerals resources, including natural gas, that are currently being exploited within the vicinity.

Two rivers, Brazos and Paluxy, are present in the vicinity. Because the portions of the rivers in the vicinity are not classified as National Wild and Scenic Rivers by the federal government, no adverse impacts to such rivers are anticipated.

There are 144,425 ac of prime farmlands which are considered “prime land” by the U.S. Department of Agriculture (USDA) within the vicinity. Because construction does not occur where croplands are located, no adverse impacts are expected to occur.

Numerous parks and venues provide camping and recreational opportunities within the vicinity of CPNPP including a state park (Subsection 2.2.1.2). Because the closest park is located 3.3 mi from the site, no adverse physical impacts from construction are expected to affect recreational areas within the vicinity of CPNPP.

Impacts to aesthetics are discussed in Subsection 4.4.1.4. Impacts to recreation due to the construction workforce are discussed in Subsection 4.4.2.6.

No tribal lands are located within the vicinity of the CPNPP site as detailed in Subsection 2.5.3.3. Related federal activities are discussed in Section 2.8. No other federal projects are related to this COL application within the vicinity, no adverse cumulative effects are anticipated.

There are several wetlands present within the vicinity. However, no construction activities are expected to occur on wetlands. No construction activities in the vicinity take place in a floodplain. These matters are discussed further in Subsections 4.2.1.6 and 4.3.1.

One city and eleven smaller towns and unincorporated communities are located within the vicinity of CPNPP and are discussed further in Subsection 2.2.1.2. Glen Rose and Granbury have zoning plans within their city limits. Because the construction is out of the nearest city limits, there are no zoning limitations affecting the site.

The construction workforce may accelerate housing development in the vicinity, causing some additional land to be developed. However, numerous housing developments are already planned or underway due to the population growth in the area and the construction workforce is expected to primarily use temporary housing, such as hotels, RV parks, mobile homes, and rental homes. It is possible that new RV or mobile home parks open to accommodate the construction workers. Such parks would be expected to be temporary and not affect the long-term land use in the vicinity.

The only construction impacts to land use in the vicinity of the CPNPP site are expected from the new transmission lines, the new water pipeline to Lake Granbury, and the increase in roadway traffic load and housing. No additional land is expected to be required for the CPNPP site. Transmission line corridors are discussed in Subsection 4.1.2. No other land-use changes in the vicinity are expected. While the impacts of the construction of the transmission line corridors are not known at this time, the overall effect of CPNPP Units 3 and 4 construction on land use in the vicinity of the site is expected to be SMALL based on minimal impacts to local transportation systems, pipelines, rivers, and recreational areas.

4.1.2 TRANSMISSION CORRIDORS AND OFF-SITE AREAS

As discussed in Subsection 4.1.1.1, a BDTF to support the CPNPP Units 3 and 4 operations is planned with approximately 400 ac expected to be disturbed for the construction of this facility.

Additional water intake and discharge pipelines are expected to be constructed for CPNPP extending from the plant to Lake Granbury. The pipelines are expected to occupy an existing 50-ft ROW. However, during construction an area of up to 125 ft wide along the pipeline could be disturbed. The new pipelines are expected to parallel to the existing makeup and return water pipelines and are illustrated in Figure 1.1-4. The makeup pipeline is used to maintain the level in SCR and the return line was not used to support operation of CPNPP Units 1 and 2 and is not expected to be used in the future. Additional intake and discharge structures are expected to be placed to the northwest and adjacent to the existing intake and discharge structures on Lake Granbury. During construction of the intake and discharge structures, an additional amount of land disturbance is anticipated to occur. The disturbed land along the pipeline corridor consists mainly of grassland and scrub brush.

As discussed in Subsection 9.4.3.1, operating the proposed project requires expanding four electrical transmission lines that connect the proposed project to switching stations in the area, and expanding the connection between two switching stations located off-site. The transmission lines consist of five single and double 345-kV circuits that are owned, operated, and maintained by Oncor Electric Delivery Company LLC (Oncor). The plant connects to the transmission system through a 345-kv switchyard located on the CPNPP site.

Three single-circuit transmission lines are located on existing ROWs and use existing tower structures. Two double circuit expansions require the construction of new towers on new or expanded transmission line ROW 160 ft wide. The first is a 45-mi line to Whitney and the second is a 17-mi line to DeCordova. Figure 1.1-5 illustrates the location of the transmission lines and switchyards. No land-use impacts are anticipated from the transmission line construction activity located on existing ROWs as vegetation maintenance is already performed. Land use along the DeCordova ROW consists mainly of grassland, while the land use along the Whitney ROW consists of primarily grassland with some deciduous and evergreen forest. Table 2.2-4 shows land use within the proposed transmission line corridors. Approximately 954 ac is anticipated to be disturbed in the Whitney ROW and approximately 671 in the DeCordova ROW is anticipated to be disturbed. Given the relatively little acreage involved and the nature of the land that will be committed, land-use impact from the expansion of the Whitney and DeCordova ROWs is expected to be SMALL.

The proposed transmission lines are 110 feet high and crosses through Bosque, Hood and Somervell Counties within the region. According to ONCOR, the Whitney line is approximately 45 miles long and the DeCordova line is approximately 17 miles long. The Whitney line traverses Dinosaur Valley State Park and is clearly visible throughout the park except in areas of low elevation. There are nine additional parks, Adair Spring Park, American Legion Park, Cleburne State Park, Ham Creek Park, Meridian State Park, Nolan River Park, Oakdale Park, Steele Creek Park, and Lake Whitney State Park within the proposed transmission line viewshed. The distances from these parks to the transmission lines are 5.2, 18.9, 9.7, 6.2, 13.3, 5.5, 4.2, 2.9 and 3.9, respectively. It is also anticipated that the DeCordova line will be visible from portions of Reunion Grounds located near Lake Granbury, approximately 5.7 miles away. Given the length of the proposed transmission lines and their prospective visibility from eleven state parks, the aesthetic impact from the expansion of the Whitney and DeCordova ROWs is anticipated to be SMALL to MODERATE.

4.1.3 HISTORIC PROPERTIES

This subsection focuses on the effects of CPNPP Units 3 and 4 construction activities on existing historic properties on the CPNPP site and within 10 mi of its boundary. According to 36 CFR 800 (I), historic properties are defined as those properties that are eligible for inclusion in the National Register of Historic Places (NRHP) or that are already listed on the NRHP. Aboveground historic properties and archaeological sites are among the entities that can be considered for NRHP inclusion. According to 36 CFR 60.4 aboveground historic properties can possess integrity individually or as contributing properties to historic districts. Furthermore, their significance depends on specific criteria of event, person, design/construction, or information potential, and integrity involves both architectural and aesthetic elements, including location, design, setting, materials, workmanship, feeling, and association. Archaeological sites can be affected directly by physical damage to surface features or subsurface deposits. Generally, noise-related effects are extraneous to archaeological sites because the integrity of site patterning is unaffected; likewise, aesthetic/visual effects on archaeological sites are extraneous because archaeological site integrity depends on the ability to address research questions that are independent of the preservation of site ambiance.

The number, location, and NRHP status of relevant historic properties at the CPNPP site and in the surrounding area are addressed in Subsection 2.5.3. Additional information is provided in Tables 2.5-21, 2.5-22 and 2.5-23.

4.1.3.1 Site and Vicinity

Direct effects on existing historic properties from construction on the CPNPP site are possible only within the on-site and off-site areas of potential effect (APE) for the CPNPP (Figures 2.5-7 and 2.5-8). Indirect (noise-related and aesthetic/visual) effects from proposed construction are possible on the site and within 10 mi of its boundaries. This 10-mi buffer extends through portions of Somervell and Hood counties. However, because of the local vegetation cover and topographic relief, noise-related and aesthetic/visual effects from on-site construction on aboveground historic properties are minimal.

4.1.3.1.1 Prehistoric Archaeological Sites

In the 1972 survey of SCR, no prehistoric archaeological sites were identified within the current on-site APE (Figure 2.5-7 and Table 2.5-21) were inundated or destroyed with the creation of SCR. Sites recorded by SMU include fourteen prehistoric archaeological sites and six archaeological sites with both prehistoric and historic components on or within a 1-mi radius of the CPNPP, none of which are within the on-site APE (Skinner and Humphreys 1973). Therefore, they are not directly impacted by the proposed construction.

A portion of the water pipeline corridor will cross the CPNPP site. The construction corridor for the water pipeline is 150 ft. Most of the corridor follows existing ROWs, and has been previously impacted by transmission lines, existing waterline, and road construction. An archeological survey of proposed water pipeline routes (including alternate routes) identified two additional prehistoric sites (41SV160 and 41SV162) in the proposed construction corridor (Subsection 2.5.3.1). 41SV160 and 41SV162 were both observed to be extremely disturbed, eroded, and unlikely to have further research potential. Construction in the water pipeline corridor is likely to impact these sites; however, because little site integrity remains, the overall impacts of water pipeline construction on Locality 2 and 22 would be SMALL.

Numerous prehistoric sites and components are located outside of the CPNPP boundaries. Soil-disturbing construction activities within the on-site APE have no direct effects on such distant sites. Indirect effects related to on-site construction do not impact these sites because noise-related and aesthetic/visual effects are extraneous considerations for buried prehistoric sites.

The effects of on-site construction at the CPNPP upon prehistoric archaeological sites on and within a 10-mi radius of the property are SMALL. No mitigation is warranted.

4.1.3.1.2 Historic Period Archaeological Sites

A hand-stacked stone wall dating from the early to mid-twentieth century was identified within the on-site APE at CPNPP as discussed in Subsection 2.5.3.2. This feature is not associated with any intact sites and is not eligible for listing in the NRHP. Nearby homestead and farmstead sites recorded during the 1972 SMU survey of SCR have subsequently been inundated by the flooding of the reservoir. The stone wall represents a bygone property boundary. A large portion of the extent of the wall was also inundated by the flooding of SCR, and what remains today is the exposed, more upland portion that was not flooded. Because of the wall's location within the on-site APE, the direct impacts of construction at CPNPP on the stone wall are expected to be moderate to large.

A total of 14 (eight historic and six multi-component sites) historic period archaeological sites are located on or within a 1-mi radius of the CPNPP but remain outside of the on-site APE. Of these fourteen historic period archaeological sites, none are eligible for listing on the NRHP (Subsection 2.5.3). One additional historic period archeological site, 41SV161 was identified during an archeological survey of proposed water pipelines; the site is not eligible for listing in the NRHP. A temporary construction corridor of 150 ft is utilized during water pipeline construction. The portions of this site nearest the construction corridor have been previously impacted (Subsection 2.5.3.1). The direct impacts of water pipeline construction effect the previously disturbed portions of the site (trash scatter) while remaining features (concrete building foundations, concrete troughs) receive no direct impact. The cumulative construction impact on this site would be SMALL. Subsection 4.1.3.1.3 addresses NRHP-eligible or listed historic sites.

4.1.3.1.3 Historic Sites

No NRHP listed or eligible historic sites are located within the on-site APE, and none are directly impacted by proposed construction at the CPNPP. 56 listed or eligible NRHP properties are located within a 10-mi radius of the CPNPP. Indirect (noise-related or aesthetic/visual) effects are an intrinsic consideration in regard to the potential adverse effects of construction on aboveground historic properties within the vicinity of CPNPP. The visual impact from the proposed cooling towers and reactor containment buildings does not exceed the visual impact of the existing reactor domes and buildings, and all 56 of these properties are at least five mi from the on-site APE (Tables 2.5-21 and 2.5-22). Because of the local vegetation, topography, and considerable distance from the CPNPP, none of these properties are affected by audio/visual impact factors. Thus, indirect impacts of on-site construction on these sites are SMALL and no mitigation is warranted.

4.1.3.1.4 Historic Cemeteries

One small historic cemetery, the Hopewell Cemetery (SV-C004), is located within the boundaries of the CPNPP (Subsection 2.5.3). This cemetery is located one mi from the on-site APE and therefore is not directly impacted by proposed on-site construction. Hopewell Cemetery is near the water pipeline route. Vegetation between the cemetery and the water pipeline corridor is very dense. Visual impact factors from water pipeline construction on-site would be SMALL. Construction of water pipelines temporarily increases noise disturbance along the water pipeline ROW. Subsection 4.4.1.5.2 contains information on noise due to construction of water supply and return pipe lines. Noise impacts related to construction of the water pipeline are temporary, therefore the indirect impact of noise on the Hopewell Cemetery is expected to be SMALL. Three other cemeteries (Unknown Cemetery SV-C026, Post Oak Cemetery SV-C001, and Milam Chapel SV-C002) are located outside the CPNPP, but within two mi of the property boundaries (Table 2.5-23). All three of these cemeteries are at least one mi from the on-site APE and are not directly affected by proposed on-site construction. Indirect effects related to construction noise or visual aesthetics are not anticipated for these cemeteries because such factors are not sufficient to physically disturb burials and grave-markers or prevent visitor access.

One Historic Texas Cemetery, Nubbin Ridge (HD-C005), is located within one mi of the existing off-site water pipeline route. The proposed new water pipeline is anticipated to follow the existing line. Water pipeline construction has no direct impacts upon this cemetery. Because bore holes are used to install the water pipeline when crossing roads, construction would not impact road access to the cemetery. Indirect impacts due to water pipeline construction near Nubbin Ridge Cemetery will be temporary. Vegetation around the cemetery itself likely obscures construction vehicles from view, though they would be visible from the road accessing the cemetery. Subsection 4.4.1.5.2 contains information on noise due to construction of water supply and return pipe lines. Noise impacts from water pipeline construction would be temporary and indirect impacts from construction on Nubbin Ridge cemetery are expected to be SMALL.

The impacts of proposed on-site construction activities on historic cemeteries within CPNPP and its vicinity and within 10 mi of its boundaries are SMALL. No mitigation is warranted.

4.1.3.1.5 Traditional Cultural Properties

Comanche Peak, a geological feature north of the property, may have some significance to the Comanche Tribe. Squaw Creek just south of the property may also have special significance to the Comanche Tribe (Subsection 2.5.3.4). No traditional cultural properties exist on the CPNPP property. Because neither of these properties is within the on-site APE, they are not directly impacted by proposed construction. The potential for indirect, visual/aesthetic impacts from proposed construction does not exceed the impact of the current facilities within CPNPP property. Because of the distance separating the traditional cultural properties from the on-site APE, indirect noise impact on traditional cultural properties is expected to be SMALL and no mitigation is warranted.

4.1.3.2 Transmission Corridors and Off-Site Areas

Off-site construction activities include the installation of transmission lines and water intake and discharge pipelines. This subsection describes the effects of construction on historic properties within the proposed transmission corridors and Lake Granbury water pipeline ROW.

4.1.3.2.1 Water Pipeline Corridor

A portion of the off-site APE includes the installation of a water pipeline (Figure 2.5-9). The corridor for proposed water pipelines is planned to run adjacent to the existing water pipeline but within the existing ROW. A temporary expansion of the existing water pipeline ROW is expected to support water pipeline construction as it runs from the CPNPP property boundary northeast to its terminus in Lake Granbury. The exact route of the proposed Water Pipeline as it runs from the property boundary to the cooling towers was surveyed. Prehistoric archeological sites (41SV160 and 41SV162) relative to the on-site water pipeline route are discussed in Subsection 4.1.3.1.1. One historic period archeological site (41SV161) is discussed in Subsection 4.1.3.1.2.

There are no NRHP listed properties on or within a 1.2-mi radius of the proposed water pipeline corridor.

There are two prehistoric archaeological sites, 41HD14 and 41HD15, within the off-site APE (Subsection 2.5.3.5). Both of these archaeological sites are located within the existing water pipeline ROW. These archaeological sites had been previously impacted by the existing water pipeline route, transmission lines just adjacent to the water pipeline, land clearing and soil erosion. The original site form for 41HD14 from 1981 determined that “Subsurface materials can be expected to extend north to south from the existing transmission line but their extent cannot be determined from surficial evidence” (Wooldridge 1981). Based on the original assessment, Phase II archaeological testing was completed at the site (Briscoe and Walker 2008).

Neither of the sites are eligible for listing in the NRHP (Briscoe and Walker 2008). Because both sites are within the water pipeline corridor, both sites are directly impacted by off-site construction. However, the integrity of both sites has been previously impacted (80 – 90 percent disturbed) reducing the amount of intact soils and artifact concentration. Thus, the proposed off-site construction impact on these sites is expected to be SMALL, and no mitigation is warranted.

4.1.3.2.2 Transmission Corridors

Oncor selects the transmission and distribution line corridors, constructs the lines, and owns and operates the lines from the CPNPP site to various new and existing end users in north Texas. Final routes and designs have not been prepared to date but are being prepared by Oncor. Oncor has been in contact with the Texas Historical Commission about needs and requirements for the protection of cultural resources, including historical and prehistoric resources, places eligible for inclusion on the NRHP, Native American and minority population concerns and archeological inventory requirements as specified by State and Federal guidelines. Oncor would be contracting with one of the firms listed by the Council of Texas Archeologists as being certified to conduct such investigations in the State of Texas, once specific investigation plans have been approved by the Texas Historical Commission.

4.1.3.3 Archaeological Monitoring

Luminant plans to monitor vegetation clearing, excavation, grading, and other soil-intrusive activities during construction of CPNPP Units 3 and 4 and any associated new transmission lines. This monitoring is focused on the identification of prehistoric artifacts, Historic Period artifacts, man-made subsurface features, human burials, and other indicators of an archaeological site that might have escaped identification during the Section 106 review process. In the unlikely event of such finds, Luminant plans to stop work immediately at the location of the find and in the surrounding area. If artifacts and other anthropic features are discovered, appropriate notification is sent to the State Historic Preservation Office (SHPO) and those THPOs who have expressed an interest in such finds. If human remains are encountered, notification is anticipated to be sent to the proper county authority, SHPO, and THPOs who have expressed an interest in the inadvertent discovery of human remains during construction.

Additionally, Oncor plans to stop work immediately if any discovery is made during construction of new transmission lines.

4.1.4 REFERENCES

(Skinner and Humphreys 1973) Skinner, S. Alan and Gerald K. Humphreys. The Historic and Prehistoric Archaeological Resources of the Squaw Creek Reservoir. Southern Methodist University, Institute for the Study of Earth and Man, Dallas, 1973.

(Briscoe and Walker 2008) Briscoe, James and Robert Walker. Archeological Survey of CPNPP Proposed Water Connection Pipelines. ENERCON Services, Dallas, 2008.

(Wooldridge 1981) Wooldridge, H., 1981, Hood Substation 138 kV Line, Brazos Electric Power Cooperative, Inc., Esprey, Huston and Associates, Inc., Austin, Texas, January 1, 1981.

4.2 WATER-RELATED IMPACTS

This section describes site preparation activities, plant water supply, hydrological alterations that could result from plant construction activities, and the physical effects of hydrological alterations on other water users. Subsection 4.2.1 addresses hydrologic alterations; Subsection 4.2.2 addresses water-use impacts of plant construction activities, and impacts to water quality.

Impacts to surface water bodies are expected to be SMALL due to the implementation of a construction stormwater pollution protection plan (SWP3) as required by the Texas Pollutant Discharge Elimination System (TPDES) General Permit Relating to Construction Activities (General Permit), and compliance with other regulatory permits and applicable regulations. Impacts to wetland areas and shallow/perched groundwater resources are expected to be negligible while construction activities are taking place. In addition, no impacts to groundwater aquifers are expected because this water source is not planned to be used to support construction. Water bodies adjacent to the plant that could be affected by construction activities include Squaw Creek Reservoir (SCR). To a lesser extent, Lake Granbury could be minimally affected by expansion of the existing surface water intake structure. Best management practices (BMPs) would be implemented to address construction related impacts from stormwater runoff.

4.2.1 HYDROLOGIC ALTERATIONS

This subsection identifies and describes the hydrologic alterations that could result from the construction of the proposed CPNPP Units 3 and 4. Units 3 and 4 are planned for construction on the northwest side of the peninsula where CPNPP Units 1 and 2 are presently located.

Water-related impacts from construction of a nuclear power plant are similar to those for any large construction project. If not properly planned, large construction projects can result in impacts to groundwater, physical alterations of local streams and wetlands, and impacts to downstream water quality as a result of erosion and sedimentation, or spills of fuel and lubricants used in construction related equipment. Because construction activities have the potential to harm surface water and groundwater resources, applicants are required to obtain a number of permits and develop site-specific pollution prevention plans prior to initiating construction. Effluent discharged from the facility during construction activities is expected to be regulated under the TPDES General Permit requirements. The facility is expected to comply with all requirements of this permit. For a description of the physical characteristics of the surface water bodies including Lake Granbury and SCR, and groundwater aquifers including the Glen Rose Formation and the Twin Mountains Formation see Subsection 2.3.1.

4.2.1.1 Project Related Construction Activities

This subsection identifies proposed construction activities for CPNPP Units 3 and 4 that could result in impacts to the hydrology at the CPNPP site and Lake Granbury:

- Clearing additional land at the project site and constructing infrastructure such as roads and stormwater drainage systems.
- Construction of a potable water supply line from the CPNPP property boundary to plant site.

- Construction of buildings (reactor containment structures, turbine building, cooling towers, electrical substation, and other related structures).
- Construction of additional parking lots and roads.
- Construction of a cooling water intake structure and discharge structure for water withdrawn from and discharged into Lake Granbury.
- Construction of a Blowdown Treatment Facility.
- Temporary disturbance of existing vegetated areas to establish construction laydown areas, concrete batch plants, sand/soil/gravel stockpiles, and construction-worker parking areas.
- Dewatering of foundation excavations during construction (if required).

4.2.1.1.1 Power Plant Area

The CPNPP Construction Plan is presented as Figure 4.2-1. Power plant site preparation and construction is anticipated to require the removal and redistribution of several hundred cubic yards of rock and overburden soil material, which include the removal of an existing structure, an existing Class II landfill, a foundation, paved areas, and the relocation of an on-site rail line. Disturbance to other surface areas at the site may occur as well. Approximately 123 ac of the 7950-ac site are expected to be disturbed for construction of the power plant. A majority of this area was previously affected by prior construction activities for Units 1 and 2. Removal of old structures and construction of structures for CPNPP Units 3 and 4 is anticipated to result in additional alterations of the existing site; however, much of the construction is expected to occur in areas that were previously disturbed during construction of CPNPP Units 1 and 2 in the 1970s and 1980s.

Excavations are anticipated to extend below the shallow/perched groundwater by approximately 5 – 15 ft; however, groundwater production from the shallow water table aquifer and/or the Glen Rose Formation (Subsection 2.3.1.5), is expected to be minimal and within the capacity of standard sump pumps for removal.

Removal of groundwater seepage from the excavation area is expected to be minor. If dewatering is required, dewatering effluents can be directed to a stormwater retention basin prior to discharge, if required.

4.2.1.1.2 Power Production

The CPNPP Units 3 and 4 (power blocks) are located west-northwest of the current operational Units 1 and 2 (Figure 2.1-1). Impacts are expected to be eliminated or reduced by the implementation of the SWP3. Runoff should be managed through implementation of BMPs that may include vegetative buffers, silt fencing, and sedimentation basins that serve to minimize increased sedimentation to SCR near the proposed power block location.

4.2.1.1.3 Construction Areas, Temporary Structures, and Parking Areas

Several laydown yards, temporary buildings, parking areas, and other related structures are expected to be created and utilized during construction activities. Potential erosion and sedimentation from the construction, and use of these areas and structures should be controlled using appropriate BMPs, as required by the SWP3. These controls may include material dunnage, vegetative buffer zones, silt fencing, and diversionary channels to sedimentation basins. Any effects that may occur from these activities would be temporary and are expected to be SMALL due to the implementation of appropriate stormwater BMPs.

4.2.1.1.4 Cooling Towers

Placement of cooling towers to support the CPNPP Units 3 and 4 plant operations are planned on a smaller peninsula located northwest of the proposed construction area of Units 3 and 4 (Figure 2.1-1). Approximately 152 ac is expected to be disturbed for construction of the cooling towers. Due to the location of cooling towers in a previously undisturbed area, the potential for increased sediment runoff from heavy earth-moving activities and loss of vegetative cover increases. Additionally, construction of a pipeline from the proposed cooling towers area to the power block area involves some disturbance of the existing area. Any effects that may occur from these activities would be temporary and are expected to be SMALL due to implementation of appropriate stormwater BMPs.

4.2.1.1.5 Blowdown Treatment Facility

Placement of a Blowdown Treatment Facility (BDTF) to support the CPNPP Units 3 and 4 operations is planned for an area southwest of SCR Dam and due south of existing CPNPP Units 1 and 2 (Figure 1.1-4). Approximately 400 ac is expected to be disturbed for construction of the BDTF. Due to the location of the BDTF in a predominantly undisturbed area, the potential for increased sediment runoff from heavy earth-moving activities and loss of vegetative cover increases. Any effects that may occur from these activities would be temporary and are expected to be SMALL due to the implementation of appropriate stormwater BMPs. Additionally, any alteration of natural drainage features that may occur during construction of the BDTF will require appropriate USACE permits. For a description of the BDTF see Subsection 3.6.1.4.

4.2.1.1.6 Currently Undisturbed Areas

A majority of the areas proposed for additional power plant area construction are currently within previously disturbed areas. The cooling tower area and BDTF area are predominantly undisturbed, overgrown, and forested as are smaller areas within the CPNPP Units 3 and 4 power block. Clearing these areas may be required to support construction activities. Construction activities are expected to follow BMPs for soil and erosion control, as required by the site's SWP3 in accordance with the TPDES General Permit. Therefore, impacts to the currently undisturbed areas from construction activities are considered to be SMALL and would not warrant further mitigation.

4.2.1.1.7 Retention Ponds for Sediment Control

Surface water runoff and associated contaminants are expected to be addressed in the SWP3 and controlled using BMPs, which may include dunnage, vegetative buffer zones, silt fencing, and diversionary channels and sedimentation basins. Stormwater retention ponds for CPNPP Units 3 and 4 should be designed and constructed to accommodate surface water runoff and allow sediment-laden water from dewatering activities, if required, to pass through the ponds prior to discharge. Excavations should extend below the shallow perched water table by approximately 5 – 15 ft. Impacts from excavation dewatering activities are considered to be SMALL, due to low shallow/perched groundwater availability in the excavation area. Dewatering, if required, is expected to occur within a limited area for a reasonably short time frame. Dewatering efforts would be handled by use of sump pumps, if required. Construction activities follow BMPs for soil and erosion control, as required by the TPDES General Permit. Therefore, impacts to the local hydrology and wetlands from construction activities are expected to be SMALL and would not warrant further mitigation.

4.2.1.1.8 Off-site Construction

Installation of a raw water intake structure for CPNPP Units 3 and 4 is planned adjacent to the existing intake structure on Lake Granbury that currently supplies water to SCR. The intake structure is to have two 42-in pipelines each supplying water directly to the cooling towers for Units 3 and 4. Two additional gravity-drain 42-in blowdown discharge pipelines (one from Unit 3 and one from Unit 4) with multi-port diffusers are planned to be located approximately 800 ft upstream from De Cordova Bend Dam in the vicinity of the existing discharge pipe. The four pipelines associated with CPNPP Units 3 and 4 are expected to be placed in the existing pipeline right-of-way (ROW). Off-site hydraulic alterations from these installations and that of the additional intake and discharge structures are discussed in Subsection 4.2.1.2.

The existing road system is expected to adequately handle the construction traffic required for the CPNPP Units 3 and 4 facility, and no off-site road construction is expected. Therefore, no off-site hydrologic alterations from the construction of roads for CPNPP Units 3 and 4 are expected.

4.2.1.2 Hydrologic Alterations Due to Construction

Dredging activities to support construction of the makeup water and blowdown system intake and discharge structures on Lake Granbury is anticipated. A temporary increase in turbidity could occur in Lake Granbury near the intake and discharge structures during construction and dredging activities. The additional turbidity from these construction activities is expected to be minimal, because the activities should be localized and short in duration. The need for installation of riprap, stemwalls, or other appropriate means to stabilize the banks of the lake during and following construction is not anticipated. BMPs are expected to be employed to minimize sediment runoff from disturbed areas above the shoreline.

Pipeline construction for both the intake and discharge structures is expected to be in the existing pipeline ROW. Temporary construction easement is expected to be provided adjacent to the existing ROW easement to support pipeline construction. This construction easement has been evaluated to identify potential impacts to wetland, ecological and cultural resources sensitive areas as well as potential impacts to existing water bodies, including Lake Granbury and SCR.

The source of construction water for concrete batch plant operations, concrete curing, and system startup is expected to be supplied from an on-site raw water storage supply from Somervell County Water District (SCWD), a future municipal water supplier or Lake Granbury. SCR was determined to be unsuitable for these uses due to salinity concentrations. Water for dust suppression and general clean up is expected to be withdrawn from SCR (Subsection 4.2.1.3).

Construction activities on Lake Granbury are expected to be conducted in compliance with Texas Commission on Environmental Quality (TCEQ) and the U.S. Army Corps of Engineers (USACE) permit requirements, and are not expected to affect long-term water quality.

Construction plans do not call for dewatering activities that could affect groundwater aquifer flow and quality. Groundwater should not be utilized to support construction. Therefore, there would be no impact to groundwater aquifer availability.

4.2.1.3 Water Source and Use Rates

Water for construction of CPNPP Units 3 and 4 is expected to be obtained from Wheeler Branch Reservoir, Lake Granbury, and SCR. Existing onsite water supply wells completed in the Twin Mountains Formation would be utilized as a backup emergency potable water supply, if required. Potable water demands of up to 350 gpm (504,000 gpd) are expected from the SCWD (Wheeler Branch Reservoir), and raw water demands of 470 gpm (676,800 gpd) to 1,100 gpm (1,584,000 gpd) are expected from Lake Granbury. Non-potable water demands of up to 93,000 gpd are expected from Squaw Creek Reservoir during construction. The demands from each source are dependent upon specific construction needs and will vary during construction. Maximum demands are anticipated during the initial fills and flushes of pipelines and onsite raw water tanks.

The recommended planning number for drinking water consumption for workers in hot climates is 3 gpd for each worker or approximately 5 – 7 oz every 15 – 20 min (NIOSH 1986). Based on the anticipated maximum construction worker population of 4300 people (Section 4.4), the potable water consumptive use is estimated at 12,900 gpd. The quantities of water obtained from the SCWD (Wheeler Branch Reservoir), Lake Granbury, SCR, and the Twin Mountains Formation are expected to have little effect on the availability of water for other users and are considered a SMALL impact.

4.2.1.4 Water Bodies Receiving Effluents

Construction is expected to result in permanent structures occupying about 275 ac of the site (Figure 2.1-1). Because the CPNPP Units 3 and 4 construction is located on a peninsula of SCR, this water body could potentially be affected by site construction activities and stormwater runoff. Additionally, because makeup water and blowdown system intake and discharge structures for Units 3 and 4 are required on Lake Granbury, this water body could potentially be affected by intake/discharge construction activities. The potential construction effects on SCR and Lake Granbury are expected to be temporary, and because of the volume and flow of the surface water bodies and the use of BMPs, the effects should dissipate rapidly. Therefore, the impact to surface water bodies is expected to be SMALL.

4.2.1.4.1 Intake and Discharge Structure

The makeup water and blowdown system intake and discharge designs are described in Sections 3.3 and 3.4, including the estimated withdrawal of Lake Granbury water required for the CPNPP Units 3 and 4 plant operations, the maximum expected discharge flow rate and water temperature, and the estimated withdrawal of SCR water required for dust suppression and general construction cleanup. Section 4.3 provides a detailed discussion of the ecological impacts of construction of the intake structures, intake pipelines, and discharge pipelines. Impacts of water intake and discharge structures are presented in Section 5.3.

The intake and discharge structures for Units 3 and 4 plant operations are to be located approximately 7.13 mi north-northeast of the CPNPP site on Lake Granbury (Figure 4.2-2). Dredging may be required in the vicinity of the intake and discharge structures, and the appropriate TCEQ permits are expected to be acquired prior to commencing dredging activities. Makeup water and blowdown system is expected to be withdrawn by an intake structure located approximately 1.31 mi upstream from the De Cordova Bend Dam. The makeup water is pumped to the CPNPP Units 3 and 4 cooling system through pipelines, and the blowdown water from the CWS and UHS is discharged through separate pipelines back to Lake Granbury about 1.14 mi downstream from the intake structure. Emergency safe shutdown of the reactor does not rely on an external source of makeup water.

The cooling tower effluent is anticipated to be discharged from the outfall, located approximately 0.17 mi upstream from the De Cordova Bend Dam, through engineered diffusers designed to assure compliance with TPDES requirements and numerical limits imposed by the station's TPDES wastewater permit (TCEQ 2004). A temporary increase in turbidity could occur in Lake Granbury near the discharge structure during construction and dredging activities. The additional turbidity from these construction activities is expected to be minimal, because these activities are expected to be localized and of short duration. Details of the discharge system are presented in Subsections 5.2.1.6 and 5.3.2.

Effluent such as stormwater, road-dust-suppression water runoff, and other construction water uses are controlled using BMPs such as vegetative buffer zones or silt fences, and may be directed first to a settling basin prior to release into SCR, in accordance with the station's SWP3. Following construction activities, settling basin may be used as a final accumulation point for other wastewaters generated from plant start-up activities. See Subsection 4.2.2.2 for additional information regarding water bodies receiving construction effluents.

4.2.1.4.2 Undisturbed Areas

Runoff from undisturbed areas follows flow paths from those already established unless the runoff has the potential to affect construction areas or developed areas; then, additional steps should be taken to minimize the impact of stormwater runoff.

4.2.1.5 Transmission Facilities

Transmission line ROWs are to be developed for CPNPP Units 3 and 4 by the transmission line company (Oncor). Subsections 4.1.2 and 5.6.1 present additional information related to impacts from planned transmission corridors.

4.2.1.6 Floodplains and Wetlands

The CPNPP Units 3 and 4 site is located on the western end of a peninsula predominately surrounded by SCR and the CPNPP Units 1 and 2 Safe Shutdown Impoundment, approximately 0.49 mi west-northwest of CPNPP Units 1 and 2. The elevation of facilities for CPNPP Units 3 and 4 is 822 ft msl, which is above the SCR probable maximum flood (PMF) elevation of 789.7 ft msl (CPSES 1974). The SCR emergency spillway elevation is 783 ft msl. Consequently, the CPNPP Units 3 and 4 site does not lie within the 100- or 500-year flood elevations and is therefore considered a “dry site.” The spillway elevation of the Lake Granbury De Cordova Bend Dam is 707 ft msl, with a normal pool elevation of 693 ft msl, and based on elevation and distance, does not pose a flood risk to the CPNPP Units 3 and 4 site (BRA 2007). The existing intake and pipeline corridor between Lake Granbury and the CPNPP site does not cross any area within the designated 100- or 500-year floodplain (FEMA 1988).

Two potentially jurisdictional wetlands (USACE has to determine if wetlands are jurisdictional) are situated on either side of the small peninsula where the proposed cooling towers for Units 3 and 4 are located at the CPNPP site. Both of these suspected wetlands areas are located along the SCR shoreline where unnamed intermittent streams drain into the reservoir. Figure 2.4-1 illustrates the location of the two wetlands near the proposed construction site. There are no wetlands associated with the retention ponds found on the CPNPP site.

Field surveys were conducted from March through July 2007 to determine the presence of wetlands primarily within the proposed cooling tower construction site. Surveys were also conducted along the shoreline of SCR and within the primary property boundaries of the power plant. Potential wetlands were (1) identified using both USGS 7.5 minute topographic maps and maps produced by ArcView GIS using infrared aerial photographs as their base layer; (2) field tested for hydrology, hydric soils, and hydrophytic vegetation; then, (3) designated as potentially jurisdictional wetlands. Wetlands meeting all three of these qualifications were then mapped with a Trimble GeoXH global positioning system unit capable of sub-meter accuracy. As mentioned above, two littoral, forested wetlands were identified within the survey area covering a total of approximately 0.75 ac. See Subsection 2.4.1 and Figure 2.4-1 for additional information. Individual wetlands ranged in size from 0.5 to 0.25 ac; a detailed description of each of these areas is presented in Subsection 2.4.1. Construction impacts to wetlands are expected to be evaluated prior to construction, appropriate permits are planned to be obtained, and the station is expected to comply with all state and federal guidelines and regulations.

The CPNPP currently follows state and federal guidelines and regulations to protect wetlands. Wetlands have developed in limited areas along the SCR shoreline. If construction activities could potentially impact these wetland areas, sedimentation basins and other engineering controls should be utilized to limit any adverse effects. Impacts to vegetated or forested areas are also expected to be minimized by use of the SWP3 and BMPs. Routing runoff through sedimentation basins minimize solids discharged to SCR.

4.2.1.7 Potentially Affected Federal Projects

The CPNPP site is situated adjacent to SCR, which is owned and maintained by Luminant. A review has been performed for possible federal agency actions in the vicinity of this project site (Section 2.8). Two federal projects were identified pursuant to the National Environmental Policy

Act (NEPA); an Environmental Assessment was prepared in 2006 to develop Ham Creek Park into a Class A campground at Whitney Lake, Johnson County, Texas (USACE 2006). The second project is the Wheeler Branch Reservoir being built by the SCWD. A USACE 404 permit has been issued for this project. The CPNPP project is expected to have no adverse affects on any federal projects.

As presented in Subsection 2.2.3, there are no Native American lands in the region based upon a review of the National Atlas Information.

4.2.1.8 Effects of Alterations on Water Users

No significant effects from water usage during construction activities are anticipated on any other water users in the vicinity of the CPNPP site, including surface water and groundwater resources used by municipalities and industrial facilities.

Surface water quality in SCR is slightly saline and is currently used for CPNPP Units 1 and 2 cooling, with reservoir makeup water coming from Lake Granbury. Surface water quality in Lake Granbury is slightly saline and four municipal water systems obtain water from the Brazos River Authority's (BRA) Lake Granbury Surface Water and Treatment System (SWATS) (BRA 2007a) and one private municipal water system obtains water from Lake Granbury as their sole or primary water supply (Table 4.2-1). The closest municipal user to the CPNPP Lake Granbury discharge is the Lake Granbury SWATS, located approximately 3.45 mi upstream. There are no downstream municipal users between the CPNPP Lake Granbury discharge and the City of Waco, Texas, approximately 65 mi south-southwest. The closest industrial user is the Wolf Hollow electric power plant, with an intake located approximately 150 ft downstream from the CPNPP intake structures on Lake Granbury. The closest upstream industrial user is the DeCordova Bend electrical power plant located approximately 1.56 mi from the CPNPP Lake Granbury intake. Construction activities for the CPNPP Units 3 and 4 intake are anticipated to have negligible, if any, effect on water quality or its current uses. Surface water rights concerning Lake Granbury near the CPNPP intake are not expected to be impaired for their designated uses. In addition, constructing intake structures requires USACE and TCEQ permits.

Potable water is planned to be supplied by SCWD, raw water is expected to be supplied from Lake Granbury, and non-potable water from SCR. Except for backup potable supply, groundwater is not expected to be used during construction. Environmental impacts to surface and groundwater would be SMALL and are managed under the provisions of applicable state regulatory programs.

4.2.1.9 Effects of Alterations on Terrestrial or Aquatic Ecosystems

The greatest potential water-related impacts during construction are expected to be from runoff that may contain higher than normal concentrations of silt and clay. Construction area runoff would be managed using BMPs established by the SWP3, and if necessary, would be directed to settling ponds prior to discharge to minimize this threat. TPDES limitations on physical and chemical parameters are met during construction activities, and the impacts to terrestrial and aquatic ecosystems are considered SMALL.

4.2.1.10 Construction Stormwater Control and Other Minimizing Actions

The impacts from stormwater runoff during construction are considered SMALL and should be effectively managed by development and implementation of a site-specific construction SWP3. The construction SWP3 is expected to address employee training and installation of soil erosion measures such as silt fences, straw bales, slope breakers, and other soil erosion prevention measures. The SWP3 also contains preventive maintenance procedures for construction equipment to prevent leaks and spills, procedures for storage of chemicals and waste materials, spill control practices, revegetation plans, procedures for regular inspections of soil erosion control measures, and procedures for visual inspections of discharges that could create an impact on water quality. Much of the proposed Units 3 and 4 site footprint is located within areas where construction was previously completed, and established stormwater drainage systems and roadways already exist.

The TCEQ requires construction projects that impact five ac or greater to obtain authorization under the TPDES General Permit prior to start of construction. The current TPDES permit (TCEQ 2003) requires BMPs for soil and erosion control, stabilization practices, structural controls, materials management, inspections, etc. In addition, the U.S. Environmental Protection Agency (EPA) has issued BMP guidance for soil and erosion control (EPA 2007), and for development of SWP3s. Because construction of Units 3 and 4 is estimated to require approximately 659 ac, coverage under the TPDES General Permit is required.

4.2.2 WATER-USE IMPACTS

This subsection is a discussion of water-use impacts that includes surface water and groundwater environments during the construction phase of the project. Measures to eliminate or reduce construction impacts are discussed in Subsection 4.2.1.10.

4.2.2.1 Construction Activities Potentially Impacting Water Use

Lake Granbury and SCR are the waters that could potentially be affected by construction activities. Descriptions of Lake Granbury and SCR, the shallow/perched groundwater, bedrock aquifers in the site vicinity including the Glen Rose Formation and the Twin Mountains Formation, and the CPNPP site are presented in Subsection 2.3.1.

Dredging for sediment removal is anticipated in the immediate area of the CPNPP Units 3 and 4 makeup water and blowdown system intake and discharge prior to startup of the makeup water and blowdown system. A temporary increase in turbidity could occur in Lake Granbury near the Units 3 and 4 structures during dredging activities. Dredging operations are conducted in compliance with USACE and TCEQ requirements, and are not expected to affect long-term water quality. This temporary effect is considered SMALL and is not expected to have a significant impact on water use or water quality.

4.2.2.2 Water Bodies Receiving Construction Effluents

The impacts of effluents from construction activities are considered to be SMALL. Water is expected to be withdrawn from SCR in sufficient quantities to provide dust suppression water for roads and water for general cleanup activities as needed. The water withdrawn is essentially consumed with no free-flowing streams or runoff generated from these activities.

Water used for construction is not heated or cooled. Temperature and velocity of construction effluents to water bodies are dependent on precipitation received at the site during construction activities. Runoff from precipitation events occurring during construction activities is discharged and managed under the SWP3. Because precipitation events cannot be predicted, it is not possible to determine temperature and/or velocity of the resulting runoff that is discharged to receiving water bodies.

Stormwater that impacts the construction areas is expected to be directed to settling basins for CPNPP Units 3 and 4 to minimize any water quality impacts from its generation before being directed to a monitored discharge. Discharge and monitored runoff is expected to enter SCR in small amounts.

Appropriate regulatory permits are obtained for construction in the affected SCR, Lake Granbury, and wetland areas (Table 1.2-1). The BRA has administrative and legal oversight of the Brazos River system. As such, they are mandated to promote and preserve water quality while also fostering beneficial and economic uses. The USACE regulatory authority is based on Section 10 of the Rivers and Harbors Act of 1899, which prohibits the obstruction or alteration of navigable waters of the United States without a permit. Section 404 of the Clean Water Act prohibits the discharge of dredged or fill material into waters of the United States without a permit.

Water discharges are monitored in accordance with applicable TPDES requirements and state water quality standards at the time of construction; no Native American tribal standards apply.

4.2.2.2.1 Pre-Operational Piping Flush Effluents

Prior to startup, the piping systems are flushed with water supplied from SCWD. Water effluents are discharged to the water retention basin with sampling conducted per the TPDES permit. Effluents containing detergent constituents are also planned to be discharged to a lined wastewater basin, where they are sampled and disposed according to the TPDES permit, or as required by applicable state and local regulation.

Because pipe cleaning discharges are monitored and restricted by the requirements of the CPNPP TPDES permit, the impacts to the environment from the pre-operational piping flushes are considered to be SMALL and not warrant mitigation.

4.2.2.3 Water Quantity Used and Quantity Available to Other Users

Identification and locations of surface water and groundwater aquifer users in the area are provided in Subsection 2.3.2. However, as discussed in Subsection 4.2.2.2, the amount of water needed during construction is not expected to affect water conditions in Lake Granbury or SCR, or existing or future water rights and allocations, and should not require rationing of any existing water users. Primary water needs during the construction of CPNPP Units 3 and 4 are for concrete batch plant operations, watering of roads for dust suppression, and watering of disturbed areas to establish cover vegetation.

Because most of the water needed for construction is expected to be withdrawn from Lake Granbury, SCR, or obtained from the SCWD, there should be no effects to the water quality or detrimental impacts that would affect any other user's consumption.

4.2.2.4 Water Quality Changes Due to Substrate Exposure

Only very localized and transient impacts due to substrate exposure are anticipated. Construction area runoff is expected to be directed to retention basins in accordance with the SWP3 then discharged to SCR. The TPDES General Permit is expected to address discharge requirements relative to water quality. Construction impacts to the intake and discharge areas are local and transient, and are considered to be SMALL. Large areas are not expected to be affected, and the locally affected areas are expected to recover rapidly. Measures to eliminate or reduce construction impacts are discussed in Subsection 4.2.1.10.

4.2.2.5 Effects of Alterations on Other Water Users

Currently, five municipal water systems obtain water from Lake Granbury through the SWATS. The closest municipal user to the CPNPP discharge is SWATS, located approximately 3.45 mi upstream of the CPNPP Intake Structure. There are no downstream municipal users between the CPNPP Lake Granbury discharge and the City of Waco, Texas, approximately 65 mi south-southwest. The closest industrial user is the Wolf Hollow electric power plant, with an intake located approximately 150 ft downstream from the CPNPP Lake Granbury intake. The closest upstream industrial user is the DeCordova Bend electric power plant, located approximately 1.56 mi from the CPNPP Lake Granbury intake. Construction activities for CPNPP Units 3 and 4 intake are anticipated to have negligible, if any, effect on water quality or its current uses. Short-term increases in turbidity from construction at the CPNPP Lake Granbury intake and discharge sites are not expected to impact water supplies for these municipalities or industrial sites.

No flowing streams that affect water quality in SCR are in close proximity of the CPNPP site. However, the 109-river mi stretch of the Brazos River located upstream of Lake Granbury has a 303(d) designation under the provisions of Section 303 of the Clean Water Act. The 303(d) designations (indicating impaired waters) are due to elevated naturally occurring chloride concentrations (Subsection 2.3.3.1). Additionally, Lake Granbury is listed as an impaired candidate for exceeding water quality standards for chloride.

The Cretaceous-age Glen Rose Formation underlies the site and has an approximate thickness ranging from 217 to 271 ft below ground surface bgs. Under CPNPP Units 3 and 4, the thickness is approximately 230 ft. In the CPNPP vicinity, the Glen Rose Formation has been described as a poor water bearing formation with low water availability. Recharge into the site's shallow/perched groundwater system occurs through precipitation with no regional subsurface groundwater aquifer recharge. Because the local groundwater aquifer is not expected to be utilized to support construction, there would be no impacts to groundwater aquifer supplies.

In and near the CPNPP plant area, the principal water-bearing unit is the Cretaceous-age Twin Mountains Formation located immediately below the Glen Rose Formation. The top of the Twin Mountains Formation is determined to be at approximately 238 ft below the Units 3 and 4 plant grade elevation. In the vicinity of the CPNPP site, the Twin Mountains Formation rocks consist of sandstones and shale with thin claystone and limestone interbeds, which together are more than

220 ft thick (Subsection 2.3.1). The nearest outcrop of the Twin Mountains Formation is approximately 7.5 mi west of the CPNPP site (CPSES 2002). Currently, the Twin Mountains Formation is used as the municipal groundwater supply for the City of Glen Rose, located 5.2 mi south of the CPNPP site. Future municipal water supply for the City of Glen Rose, other smaller Somervell County communities, and some private users in Somervell County is planned to be obtained from Wheeler Branch Reservoir, which is operated by SCWD.

4.2.2.6 Construction Alterations to Other Users

Water quality and quantity safeguards that are implemented are expected to prevent alterations of water uses for other entities.

4.2.2.7 Construction Alterations to Terrestrial and Aquatic Ecosystems

Dredging to expand the intake structure area on Lake Granbury could create a temporary loss of shoreline-edge habitat in the affected areas. Localized shoreline and bottom materials potentially can be affected during that short construction period; however, impact from dredging is expected to be SMALL based upon the implementation of planned erosion controls (Subsection 4.2.1.10).

4.2.2.8 Proposed Practices to Control Water-Use Impacts

Using proven construction methods, exercising small land disturbances for Unit 3 and 4 construction activities, and developing and implementing BMPs associated with the site-specific SWP3 and TPDES General Permit requirements should eliminate or reduce the potential for any water-use impacts. Measures to eliminate or reduce construction impacts are discussed in Subsection 4.2.1.10.

4.2.2.9 Water Quality Requirements for Domestic and Aquatic Ecosystems

The BRA has conducted extensive domestic and aquatic ecosystem studies on Lake Granbury, and compares their findings with set standards for water quality management. In addition, BRA continues to monitor the ecological health of the water within the Brazos River watershed and Lake Granbury, including the area around the CPNPP intake and discharge (Subsection 2.3.3).

Additionally, Luminant has conducted domestic and aquatic ecosystem studies on SCR and also compares their findings with set standards for water quality management. Luminant continues to monitor the ecological health of the water within SCR relative to radiological aspects.

4.2.3 REFERENCES

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TABLE 4.2-1
LAKE GRANBURY MUNICIPAL WATER SYSTEMS

Public Water System	Use	Population Count	Average Daily Consumption
Oak Trail Shores	Municipal	6354	0.362 Mgd
City of Granbury[(a)]	Municipal	See Note	See Note
Action Municipal Utility District[(a)]	Municipal	See Note	See Note
Johnson County Fresh Water Supply District No. 1[(a)]	Municipal	See Note	See Note
Johnson County Special Utilities District[(a)]	Municipal	See Note	See Note

a) Treated Water Provided by the Lake Granbury Surface Water and Treatment System (SWATS)

Note: SWATS Total Population Count = 60,692, Total Average Daily Consumption = 5.360 million gallons per day (Mgd)

(TCEQ 2008)

4.3 ECOLOGICAL IMPACTS

In 1996, the NRC published NUREG-1437, a generic environmental impact statement for license renewal of nuclear power plants. In part, NUREG-1437 was written to enhance the efficiency of the license renewal process by documenting well understood generic environmental effects common to most existing plants and to separate them from effects that need to be addressed in plant-by-plant renewal proceedings. NUREG-1437 also applies to new construction at existing plants because it takes into account the significance of effects during refurbishment. Refurbishment is defined as large or significant construction activity at an existing site.

NUREG-1437 adopted the standard for assessing environmental issues established for Table B-1 of 10CFR51, Subpart A, Appendix B. Each effect is assigned to one of three significance levels: SMALL, MODERATE, or LARGE. SMALL effects are those that are undetectable or so minor that they would neither destabilize nor noticeably alter any important attribute of a resource. MODERATE effects are those sufficient to alter noticeably, but not to destabilize, important attributes of a resource. LARGE effects are those that are clearly noticeable and sufficient to destabilize important attributes of a resource. These significance levels are used to describe the construction related impacts on terrestrial and aquatic ecology.

The NRC’s standard review plan for environmental reports, NUREG-1555, emphasizes evaluating the impact of station construction and operation on important species, as defined in NUREG-1555, and their habitats. Consequently, the discussion in this section focuses on those important species (Subsections 2.4.1.1.4 and 2.4.2.4). The NRC staff recently issued draft updates of NUREG-1555 Subsection 4.3.1, Terrestrial Ecosystems, and Subsection 4.3.2, Aquatic Ecosystems. This section also considers the changes reflected in those updates.

4.3.1 TERRESTRIAL ECOSYSTEMS

Site preparation and plant construction activities in terrestrial habitats for the CPNPP Units 3 and 4 (Figure 4.3-1) include the following:

- Installing erosion and sediment control devices and practices.
- Clearing vegetation by cutting and grubbing.
- Disposing of vegetative debris or recycling the debris for later use at the site.
- Leveling the land by grading or filling as needed.
- Excavating to install building and other structural foundations.
- Excavating trenches for additional water intake and blow-down discharge pipelines and other station piping and utility connections.
- Installing pipelines and other utilities, and backfilling the trenches.
- Disposing of spoil either on- or off-site.

- Excavating evaporation and water retention ponds.
- Pouring concrete foundations.
- Constructing buildings and other structures on the additional foundations.
- Leveling by grading or filling for additional parking lots and internal roadways.
- Paving roadways and parking lots.
- Grading and landscaping to permanently control erosion and runoff.

This section describes the potential impacts of the construction activities listed above on the ecological resources of the CPNPP site and vicinity within Somervell and Hood counties. No other major state or federal projects are planned in the vicinity of the CPNPP site (Section 2.8). Disturbance in the area would be directly related to construction activities for the proposed project. Scheduled activities are not expected to acquire a Limited Work Authorization (LWA). Construction of CPNPP Units 3 and 4 is scheduled for completion as shown in Table 1.1-1.

Except for the addition of permanent structures that affect a small percentage of the natural habitat available on the site, potential impacts associated with construction are expected to be temporary and minor. An estimated 275 ac in the core area of the site are expected to be affected by the construction of the new reactor units, switchyard, and cooling towers (Figure 4.3-1). In addition, construction of the proposed BDTF occurs within an area of approximately 400 ac (Figure 1.1-4). Accordingly, 675 ac represent the maximum area of soil to be disturbed at any time during pre-construction activities, which include site work preparing the construction areas. Virtually all habitat effects would take place during pre-construction activities.

When construction is complete, approximately 150 ac of the affected on-site acreage in the core area of the site and the entire 400 ac in the area of the BDTF (or a total of 550 ac) would contain permanent structures or other facilities, including paved parking lots. About 125 ac of altered areas not containing permanent structures would be landscaped or re-vegetated or otherwise restored to approximate a natural condition such as grassland and routinely maintained following construction, and converted to a routinely maintained area. Although 125 acres of the core area will be converted to maintained areas, the original habitat would be considered permanently altered.

A detailed and comprehensive description of the terrestrial environment at the CPNPP site is provided in Subsection 2.4.1. Terrestrial ecological effects from constructing additional reactor units and support facilities at CPNPP would be negligible to SMALL impacts. None are MODERATE or LARGE. These effects are subject to mitigation by generally accepted measures employed during construction or already in place at the site. Application of such measures is warranted at CPNPP Units 3 and 4. Mitigation beyond the application of these measures is not warranted.

4.3.1.1 Terrestrial Vegetation

Anticipated effects of construction at CPNPP for the proposed project would include temporary and long-term alteration and loss of vegetative cover, loss of wildlife habitat, increased erosion, and increased interaction between humans and wildlife. Approximately 100 ac of Ashe juniper forest, about three percent of the Ashe juniper habitat presently on the site; 18 ac of mixed hardwood forests, about four percent; 60 ac of grassland, about nine percent; 0.3 ac wetland, about 0.5% of on-site wetlands are located within the proposed core construction area. The remaining acreages are in areas previously disturbed by original construction associated with CPNPP Units 1 and 2.

Pre-construction of the BDTF is anticipated to permanently affect a total of 400 acres. Approximately 313 acres of Ashe juniper habitat (10 percent of the Ashe juniper habitat on-site), 34 acres grassland (5 percent of on-site grassland habitat), and 45 acres mixed hardwood (9 percent of mixed hardwood on-site) have been identified within the 400 ac BDTF. Seven acres of developed area is also expected to be disturbed by constructing the BDTF. In addition to habitat alterations associated with construction of the BDTF, approximately 5882 linear feet of ephemeral stream exists within the 400 ac BDTF and would also be affected by pre-construction activities.

Construction and support areas shown on Figure 4.3-1 contain no old growth timber, unique or sensitive plants, or unique or sensitive plant communities. Because the vegetation communities within the CPNPP boundary are common throughout Somervell and Hood counties, the affected area at CPNPP would be a very small percentage of the total acreage of these cover types in the general area. Construction on the site would not noticeably reduce the local diversity of plants, plant communities, or the wildlife species that inhabit them.

Clearing activities are performed in compliance with federal and state regulations, and permit requirements during pre-construction. In the Ashe juniper and mixed hardwood forests, contractors would clear the construction area of woody vegetation, and where necessary, fill and grade the site to create a level surface. If it exists in sufficient quantity to attract a buyer, merchantable timber within these areas may be harvested for commercial sale. Remaining trees and other vegetation would then be felled. Stumps, shrubs, and saplings would be grubbed, and groundcover and leaf litter would be cleared to prepare the land surface for grading.

Felled trees, stumps, and other woody material would be disposed of by chipping or spreading the wood chips. Areas for waste disposal have yet to be finalized. These areas may be on- or off-site. Opportunities to recycle woody material for use elsewhere on the site may also be considered. Recycling opportunities could include cutting logs into firewood, using wood chips to mulch landscaped areas, using logs to line pathways, and piling logs and brush in open areas to enhance terrestrial wildlife habitat.

Mulch not in use will be stored onsite within areas previously identified to be disturbed, until they are needed for application. Leachate from rain percolating through stored mulch at a construction site is considered under State required permits for stormwater. The site specific Stormwater Pollution Prevention Plan will include best management practices that may include structural confinement of mulch to avoid discharges of leachate to Squaw Creek Reservoir. Ecological impacts are nullified by best management practices employed to prevent stormwater runoff.

Large mulch piles are at risk for spontaneous combustion as the wood pulp decays. Periodically turning the pile or creating several smaller piles rather than one large pile will circulate air through the mulch and reduce heat build up.

Little additional fill or grading is needed in non-forested grasslands and previously disturbed areas during pre-construction. Heavy equipment would be used to scalp vegetation at ground level, leaving the plant rootstock largely intact. Most non-woody vegetation within construction zones is destroyed by the equipment operating there and by stockpiling or disposing of excess soil. There are no opportunities for recycling non-woody vegetation, nor is additional area needed either on- or off-site to dispose of the residual material.

After the ground is free of vegetative cover, erosion, sedimentation, and fugitive dust are expected. These factors are controlled by implementing good construction practices and BMPs. BMPs seek primarily erosion control to keep soil in place then employ sediment control to capture any sediment moved by stormwater before it leaves the site or enters SCR. The measures to be employed at the CPNPP site would be incorporated in a site-specific SWP3 using appropriate state or local specifications prior to initiating construction. Among the general measures to be considered for inclusion in the SWP3 are:

- Minimize the area to be disturbed by protecting vegetated buffers using silt fences or other sediment controls.
- Phase construction activity to minimize the duration of soil exposure and stabilizing exposed soil as quickly as possible after construction. Temporary cover BMPs include temporary seeding, mulches, matrices, and blankets and mats while permanent cover BMPs include permanent seeding and planting, placing sod, channel stabilization, and vegetative buffer strips.
- Control stormwater flowing through the site by diversion ditches or berms to direct runoff away from unprotected slopes and direct sediment-laden runoff to sediment-trapping structures such as holding ponds. The use of retention ponds for sediment control is discussed more fully in Subsection 4.2.1.1.7.
- Establish perimeter controls such as vegetative buffer strips supplemented with silt fences and fiber rolls around the perimeter of SCR to help prevent soil erosion and stop sediment from entering the reservoir.
- Establish stabilized construction entrances to and exits from the site to limit the amount of sediment tracked onto public roads.
- Control fugitive dust by watering access roads and the construction site as needed.
- Schedule periodic and regular inspection and maintenance of all BMPs put into place.

Following construction, contractors would seed all temporary work spaces, such as laydown areas or temporary parking lots, with herbaceous plants or grass, as was done upon completing CPNPP Units 1 and 2. In some cases, native shrubs and trees would be replanted according to a re-vegetation and or landscaping plan for the facility. Although some areas may be re-vegetated, it should be noted that original habitats will not be restored resulting in a permanent alteration.

Removal of forests sometimes results in increased forest fragmentation that can affect the movement of wildlife through habitat. Review of Figure 4.3-1 indicates the primary construction area is located within Ashe juniper and mixed hardwood forests that are already partially isolated from adjacent forested areas as a result of previous construction and transmission line maintenance activities. No federal or state projects with the potential to further fragment wildlife habitat have been identified. Construction activities that affect small forest stands are not expected to result in additional forest fragmentation or removal of potential travel corridors available to terrestrial wildlife.

Effects of construction on terrestrial plant communities are managed by using standard construction techniques that minimize long-term impacts, such as minimizing topsoil loss prior to re-vegetating or reseeding, and allowing the area to develop back into a stable ecological community. Even if an area is not reseeded, some regeneration from the original root systems and seed bed is expected. Invasive species are equally likely to colonize barren soils. Over time and in the absence of further disturbance, primary colonizing species are replaced by later successional species. Eventually, disturbed areas not actively re-vegetated and maintained also develop stable communities similar to what existed prior to construction.

On-site areas to be disturbed during pre-construction are only a small portion of the common habitats available at the CPNPP site and elsewhere in the area. Best Management Practices would be used to minimize adverse construction impacts in areas that cannot be avoided. For these reasons, the overall impact of construction on terrestrial vegetation is SMALL.

The impacts of land clearing, grading, and leveling to construct the additional transmission lines are generally similar to those experienced on-site with two major exceptions. First, clearing and grading occur only at the sites of the additional transmission towers where the activity is limited to that needed to provide a level foundation space for the individual towers. Second, the ability to relocate proposed tower sites laterally along the ROW means that towers can usually be sited to avoid environmentally sensitive areas such as those that might contain small populations of special interest plants, water bodies and waterways, and wetlands.

The impacts of land clearing, grading, trenching, and leveling to construct the water pipeline between the site and Lake Granbury are also generally the same as those experienced on-site. Following construction, the approximately 64 ac of widened pipeline ROW is likely to be seeded with annual grasses or other species that do not require periodic fertilizing or applying other amendments. Following initial seeding, the disturbed area would be allowed to re-vegetate naturally with native herbaceous and small shrub species, largely approximating the cover types established on the existing ROW (Subsection 2.4.1.2.2). These largely grassland types contain no wetlands or habitat for threatened or endangered species. Preventing the future growth and development of large shrubs and trees also establishes a permanent corridor that is maintained for safety and to facilitate visual inspection of the ROW.

Transmission line and water pipeline construction is also covered by an SWP3 and spill prevention plan, and the BMPs that are incorporated into those plans. Measures used to maintain the transmission line ROW after construction is completed are discussed in Subsection 5.6.1.

4.3.1.2 Wildlife Resources

Direct wildlife mortality that could occur during the construction period is expected to only affect organisms that cannot readily flee the construction area. Clearing, grading, excavating, and burying habitats within the construction zone is expected to lead to mortality of small mammals, reptiles, amphibians, invertebrates, and nesting birds with eggs or young. For the reasons discussed below, direct mortality of wildlife in the limited areas of construction is not expected to be great enough to cause detectible population effects.

Burrowing vertebrates are especially vulnerable to construction activity. Amphibians, reptiles, and mammals are three vertebrate groups that display burrowing activity and are found on the CPNPP site. The actual density of burrowing species at the CPNPP site is unknown because no inventory was performed to identify which specific burrowers may be present. However, most burrowing animals are also mobile and flee construction areas. Although there may be some mortality to burrowing animals during the construction period, the confined disturbance is not expected to significantly affect local populations of species that inhabit burrows because these species are not limited to the construction area. Burrowing vertebrates are common throughout many habitats across the CPNPP site.

Wildlife typically avoid roadways where activity and noise increase (USDOT 2004). Construction machinery and personal vehicles occasionally collide with wildlife on construction sites, or while traveling to and from these sites. Wildlife species that are particularly vulnerable to collisions with vehicles are inconspicuous, slow-moving, and nocturnal species such as opossums, skunks, rabbits, deer, turtles, snakes, amphibians, and birds, such as mourning doves and meadowlarks that inhabit shrubs or fields adjacent to roads.

To reduce collision occurrences, vehicles would be confined to roadways and authorized stream crossings. The potential for collisions between birds and structures, vehicles, and transmission lines also exists. Avian collisions with fabricated structures are thought to be the result of numerous factors related to the characteristics of each species such as flight behavior, age, habitat use, seasonal habits, and diurnal habitats, and to environmental characteristics such as weather, topography, land use, and orientation of the structures. Most authors on the subject of avian collisions with utility structures agree that collisions are not a significant source of mortality for thriving populations of birds with good reproductive potential.

The NRC reviewed monitoring data concerning avian collisions with cooling towers at nuclear power plants in NUREG-1437 and determined that overall avian mortality is low. Transmission lines exist within the CPNPP site and have not resulted in any significant avian mortality. Therefore, avian mortality along additional transmission corridors is not expected to increase dramatically during construction of the additional facilities. The number of construction-related bird collisions with structures is considered to be SMALL. No plan is in place to mitigate avian mortality.

Noise, machinery activity, and fugitive dust from disturbed ground are expected to displace mobile species beyond the actual construction area, similar to animal movement away from areas of vehicle traffic along highway systems. Heavy equipment such as scrapers and bulldozers typically emit noise at levels within the 70 – 90 dBA range at distances of 100 ft. Because a small percentage of habitat on the CPNPP site is expected to be disturbed, ample habitat is available adjacent to the construction site, which provides refuge for displaced animals. Avoidance behavior surrounding construction sites partially offsets the risk of wildlife colliding with equipment or vehicles. All native fauna are expected to return upon cessation of the construction activity and associated noise.

Temporary disturbance and displacement of wildlife by construction activities are anticipated, but the surrounding area is expected to experience a return of most wildlife, with the exception of areas subject to routine operational noise such as the CPNPP Units 3 and 4 cooling tower area. Even in such noisy areas, wildlife like white-tailed deer and rabbits eventually habituate to the increased noise levels and repopulate the area. Wildlife populations on-site or in nearby habitats would not be adversely affected by temporary disturbance or displacement. Construction within or near critical habitats that are used for significant life history functions, like nesting, may result in a greater individual impact. Potential impacts could be mediated by scheduling construction activities outside of important time periods, such as nesting times.

There is a potential for the accidental release of chemicals, including petroleum products, during construction. The consequences to wildlife would be most severe if toxic compounds enter surfacewaters. Refueling vehicles and storing fuel, oil, and other fluids during construction create a potential contamination hazard to aquifers and surfacewaters. Appropriate controls are activated in accordance with a site-specific spill prevention plan that minimizes the potential for accidental spills.

Whether incorporated into the SWP3 or produced as a stand-alone document, the spill prevention plan clearly identifies ways to reduce the possibility of spills, contain and cleanup spills, dispose of contaminated materials, and train personnel responsible for spill prevention and response. Usually included as a minimum in the spill prevention plan is the following:

- Drawings showing the locations of all chemical and petroleum-related storage areas, storm drains, surface water bodies, and waterways on or near the site.
- Description and list of all types of equipment to be used to adequately cleanup a spill.
- Specification concerning notifying appropriate authorities, such as police and fire departments, and hospitals.
- Proper waste handling and safety procedures for each type of waste.
- Description of procedures for immediate cleanup of spills and proper disposal of contaminated clean-up materials.
- Identification of personnel responsible for implementing the plan in the event of a spill.
- Description of a program for educating employees and contractors on the potential hazards to humans and the environment from spills and leaks.

- Schedule for updating the plan and cleanup materials as changes occur to the types of chemicals and other materials stored and used on-site.

The plan would also specify material handling procedures and storage requirements. The overall intent of the plan is to minimize the possibility of a serious spill and promote rapid response and cleanup. This plan reduces the likelihood of a spill and minimizes the potential adverse effects. Serious spills represent a very SMALL potential adverse impact.

Aside from the possibility of an accidental toxic release, the only permanent disturbance regarding construction is reduction in the site's wildlife carrying-capacity because of the loss of habitat that would be replaced by permanent facilities. Effects of construction in affected areas would lower the overall carrying capacity for wildlife within the CPNPP site. Given the limited area of construction, impact to terrestrial habitats and wildlife at and near the CPNPP site is considered SMALL.

4.3.1.3 Important Terrestrial Species

As discussed in Subsection 2.4.1.1.4, important species are (1) federal- or state-listed (or proposed for listing) threatened or endangered species, (2) commercially or recreationally valuable species, (3) species that are essential to the maintenance and survival of species that are rare or commercially or recreationally valuable, (4) species that are critical to the structure and function of the local terrestrial ecosystem, and (5) species that may serve as biological indicators to monitor the effects of the proposed facilities on the terrestrial environment. See Subsection 2.4.1.1.4 for documentation concerning consultation with the U.S. Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife Department concerning federally and state-listed species.

Subsection 2.4.1.1.4 identifies no essential, critical, or bio-indicator species that potentially occupy habitats at or near the CPNPP site. The only important terrestrial species potentially occupying the site are a small number of rare species and a larger number of recreationally valuable species that are common in northern Texas.

SCR was closed to the public in September 2001 but will be reopened for full recreational uses with controlled access.

The golden-cheeked warbler and the black-capped vireo are the only terrestrial species listed by USFWS that potentially utilize Ashe juniper habitat on the CPNPP site. No federally listed plant species are within Somervell and Hood counties. Proposed construction activities cannot adversely affect any federally listed plants.

Although both the warbler and vireo have been observed foraging or nesting within 3.5 mi of the CPNPP site, neither of the species or their nests have been identified on the site. Proposed construction at the CPNPP site requires removal of only 3 percent of the Ashe juniper habitat that might be used by the warbler and less likely by the vireo for feeding or nesting. The potential for impact to either of these species is considered very SMALL.

State-protected terrestrial species potentially occurring on or immediately adjacent to the CPNPP site include the bald eagle, Texas horned lizard, and timber rattlesnake. The direct taking of state-protected, non-game species without proper permitting is prohibited. The taking of habitat for these species is not prohibited.

Wintering bald eagles are reported by CPNPP site personnel to forage and perch along the shore of SCR. The eagle, while state-listed, is not an essential species as defined by NUGREG-1555. No nests have been identified in the trees along the shoreline. No large, deciduous trees such as cottonwoods that might be capable of supporting a large eagle nest are anticipated to be removed by construction activities in either the Ashe juniper or mixed hardwood woodlands. Proposed construction activities are not expected to adversely affect bald eagles.

Proposed construction activities are not expected to adversely affect the Texas horned lizard that is associated with sandy and rocky soils and short or sparse vegetation. While its preferred food source, the harvester ant, was identified on the site in an area dominated by tall grass and forbs, directed field survey failed to reveal any lizards there.

Proposed construction could potentially impact timber rattlesnakes that are most frequently associated with riparian and bottomland forest or partially wooded hillsides. Although no timber rattlesnakes were observed, the proposed locations of the new cooling towers and blowdown treatment facility contain appropriate mixed hardwood habitat. Mechanical clearing in these areas may adversely affect small numbers of timber rattlesnakes through (1) direct mortality of those who fail to flee the site when equipment is in use or (2) loss of habitat and food resources. This affect would be a SMALL impact on the species that probably has no influence on populations of the rattlesnake elsewhere in the area.

4.3.1.4 Important Terrestrial Habitats

Important habitats as specified by NUREG-1555, include (1) wildlife sanctuaries, refuges, and preserves; (2) habitats identified by state or federal agencies as unique, rare, or of priority for protection; (3) wetlands and floodplains; and (4) land areas identified by the USFWS as critical habitat for species listed as threatened or endangered. With the exception of a number of recreation areas, campgrounds, boating areas and wildlife viewing sites in the vicinity of CPNPP (Table 2.4-11), there are no important terrestrial habitats on or in the immediate area of the site. Construction at the CPNPP site would have no impact on important habitat. Distance from the site to any of the areas listed in Table 2.4-11 provides an ample buffer for any construction noise originating from the CPNPP site, although travelers visiting local recreational attractions may notice some increase in traffic on local roadways.

Wetlands are also considered important habitats. An emergent wetland within SCR could be impacted by construction of the proposed cooling towers (Figure 4.3-1). Additionally, field reconnaissance in the area of the proposed blow down treatment facility identified a small wetland estimated to be about 0.25 ac in area. These wetlands, that comprise less than one percent of the total area of on-site wetlands are the only wetland areas located within the proposed construction zone. The USACE is responsible for determining jurisdiction over wetlands and providing guidance regarding compensatory mitigation and the need for permitting. The CPNPP's standard operating procedures prohibit all dredge-and-fill activities that result in discharge of sediment into jurisdictional waters or wetlands without first obtaining the USACE permit. Although each permit is site-specific, BMPs typically require the following when construction occurs in proximity to waterways or wetlands:

- Keep disturbance of vegetation and the substrate to a minimum.
- Grade and reseed disturbed areas, using native vegetation if at all possible, to minimize erosion and preclude sedimentation.
- Avoid environmentally sensitive areas such as those with important habitats or species.
- Construct waterway crossings only if no reasonable alternate exists and minimize placing fill material in the waterway or adjacent wetlands.
- Use board roads or removable mats.
- Totally remove any temporary fill material and restore the site to its original elevation.

4.3.2 AQUATIC ECOSYSTEMS

A detailed and comprehensive description of the aquatic environment at the CPNPP site is provided in Subsection 2.4.2. Figure 4.2-1 shows the proximity of the Units 3 and 4 construction area to SCR and other nearby aquatic habitats. The construction area does not encroach into any of these habitats including SCR.

Construction and transmission line maintenance near water bodies has the potential to adversely affect aquatic environmental quality. Effects of erosion on areas of disturbed vegetative cover, as well as toxicity caused by unintentional chemical spills may occur. Transmission line maintenance procedures are discussed in detail in Subsection 5.6.1.

Construction occurs along the waters edge at SCR and Lake Granbury. The BMPs provided by site-specific SWP3 and spill prevention guidance that minimize the risk of surfacewater contamination by construction activities must be strictly followed (Subsection 4.3.1.4). Guidance includes storing fuel and other potentially toxic materials and transferring them to vehicles in a pre-established maintenance yard well away from waterways or the banks of the reservoirs. Stormwater potentially carrying sediments, fuel, and lubricants would also be directed into settling ponds to minimize water quality impacts to surrounding water bodies (Subsection 4.2.1.1.7).

Aquatic organisms commonly found in SCR and Lake Granbury are not considered sensitive (Subsection 2.4.2.2). Should physical or chemical pollutants temporarily reduce habitat quality, mobile organisms would retreat to other areas as they do in summer months when reservoir temperatures in SCR exceed 100ºF near the CPNPP Units 1 and 2.

The intake and discharge structures on SCR were initially constructed to service CPNPP Units 1 and 2. Additional intake and discharge structures on Lake Granbury are required for CPNPP Units 3 and 4. The additional intake structure is to be located about 1.31 mi upstream from the De Cordova Bend Dam. The additional discharge structure is to be located about 1.14 mi downstream from the intake, or approximately 0.17 mi upstream from the dam.

4.3.2.1 Squaw Creek Reservoir

Potential impacts to SCR during the construction of CPNPP Units 3 and 4 are expected to be SMALL. Because CPNPP Units 3 and 4 would receive water from and discharge water to Lake Granbury rather than SCR, construction is not anticipated on the existing intake and discharge structures in SCR.

Three alternate pipeline routes to cross the existing CPNPP site then join the existing ROW near the Somervell/Hood county line were evaluated. Two of these routes would cross SCR. From an aquatic ecosystem standpoint, constructing the pipeline around the reservoir is preferable to constructing the pipeline within the reservoir. Constructing a pipeline through SCR would likely disturb reservoir sediments. Aquatic habitat within SCR is already less than ideal because of high total dissolved solids and seasonally high temperature. For these and other reasons, the alternate routes that would cross SCR were rejected.

Fish species within the reservoir are particularly hardy to adverse conditions (Subsection 2.4.2). As in air, sound and its effects on the auditory senses are known to diminish over distance relative to the intensity and duration of sound. Studies reveal that mortality from pile driving was significantly reduced as distance from the event increased (Hastings and Popper 2005). As in the terrestrial community, aquatic animals tend to avoid areas of loud noise and high traffic (USDOT 2004). Increases in turbidity would temporarily affect the reservoir around the construction site but preconstruction conditions would likely resume. Accidental discharge and stormwater runoff is limited under the SWPPP and spill prevention plan that would be implemented prior to construction.

4.3.2.2 Lake Granbury

Limited dredging may be required for construction of the discharge structure on the bank of the reservoir. Dredging activities could create a temporary loss of riparian habitat in the immediate area of construction. The permanent loss of habitat would be limited to the length of the discharge structure as the native shoreline vegetation would be allowed to reestablish right up to the structure.

Localized shoreline and bottom sediments could also potentially be disturbed during the short construction period. A cofferdam would enclose the construction site, and in combination with a sheet pile wall along the reservoir bank, would largely eliminate sedimentation. The cofferdam also allows use of conventional construction equipment such as an excavator and crane that would operate from the reservoir bank. Implementation of BMPs would limit erosion along the reestablished bank resulting in a temporary but SMALL impact on Lake Granbury.

Lake Granbury water flows directionally toward the dam then into the Brazos River. Suspended sediment is minimized by using BMPs during construction within a body of water. Practices to minimally impair waterbodies during construction activities include the use of silt curtains and gunderbooms to localize suspended sediments within the water column.

Both dredging and construction are invasive, though temporary, activities. Essentially all benthic communities within the area are expected to be affected. Although temporary increases in turbidity are unavoidable, re-suspension of toxicants such as heavy metals, polychlorinated biphenyls, or Dichlorodiphenyltrichloroethane (DDT) is not expected to occur (BCDC 1998).

As preconstruction conditions return, benthic communities re-colonize the area, and suspended solids that once caused temporary increases in turbidity settle out of the water column. Construction and dredging for additional intake and discharge structures have a MODERATE, but short-lived, effect on a small portion of lower Lake Granbury. Given the localized nature of construction and the large size of the lake, overall impacts to Lake Granbury are expected to be SMALL.

4.3.2.3 Intermittent Streams

Six mapped intermittent streams flow into SCR (Figure 2.4-1). Given their distance from the CPNPP construction area, these intermittent streams would not be affected by construction activity. In addition, two intermittent streams are located in the area of the proposed blow down treatment facility. They are unnamed tributaries to Squaw Creek that flow into the creek downstream of the SCR dam (Figure 2.4-1). As water of the United States, they are subject to the regulatory jurisdiction of USACE as discussed in Subsection 2.4.2.8.

4.3.2.4 Fisheries Resources

No additions or alterations of the water intake and discharge structures on SCR are planned. Additionally, SCR will be protected from any indirect or direct effects of construction elsewhere on the site by maintaining a vegetated buffer strip between construction sites and the shoreline of the reservoir and by channeling sediment laden stormwater into retention ponds.

SCR is a small reservoir owned by CPNPP that was closed to recreational fishing by the public in September 2001 for reasons of site security. SCR will be reopened to the public with controlled access and will allow recreational fishing once again. The most common fish identified in SCR during the 2007 studies were channel catfish, largemouth bass, and freshwater drum.

Lake Granbury supports a struggling sport fishery, with the predominant game fishes being largemouth and striped bass. Golden algae have been causing extensive fish kills throughout the winter months each year (Subsection 2.4.2.2). The reservoir itself is over 70 mi long, which leaves ample area for fish to travel. Any loss of habitat would be negligible given the vast habitat area within the reservoir.

Construction at Lake Granbury may involve pile driving, dredging, increased traffic, and other noise-producing activities. Construction on the bank of Lake Granbury is planned, and noise is expected to travel from the construction site through soil and water media, potentially affecting the audio-sensory system of fishes. Activities that emit loud and sudden noise are expected to cause more stress to hearing in fishes than constant noise because opportunities to acclimate or flee are absent.

In addition to a pressure and vibration sensitive lateral line, fishes have a structurally complex internal hearing mechanism. Ears of fishes are fluid-filled chambers containing otolith organs and sensory cilia lateral to the brain. Similar to terrestrial vertebrates, fishes convert acoustic energy to electrical signals that are deciphered by the brain for information. Unlike most vertebrates, fishes continue to produce sensory hair cells throughout their life (Hastings and Popper 2005).

This production allows for re-generation of hearing ability for fishes that endure hearing loss due to noise stress (Smith, 2008).

Fishes adjacent to construction activities on SCR and Lake Granbury are expected to experience some degree of stress to their hearing mechanism that may at least temporarily cause them to relocate or cause a temporary threshold shift, which may also affect their foraging and predator avoidance capabilities. As discussed in Subsection 2.4.2.2, TPWD stocked SCR until 1996. Of the fish selected for stocking, the fish most intolerant to higher temperature and lower water quality were not seen in samples from 2007 (Table 2.4-13). Fish found in the 2007 samples were mostly catfish, largemouth bass, and drum. Because Lake Granbury is very long (70 mi) and suitable relocation habitat is available throughout the lake, construction impacts on fish near De Cordova Bend Dam are expected to be SMALL. Minimal construction on SCR is anticipated and SCR fishes are known to relocate during stressful periods (Subsection 2.4.2.2), impacts to fish populations stemming from CPNPP construction noise and other activity are also expected to be SMALL.

4.3.2.5 Important Aquatic Species

A comprehensive list and detailed descriptions of federal- and state-protected important species are provided in Subsection 2.4.2.5.1. Although listed aquatic organisms are not found near the CPNPP site in SCR, Brazos river snakes potentially utilize habitat in the Brazos near De Cordova Bend Dam. As discussed in Subsection 2.4.2.5.1, river impoundments and the resultant silting of the Brazos River have contributed to the population decline of the species.

In this case, alterations occurring from proposed construction are temporary and BMPs are anticipated to minimize aquatic degradation. Construction activities would not permanently adversely affect residential aquatic wildlife populations, and impacts are therefore SMALL.

4.3.3 REFERENCES

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(Hastings and Popper 2005) Effects of sound on fish. Jones and Stokes. 2600 V Street, Sacramento, CA 95818. January 2005.

(Smith 2008) Western Kentucky University (WKU) Biology, Michael Smith, Assistant Professor, Specialty, Neurobiology, http://bioweb.wku.edu/faulty/smith/default.html, 7/25/2008.

(USDOT 2004) U.S. Department of Transportation (USDOT). Synthesis of Noise Effects on Wildlife Populations, FHWA-HEP-06-016, http://www.fhwa.dot.gov/environMent/hconnect/index.htm. September 2004. Accessed January 25, 2008.

4.4 SOCIOECONOMIC IMPACTS

The discussion of socioeconomic impacts is divided into three sections. Subsection 4.4.1 describes physical impacts of station construction on the community. Subsection 4.4.2 describes the social and economic impacts of station construction on the surrounding region. Subsection 4.4.3 describes environmental justice impacts as a result of site construction.

4.4.1 PHYSICAL IMPACTS

Construction activities can cause temporary localized physical impacts to off-site structures, roads, air quality, noise, or aesthetics. Many of these impacts can directly or indirectly affect humans near the CPNPP site. As discussed in Subsection 2.5.1, the area near the site is rural, with a low population density. As illustrated in Table 2.5-1, the 2007 projected population within five mi is only 3530 individuals. This is a population density of 45 people per sq mi. This section addresses potential construction impacts that may affect people, buildings, roads, aesthetics, and recreational opportunities.

4.4.1.1 Construction Activities

A detailed description of the CPNPP Units 3 and 4 site and vicinity is provided in Sections 2.1 and 2.2. Within the CPNPP site boundary, rehabilitation of existing buildings and roads is necessary as well as the construction of new buildings.

Construction requires a variety of skilled and nonskilled labor. Table 4.4-1 shows the type of laborers employed for the project based on the percentage of total hours each is expected to contribute. Table 4.4-2 shows the number of workers employed for each year of the construction schedule. Figure 4.4-1 shows the total number of workers on-site for each quarter of the project. The estimated number of total workers on-site rises to a peak of 5201 in 2014 and then diminishes over the next three years. Completion of the construction phase is discussed in Table 1.1-1. It is assumed that 70 percent of the construction workforce in-migrates to the region. The migration numbers are assumed based on the availability of craft labor as discussed in Subsection 4.4.2.1. Due to the temporary nature of construction work, many construction workers on large projects such as power plant construction move throughout the country to job sites and do not relocate their families for each job. Thus it is assumed that only 25 percent of the construction workforce for CPNPP choose to move their families to the region.

As shown in Table 2.5-1, the 2007 projected permanent population for the area within 10 mi is 32,451. Population distribution details are given in Subsection 2.5.1.

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

- Construction workers and personnel working on-site.
- People working or living immediately adjacent to the site.
- Transient populations such as temporary employees, recreational visitors, and tourists.

Construction workers within the site boundary experience the most physical impact due to plant construction activities. Workers have adequate training and personal protective equipment to minimize the risk of potentially harmful exposures. Emergency first-aid care is available at the construction site, and regular health and safety monitoring is conducted during construction. These activities are performed in compliance with local, state, and federal regulations, and site-specific permit conditions. Reasonable efforts are taken to make transient populations aware of the potential impacts of construction activities.

Approximately 275 ac of the CPNPP site are expected to be disturbed for construction of Units 3 and 4. Most of the construction for CPNPP Units 3 and 4 occurs on previously disturbed areas or areas currently forested. Off-site construction includes the construction of the transmission corridors and construction of a water pipeline from Lake Granbury. Construction activities result in elevated noise and dust levels and traffic on roads. In addition to dust, construction equipment locally increases air emissions. Blasting to remove native rock could result in both noise and shock impacts. Erection of cranes and buildings may affect aesthetic qualities of the community.

4.4.1.2 Impacts to Off-Site Structures

Construction activities are not anticipated to affect any off-site buildings, primarily due to distance. Figure 2.5-20 and Subsection 2.5.5 indicate that the nearest residence is approximately 0.8 mi southwest of the CPNPP Units 3 and 4 center point, to the east of Farm to Market (FM) 56 and adjacent to the CPNPP site boundary. Because of their distance from the site, no off-site industrial or commercial facilities are impacted by construction activities.

Many existing on-site buildings related to the safety of the existing facility were constructed to meet seismic qualification criteria, which make them resistant to the effects of vibration and shock similar to that which could occur during construction. Other on-site facilities were constructed to the appropriate building codes and standards, which include consideration of seismic loads. Regardless of the applicable design standard, construction activities are planned, reviewed, and conducted in a manner that ensures no adverse effect on the operating nuclear units and ensures buildings are adequately protected from adverse impact.

Historically significant buildings or recognized cultural resources within the CPNPP site boundary are discussed in Subsection 2.5.3. Construction impacts on historically significant buildings are discussed in Subsection 4.1.3.

The distance of the nearest off-site structures minimize the interaction of the buildings with construction activities, while the design of on-site buildings ensures no adverse interaction with the operating units. Thus, the impact of plant construction on buildings is SMALL and no mitigation is warranted.

4.4.1.3 Impacts to Transportation

Transportation is described in Subsections 2.5.2.2 and 4.1.1.2. No public transportation routes are located within the site boundary. Construction is planned for new roads and for modification and improvement of existing roads inside the CPNPP site. Physical impacts due to on-site road construction would be limited to plant construction workers and operating workers associated with CPNPP Units 1 and 2.

As stated in Section 2.1, a railroad spur enters the site on its western boundary and extends to the area south of the new reactor locations as illustrated in Figure 1.1-2. The railroad spur does not need to be upgraded to support equipment delivery. The length of the track on-site is expected to be reduced to allow for the new reactors. Because the rail line spur outside the site boundary makes use of a pre-existing ROW that is already zoned for industrial use and has already been disturbed, construction impacts are expected to be SMALL and no mitigation is necessary.

Plant construction at CPNPP results in an increase in traffic on local roads. Subsection 4.1.1 describes the transport of construction materials and workforce to the site by public roads. Figure 2.5-5 illustrates the road and highway systems of both Hood and Somervell counties. Both construction workers and truck deliveries access the site via FM 56 (Subsection 2.5.2.2). FM 56 passes to the west of the site, connecting FM 51 to U.S. Highway 67 (US 67). FM 56 is a two-lane highway and has turn lanes near the plant entrance.

As discussed in Subsection 2.5.2.2.3, averaged annual daily traffic (AADT) counts in 2007 on FM 56 indicate that 8500 vehicles use FM 56 to the north of the plant entrance while 3500 vehicles use FM 56 to the south of the entrance. The AADT counts indicate that approximately 13,400 vehicles travel on US 67 just east of the intersection with FM 56, and 6500 vehicles travel on US 67 to the west of the intersection. The AADT counts indicate that 34,000 vehicles travel on US 377 just east of the intersection with FM 56, while 13,100 travel on US 377 to the west of the intersection (TxDOT 2007).

According to the Highway Capacity Manual, the capacity of a two-lane highway is 1700 vehicles per hour for each direction of travel. The capacity is nearly independent of the directional distribution of the traffic on the facility, except that for extended lengths of two-lane highway, the capacity does not exceed 3200 vehicles per hour for both directions of travel combined (TRB 2000).

Construction is expected to take place during a single shift, with the possibility of night testing or the addition of another shift, as warranted. A conservative estimate of 60 daily truck deliveries is assumed for this analysis, with all deliveries occurring during daytime hours. The total number of workers on-site at peak is 5201 (4953 constructionworkers plus 248 operations workers).

A traffic study for the CPNPP site was conducted in 1987 during the construction of CPNPP Units 1 and 2 when approximately 8694 persons were employed on-site. The study found an auto-utilization factor of 2.34 persons/vehicle for vehicles entering the site, including factors such as absenteeism and late arrivals. The study also found a higher incidence of carpooling among construction workers (DeShazo, Starek & Tang 1987). Thus a conservative estimate is that carpooling occurs among the construction workforce resulting in an average of two people per vehicle, or 2601 (5201 workers at peak divided by two) vehicles entering or leaving the site at peak times. This is much less than the 3710 vehicles found in the 1987 traffic study (DeShazo, Starek & Tang 1987). Also, after the completion of the 1987 traffic study, improvements in traffic signals, widened lanes, turn lanes, and additional signage were made in the immediate area to handle the large volume of traffic.

Almost two-thirds of the construction workers are expected to settle in Hood and Somervell counties. As discussed in Subsection 4.4.2.1, based on the settlement patterns of the operations workers for CPNPP Units 1 and 2, and approximately 12 percent of the workers are expected to settle in Johnson County, 9 percent in Tarrant County, 6 percent in Erath County, and 5 percent in Bosque County. Applying the assumption of two workers per vehicle, the total number of vehicles originating in Johnson County is 312, in Tarrant County is 234, in Erath County is 156, and in Bosque County is 130. Due to the distribution of workers,construction workers and deliveries have a minimal impact on the interstate and larger state highways in the region as the additional influx of drivers is still within the design of the roadway. Impact on area transportation resources generally decreases with increased distance from the site as varied routes are taken by individual vehicles. As discussed in Subsection 2.5.2.2.3, the state and federal highways that would be used by workers to travel to the plant from Johnson, Tarrant, Erath, and Bosque counties are well-maintained and currently support large volumes of traffic. The increase in traffic due to the construction workforce is expected to be only a slight increase to overall traffic levels to the highways outside the vicinity.

Although the peak construction workforce is expected to be 4953, only 2601 vehicles are expected to be used to transport the workers to and from the CPNPP site due to carpooling. This is less than the demand that was placed on the local two-lane state and county highways and farm to market roads during the construction of Units 1 and 2. With the additional improvements that have been made to the roads since that time, the impact of the construction workers and delivery trucks on local roads, primarily FM 56, is expected to be SMALL within the vicinity of the site.

4.4.1.4 Impacts to Aesthetics

The locations of parks and reservoirs in the vicinity and region are described in Subsections 2.2.1.2 and 2.2.3. Visual access to the construction of the units is expected to be mainly plant employees, visitors to SCR, and those residents across the reservoir, because further visual effects are obstructed due to the hilly nature of the area. Section 3.1 describes construction materials which ultimately lessen the visual impact of the CPNPP on the vicinity.

Federal regulations require that any temporary or permanent structure, including all accompaniments, that exceeds an overall height of 200 ft above ground level be appropriately marked with lighting. The tallest structures on-site during the construction period are expected to be the crane used for construction of the facilities. As these structures primarily consist of iron framework, they carry a lower visual weight than the reactor domes, which are the most visible structures on-site as the CPNPP nears completion.

The tallest buildings on-site during construction are the reactor domes of CPNPP Units 1 and 2. As the viewshed analysis in Subsection 2.2.1 states, CPNPP Units 1 and 2 have reactor domes that are 266 ft high. With CPNPP Unit 1 and Unit 2 in operation since 1990 and 1993, respectively, any affect on local viewsheds has already occurred. According to viewshed analysis, the reactor domes are visible from Dinosaur Valley State Park and Oakdale Park. Because the visual effects are inversely proportional to distance, the effects of CPNPP Units 1 and 2 on most other parks in the region are minimal.

Subsection 2.2.1 discusses the visual effect of the reactor domes as a function of distance and angle of vision occupied by the domes. As the distance from the domes increases, the angle of vision occupied by the domes decreases significantly. Most of the parks in the region are located more than 14 mi from the site. Although the reactor domes may be visible at that distance, they occupy less than 1 degree of vision.

The impact of construction at the CPNPP site on aesthetics and recreational opportunities is expected to be SMALL and requires no mitigation. Further discussion on the impact to recreational activities is discussed in Subsection 4.4.2.6.

4.4.1.5 Noise

The potential affects of noise from CPNPP site construction have been analyzed by projecting noise levels at the site and vicinity from various construction-related sources. Projected levels are compared to ambient measurements described in Subsection 2.5.5, as well as to federal noise level guidelines. The results of these comparisons are then used to determine the magnitude of noise impacts at the various receptors identified in Subsection 2.5.5.

The U.S. Department of Housing and Urban Development (HUD) has established noise impact guidelines for residential areas based on day-night average sound levels (Ldn) (US HUD 1996). Some states and municipalities have established noise control regulations or zoning ordinances that specify acceptable noise levels. The State of Texas and Hood and Somervell counties have not developed a noise regulation that specifies the community noise levels that are acceptable.

A special version of equivalent sound levels (Leq), and the most common measure of environmental noise levels is the Ldn. The Ldn is valid for a 24-hour period and is computed the same as a 24-hour Leq except that the prevailing sound level in the calculation has a 10-dB penalty added between the hours of 2000 and 0700. For the purpose of this document, noise impacts are assessed using the DNL of 60 – 65 dBA as the level below which noise levels would be considered acceptable for residential and outdoor recreational uses. Also, noise levels below 60 – 65 dBA are considered to be of small significance.

Typical construction noise is generated by internal combustion engines (front end loaders, tractors, scrapers/graders, heavy trucks, cranes, concrete pumps, generators, etc); impact equipment (pneumatic equipment, jack hammers, pile drivers, etc); and other equipment such as vibrators and saws. The amount of impact the construction noise has on the surrounding environment depends on numerous factors including sound intensity, frequency, duration, location on-site, the number of noise sources, time of day, weather conditions, wind direction, time of year, and natural and man made barriers.

Nuisance noise can be caused by the operation of heavy equipment, particularly vehicle and machine backup-alarms. Equipment noise can also be categorized as being either continuous or impulse in nature. Stationary equipment is considered to be that which is operated in one location for one or more days at a time. Pumps, generators, compressors, and screens are typical examples of stationary equipment. In addition, pile drivers and pavement breakers are sometimes categorized as stationary equipment. Mobile equipment is considered to be machinery that performs cyclic processes such as bulldozers, scrapers, loaders, and haul trucks. Equipment noise is influenced by the equipment type, age of equipment, specific model, equipment condition, type of operation, and duration of operation. Because of design improvements and technological advances, new machines operate more quietly for many situations. Newer equipment is noticeably quieter than older models due primarily to better engine mufflers, refinements in fan design, and improved hydraulic systems (USDOT 2006). The CPNPP construction utilizes newer equipment and equipment that is well maintained to minimize noise levels.

Many noise studies utilize noise levels based upon limited available data samples and documentation collected more than 30 years ago. Noise levels as generated by typical equipment are shown in Table 4.4-4. This information is being utilized to illustrate a worst case scenario. Table 4.4-4 illustrates noise levels in dBA at distances of 50,100, 400, and 2000 ft and at the nearest church and residences from the noise producing machinery.

Attenuated noise levels calculated in Table 4.4-4 are considered maximum noise levels. Construction equipment does not operate at maximum levels continuously, and utilizes newer and well maintained equipment. Therefore actual noise levels would be expected to be less than those predicted at the fence line. Utilization of modern equipment such as mufflers and hydraulic systems should reduce these noise levels furtherwith the exception of pile driving. For the majority of the construction activities, noise levels would be considered to be comparable to or below the background levels (50 – 55 dBA) and even this task would be below the 60 – 65 dBA classification of acceptable noise levels by HUD at each of the receptors.

Those construction activities that generate noise above 60 – 65 dBA levels at the fence line would be temporary. Generally, most construction activities would occur during normal daylight hours between 0700 and 1700. There are occasions when construction activities must be scheduled during night time hours. Typical instances include continuous concrete pours to ensure homogeneity and strength of the structures. At these times the noise level will remain upwards of 60 – 90 dB at a distance of 100 ft from the equipment (PG&E 2004) (CPWR 2002).

Nearby locations with potential sensitivity to noise were identified from the ambient noise survey as well as site reconnaissance conducted in 2007 and 2008. Receptors were reviewed within 10-mi radius of the site (Figure 2.5-20) and include the nearest residences (location 23 near the south fence line, location 1, location 17 near the east fence line), Post Oak Memorial Chapel and cemetery (location 25), Freedom Church (location 40) and Happy Hill Children's Home (location 30). Recreation locations were also selected such as the swim beach on the north side of SCR (location 15). Squaw Creek Reservoir and Park, as well as the old swim beach are located on the CPNPP property therefore public access to SCR and its facilities are controlled and limited by CPNPP. Members of the public (receptors) that are allowed access to the reservoir for recreational activities are anticipated to follow site safety requirements that exist due to the industrial nature of the facility. As an industrial site, noise levels in certain areas of the reservoir may be slightly elevated during construction activities when compared with ambient noise levels located off site.

The near-by residences are located across SCR (near location 17) and to the south-southwest of the fence line (location 23). Because a body of water is between the eastern fence line and the residences, potential noise from the site would not be attenuated past the fence line (location 2) with distance as it would be by natural methods (trees with foliage, ground cover, or earthen berms). These residences are located at a substantial distance from the noise source and are not affected by proposed additional CPNPP construction noise. The nearest state park to the CPNPP site is Dinosaur Valley State Park, located 3.3 mi to the southwest of the site and will not be affected by additional noise. Other receptors such as additional recreation areas, churches, hospitals, or schools are located at distances at which noise levels during construction activities would be comparable to background levels.

Unusual noise due to construction activities may be unavoidable and unexpected, such as steam blows or blasting. These unusual activities could result in temporarily excessive noise levels. Potential mitigation measures include notification to the surrounding receptors prior to unusual noise events and limiting events to day time hours.

Based upon the projected noise levels at various site and vicinity receptors, noise impacts from the CPNPP site construction are expected to be SMALL. Although noise impacts due to construction are expected to be small, potential noise mitigation measures include utilizing modern equipment, use of mufflers, limiting noise events to day time hours and notifying surrounding receptors prior to unusual noise events.

4.4.1.5.1 Transmission Line Noise due to Construction

Construction of new transmission lines and a new switch yard will be conducted at the CPNPP site. The extant transmission lines and corridors will be improved and maintained during construction activities at the CPNPP site. Noise produced by improvement of transmission line towers, transmission lines, and corridors will be temporary. Transmission line corridor maintenance will be temporary; therefore these activities are expected to have SMALL noise impacts to surrounding communities and habitat.

4.4.1.5.2 Noise due to Construction of Water Supply and Return Pipelines

Noise analyses due to construction of the proposed water supply and return pipelines between Lake Granbury and CPNPP was conducted in February of 2008. The proposed pipelines are constructed along the existing pipeline ROW and overhead power line ROWs. The existing pipeline ROW dissects the Treaty Oaks housing addition located southwest of the existing makeup water intakes for CPNPP Units 1 and 2 and across FM 2425. Additional housing developments are located along Lake Granbury to the southeast and northwest. An additional ROW for the cooling tower blow-down pipeline is expected to be accessed, beginning in the existing ROW and branching off approximately parallel to FM 2425. The blow-down pipeline crosses FM 2425 and the termination of the line is submerged into Lake Granbury. The construction of the supply, return, and blow-down pipelines increases the noise levels to surrounding housing additions.

Makeup water intakes for CPNPP Units 3 and 4 are constructed next to the existing makeup water intakes for Units 1 and 2. The additional pouring of concrete and the installation of pumps is expected to increase the noise levels in the area and surrounding housing additions. Housing additions are located along the shoreline to the south east and northwest of the existing water intakes and across Lake Granbury at Carmichael Bend. Recreational fishing may occur near the construction, and a park and boat ramp (De Cordova Bend Park) are located across the lake to the east-northeast of the existing makeup water station.

Construction of the makeup water lines, blow-down lines and makeup water intake station is expected to be temporary; therefore these activities are expected to have SMALL noise impacts to the surrounding communities.

4.4.1.5.3 Traffic Noise due to Construction

Plant construction at CPNPP results in an increase in traffic on local roads. Subsection 4.1.1 describes the transport of construction materials and workforce to the site by public roads. Figure 2.5-5 illustrates the road and highway systems of both Hood and Somervell counties. Both construction workers and truck deliveries access the site via FM 56 (Subsection 2.5.2.2). FM 56 passes to the west of the site, connecting FM 51 to US 67. FM 56 is a two-lane highway and has turn lanes near the plant entrance. The local road system and traffic counts are described in Subsection 4.4.1.3.

Construction is expected to take place during a single shift, with the possibility of night testing or the addition of another shift, as warranted. Much of the traffic during the construction period would be at the beginning and end of the work shift. Peak-hour traffic noise would increase along the access road. Traffic noise during the peak hours could be noticeable at the nearby residences. Heavy truck traffic would be the most bothersome and could approach levels of 70 – 90 dBA at 50 ft from the road. A conservative estimate of 60 daily truck deliveries is assumed for this analysis, with all deliveries occurring during daytime hours.

Subsection 4.4.1.3 describes the results of a traffic study for the CPNPP site during the construction of CPNPP Units 1 and 2 in 1987 when approximately 8694 persons were employed on-site. Based on this study, a conservative estimate is that there are 2601 vehicles entering or leaving the site at peak times, based on 5201 total on-site workers. This is much less than the 3710 vehicles found in the 1987 traffic study (DeShazo, Starek & Tang 1987). Since the 1987 traffic study, improvements in traffic signals, widened lanes, turn lanes, and additional signage were made in the immediate area to handle the large volume of traffic.

Although the peak construction workforce is expected to be 4953, the noise impacts from construction workers and deliveries utilizing smaller two-lane state and county highways and farm to market roads, primarily FM 56, are expected to be SMALL to MODERATE due to their intermittent and temporary nature. Potential mitigation measures include encouraging carpooling, reducing speed limits and staggering shifts to avoid traditional traffic congestion time periods.

4.4.1.5.4 Noise due to Railroad Spur Construction

As detailed in Section 2.2, a railroad spur enters the site on its western boundary and extends to the area just south of the new reactor locations. The railroad spur does not need to be upgraded to support equipment delivery and the pre-existing ROW is zoned for industrial use, therefore construction impacts are expected to be SMALL.

4.4.1.6 Impacts to Air Quality

Regional air quality, including EPA air quality standards, is discussed in Subsection 2.7.1.2.7. Areas having air quality that is worse than the National Ambient Air Quality Standards (NAAQS) are designated by the EPA as non-attainment areas. The CPNPP is not located in a non-attainment area. The nearest non-attainment area to CPNPP is Johnson County, which is a non-attainment area under the 8-hour ozone standard (EPA 2007).

Temporary and minor impacts to local ambient air quality could occur as a result of normal construction activities. Fugitive dust and fine particulate matter (PM) emissions, including those less than PM10 in size, are generated during earth-moving and material-handling activities. Construction equipment and off-site vehicles used for hauling debris, equipment, and supplies also produce emissions. Carbon dioxide emissions are generated by the use of fuel in vehicles at the rate of 19.4 lb/gal of gasoline or 22.2 lb/gal of diesel (EPA 2009). Construction vehicles also discharge Sulfur dioxide. The EPA's Non-road Diesel Rule requires non-road equipment to use low-sulfur diesel fuel with a 500 ppm sulfur maximum (EPA 2007b).The pollutants of primary concern include PM10 fugitive dust, reactive organic gases, oxides of nitrogen, carbon monoxide, and to a lesser extent, sulfur dioxides. Variables affecting construction emissions; e.g., type of construction vehicles, timing and phasing of construction activities, and haul routes, cannot be accurately determined until the project is initiated. Actual construction-related emissions cannot be effectively quantified before the project begins. General estimates are available, however, and the impacts on air quality can be minimized by compliance with all federal, state, and local regulations that govern construction activities and emissions from construction vehicles (EPA 1985).

Additional air quality impacts are expected from a concrete batch plant operating during construction. A concrete batch plant requires an air permit to operate and normally the operator or contractor is required to provide that permit. The air quality impact from the concrete batch plant is particulates, which are a concern when loading dry concrete and aggregate into the system. Once water is added into the drum mix, particulates are no longer emitted. Air quality impacts from the concrete batch plant operation are minimal using particulate controls that are required by Texas Commission on Environmental Quality (TCEQ) under Texas Administrative Code (TCEQ 2008). The Nuclear Energy Institute estimates an average of 460,000 cubic yard of concrete is necessary for nuclear power plant construction. This number was derived based on four different reactor models (NEI 2007). An estimated potential to emit particulate at 10 microns (PM10) would be 53 tons, which would qualify the concrete batch plant as a Minor Source under EPA regulations. Because the concrete batch plant is considered a Minor Source, the off-site air quality impact is projected to be SMALL.

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

- Stabilize construction roads and spoil piles.
- Limit speeds on unpaved construction roads.
- Routinely water unpaved construction roads to control dust.
- Perform housekeeping; e.g., remove dirt spilled onto paved roads.
- Cover haul trucks when loaded or unloaded.
- Minimize material handling; e.g., drop heights, double handling.

- Cease grading and excavation activities during high winds and during extreme air pollution episodes.

- Phase grading to minimize the area of disturbed soils.

- Use temporary or permanent vegetation on road medians and slopes.

A construction air monitoring compliance program is developed by evaluating the permits and associated requirements to assess where monitoring for compliance is required or prudent as a best practice. Typical construction monitoring methods are visual or consist of sampling via technicians or automated systems. Onsite construction procedures are developed to capture the permit and monitoring compliance requirements to ensure they are consistently implemented. Training is developed for the onsite workforce, and applicable personnel receive training and qualification certification prior to mornitoring for compliance. Recurring training is developed and implemented as applicable and monitoring program effectiveness is assured through an audit process.

While emissions from construction activities and equipment are unavoidable, a mitigation plan minimizes impacts to local ambient air quality, and the nuisance impacts to the public in proximity to the project. A possible mitigation plan includes:

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

Impacts to air quality from construction are SMALL with the above measures and do not warrant mitigation beyond these measures.

4.4.2 SOCIAL AND ECONOMIC IMPACTS

This subsection evaluates the demographic, economic, infrastructure, and community impacts to the vicinity and region as a result of constructing two MHI US-APWR reactors at the CPNPP site. The evaluation assesses impacts of construction-related activities and an in-migrating construction workforce on population, regional labor, tax revenues, infrastructure and community services, housing, education, and recreational activities within the vicinity and region.

4.4.2.1 Demography

Population estimates and projections for the region are discussed in Subsection 2.5.1.

Industry, heavy construction, and unemployment numbers are discussed in Subsection 2.5.2.1. The demand for workers is high in the region, with unemployment levels at approximately five percent. The expansion of drilling operations in the Barnett Shale area has increased the number of jobs in the region substantially.

Table 4.4-3 shows the number of people skilled in the various types of craft labor required for CPNPP Units 3 and 4 construction for the North Central and Tarrant WDAs. Subsection 2.5.2.1 describes the counties located in each WDA. The levels are shown for 2004 as well as the projected levels for 2014. The crafts with the most plentiful laborers in the two WDAs are construction laborers followed by carpenters and electricians. The crafts with the least numbers are millwrights, structural ironworkers, and boilermakers. According to the Construction Labor Forcast, a shortages of skilled workers is expected in 2012 in the United States, with very high shortages of boilermakers, carpenters, cement masons, and pipefitters and high shortages of ironworkers, electricians, and sheet metal workers. Using the projected 2014 numbers, the construction of CPNPP Units 3 and 4 requires almost 10 percent of the boilermakers, 43 percent of the millwrights, and 62 percent of the structural ironworkers. It is very unlikely that such high percentages of skilled craftsmen are available for the project. Also, many types of craft labor are location-dependent and the workers must travel from site to site, sometimes across the country. Thus, a large number of workers are expected to come from outside the region and out of the state of Texas.

A study of nuclear power plants found that up to 30 percent of the construction workers came from the local area. The cases with the largest share of local workers occurred when there was rapid population growth in the area and large indigenous construction work forces (Pijawka and Chalmers 1983). Hood and Somervell counties are experiencing rapid population growth along with the Fort Worth metropolitan area. In addition, the North Central and Tarrant WDAs are forecast to have over 17,000 construction laborers by 2014. Thus, it is expected that the CPNPP region has a similarly large share of local workers for the project. For this analysis it is assumed that 30 percent of the required workers come from inside the region while 70 percent come from outside the region.

During peak construction, approximately towards the end of 2014, there are expected to be 4953 construction workers on-site in addition to 248 operations workers as shown on Figure 4.4-1. Some of the different trade skills represented in the labor pool include electrical workers, welders, pipe fitters, etc. To ensure that the necessary labor pool is available, as the demand for workers increases, construction companies recruit employees from local technical school programs and work with school administrators to build up curriculum in the necessary labor trade areas. National labor trade union organizers, such as the American Federation of Labor, have made it a high priority to train new entrants in the construction industry as the need for labor ramps up. In addition, local recruiting of craft personnel, supplemental skills training, attractive compensation packages, and use of specialty contractors are expected to mitigate competition for craft workers between industries.

The total labor force in the six countries of the economic region in 2006 is 974,824, with 48,965 unemployed (Table 2.5-13). The economic region saw an increase of 4.3 percent in the construction sector from 2001 – 2006, bringing total employment levels to 73,455 people. Table 2.5-10 contains the distribution of labor by industry for the six counties in the economic region. The North Central Workforce Development Area (Collin, Denton, Ellis, Erath, Hood, Hunt, Johnson, Kaufman, Navarro, Palo Pinto, Parker, Rockwell, Somervell, and Wise counties) is predicting an increase in heavy construction workers of 19.4 percent by 2012, while the Tarrant County Workforce Development Area is predicting a 13.4 percent increase in workers.

It is assumed that 30 percent of the construction workforce comes from within the existing local/ regional industry, and the other 70 percent migrate into the region. It is assumed that only twenty-five percent of the construction workers that in-migrate bring a family. Because construction jobs such as CPNPP Units 3 and 4 only provide employment for a few years, it is assumed many construction workers choose not to relocate their families. It is further assumed that a portion of the construction workers do not have families. In 2000, the average family size in the United States was 3.18 people. This family size was multiplied by the 867 workers expected to bring their families, resulting in 3467 people. When added to the in-migrating workers without families, the total population increase due to the in-migrating construction workforce is 6067. At peak construction, 248 operations workers will also be on-site. As discussed in Subsection 5.8.2.1, it is assumed that 50 percent of operations workers in-migrate and that all in-migrating operations workers bring their families. Using the same family size, the 124 in-migrating operations workers and their families increase the population in the area by 496 people. Thus, the total population increase at peak construction is 6563 people.

Based on worker settlement pattern of the operations workers for CPNPP Units 1 and 2 discussed in Subsection 5.8.2.1, it is assumed that 42 percent of the total incoming workers settle in Hood County (2757 people), 21 percent in Somervell County (1378 people), 12 percent in Johnson County (788 people), 9 percent in Tarrant County (591 people), 6 percent in Erath County (394 people), and 5 percent in Bosque County (328 people). The remaining workers settle outside the economic region. Hood County has an estimated population of 49,906 people in 2014. The incoming workers increase the population by 5.5 percent. Somervell County has an estimated population of 8104 in 2014, so the population increases by 17 percent. In Johnson County, Cleburne has an estimated population of 34,486 which increases by 2.3 percent. Fort Worth in Tarrant County has an estimated population of 660,343 which increases by only 0.1 percent. This increase is sufficiently small that no impacts are expected in Tarrant County. Stephenville in Erath County has an estimated population in 2014 of 18,118 people and increases by 2.2 percent. Walnut Springs in Bosque County has an estimated population of 855 residents in 2014. The in-migrating workforce increases the population by 38 percent.During the construction period, an additional impact on area population occurs during refueling for CPNPP Units 1 and 2, when 800 – 1200 additional workers are required. Refueling for each unit occurs every 18 months and lasts for approximately 24 days. A refueling outage for CPNPP Unit 1 coincides with peak construction in 2014, bringing the total number of of workers on-site to approximately 6401 for a period of less than a month.

Because of the increase in population is distributed to the six counties of the economic region, the impacts of plant construction on population are anticipated to be SMALL

4.4.2.2 Economy

The characteristics of the region surrounding the CPNPP site, including industry, workforce, and unemployment are described in Subsection 2.5.2.1. The economic region of CPNPP is defined as the counties most likely to be affected by the construction and operation of CPNPP Units 3 and 4. The economic region was determined by the current residency patterns of CPNPP Units 1 and 2 operations workers as it is assumed the CPNPP Units 3 and 4 construction and operation workforce follows a similar settlement pattern. Table 5.8-2 shows the cities and counties where the CPNPP Units 1 and 2 workforce resides. Based on the residency patterns, the CPNPP Units 3 and 4 economic region was defined as Bosque, Erath, Hood, Johnson, Somervell, and Tarrant counties Within those counties, the cities of Cleburne, Fort Worth, Glen Rose, Granbury, Stephenville, Tolar, and Walnut Springs are most affected.

The in-migration of construction workers to the economic region affects the economy through the creation of new jobs and the increase in goods and services purchased. The U.S. Department of

Commerce Bureau of Economic Analysis, Economics and Statistics Division have provided a regional economic model that creates multipliers for industry jobs, earnings and expenditures.

The economic model used is the regional input-output modeling system (RIMS II). This model is based on benchmark national input/output multipliers, and incorporates buying and selling linkages among regional industries to create multipliers for both jobs and monetary expenditures (BEA 2005). The resulting multipliers were used to estimate the number of indirect jobs and expenditure of money in the economic region.

The peak number of workers onsite is 5201, with 70 percent of the construction workers (3467 workers) and 50 percent of the operation workers (124 workers) coming from outside the region. These 3591 workers are the ones that have an impact on the economic region. The construction industry was selected from the RIMS II Multipliers in Table 1.5, resulting in a multiplier value of 1.48 (BEA 2005). This means for every new construction worker to the economic region, 0.48 indirect jobs are created. Thus, 3467 construction workers result in 1664 indirect jobs for a total of 5131 jobs. For the operations workers, the power generation and supply multiplier was selected from the RIMS II Multipliers in Table 1.5, resulting in a multiplier value of 2.1 (BEA 2005). This means that for every new operations worker to the region, 1.1 indirect jobs are creating. Thus, 124 operations workers result in 136 indirect jobs. Because most indirect jobs are service-related and not highly specialized, it is assumed that most, if not all, indirect jobs are filled by the existing workforce within the economic region. Any permanent effects are discussed in Section 5.8.

In the year 2006, there were 48,965 people unemployed in the economic region (Table 2.5-13). Some or all of the indirect jobs created by the construction workforce are expected to be filled by unemployed workers in these counties. The money spent in the local area by these new workers, their families, and the newly employed persons in each county add to the economy of the economic region.

Annual construction labor and material expenditures for the construction period average $240 million a year, with a peak of approximately $516 million in 2014. The majority of annual expenditures would be spent in the economic region, with portions of those funds being spent outside the economic region. Based on the construction multiplier of 1,58 from the RIMS II multipliers in Table 1.5, for every dollar spent for construction expenditures, an additional 0.58 dollars is added to the economic region (BEA 2005). This result in approximately $139 million a year with $299 million at peak.

The increase in jobs in the economic region and the influx of money due to the construction expenditures are both beneficial in stimulating the economic region. It is likely new businesses open in the economic region to satisfy the demands of the in-migrating construction workers. Benefits include the creation of jobs, employee purchasing, and increase tax revenues. Thus the impact from plant construction is considered a MODERATE beneficial impact in the economic region.

4.4.2.2.1 Regional Taxes and Political Structure

Regional taxes and the political structure within the CPNPP region are discussed in Subsection 2.5.2.3. Several types of taxes are generated by construction activities and purchases, and by site workforce expenditures. These taxes would include income taxes on corporate profits, wages, and salaries; sales and use taxes on corporate and employee purchases; real property taxes related to CPNPP; and personal property taxes associated with employees. However, if employees buy or rent existing properties, there is no increase in property tax revenues.

As discussed in Subsection 2.5.2.3.1, the sales and use tax rate in populated areas in the economic region is 8.25 percent including local and state taxes. If the annual construction expenditures are spent within the economic region, the total sales and use tax revenue is approximately $19.8 million per year with a peak of $42.6 million. Of these totals $15 million per year ($32.3 million at peak) goes to the state with the remaining revenue going to cities, counties, and other local districts.

While there is no personal income tax in the state of Texas, the wages paid to the construction workers generate tax revenue through sales and use taxes. Based on the craft wages discussed in Subsection 2.5.2.3.1, over the course of the construction approximately $545 million in wages are paid to the construction workforce. It is expected that a large amount of those wages are spent in the economic region, generating tax revenue.

Luminant has agreements with Hood and Somervell counties to pay ad valorem taxes based on the current and new units. Table 2.5-17 shows CPNPP ad valorem taxes for CPNPP Units 1 and 2 for 2006. Based upon information from 2006, Luminant pays the majority of the ad valorem taxes to Glen Rose Independent School District (ISD) followed by Somervell County itself and the Somervell County Water District (TXU 2006b). Lesser amounts are paid to Grandbury ISD, Hood County, and Tolar ISD, while the remaining is paid to the Hood County Library District, the City of Glen Rose, and the town of Tolar (TXU 2006a)(TXU 2006b). Ad valorem taxes for Units 3 and 4 are expected to be similarly distributed to the existing arrangements and provide a substantial increase to the counties, cities, and districts that benefit.

Based on Table 2.5-16, tax revenues in Hood and Somervell counties have increased from 2002 – 2007. With continued population expansion as well as the addition of ad valorem taxes from Units 3 and 4, tax revenues should continue to increase. However, ad valorem revenues for districts in Hood County are smaller than the revenues to Somervell County districts while at the same time approximately 40 percent of construction workers are expected to reside there based on current operations workforce settlement patterns.

During the construction period, ad valorem taxes, sales and use taxes, and property taxes increase in the economic region. The increase in collected taxes is viewed as a benefit to the state and local jurisdictions in the economic region. It is anticipated that the impacts of construction on the economy of the region would be beneficial and SMALL. Conversely, the impact for Somervell County and to a lesser extent Hood County is anticipated to be LARGE and beneficial. Therefore, no mitigation is warranted.

4.4.2.3 Infrastructure and Community Services

Local public services affected by plant construction include education, transportation, public safety, social services, public utilities, tourism, and recreation (Subsection 2.5.2). In general, impacts to each of these services from plant construction are expected to be minimal. It is likely that the percentage of construction workers, accompanied by their families, moving into the region would concentrate in several established communities with well-developed public services, such as Granbury, Glen Rose, Cleburne, and Stephenville. This diversification of settlement would minimize the likelihood of any one community's services being overburdened. Some of the construction personnel would commute from existing homes in the region, and therefore, present no additional burden upon local public services.

The demand on potable water utilities and waste treatment increases during construction at the CPNPP site. As discussed in Subsection 4.4.2.1, the in-migrating construction and operations workers and their families increase the population in the economic region by 6563 people.

For consumptive water use, there are four water treatment systems associated with the cities and areas within Hood County. The Granbury Treatment Plant has a maximum capacity of 500,000 gpd and is currently using 250,000 gpd. A second treatment plant, the Brazos River Authority Lake Granbury Surface Water Treatment plant with a capacity of 10,500,000 gpd , services the City of Granbury, the Action Municipal District (AMUD), and portions of Johnson County. The current usage is 6,062,000 gpd. The Acton Municipal District, which services portions of Hood County around Lake Granbury, has a treatment plant with a maximum capacity of 4,130,000 gpd and is currently using 1,900,000 gpd (TCEQ 2007a). The city of Tolar receives its water from wells and has a maximum capacity of 280,000 gpd. The city is currently utilizing 75,000 gpd. The total system capacity for these facilities is 15,410,000 gpd and the current usage is 8,287,000 gpd. Approximately 42 percent of the in-migrating peak workforce are expected to settle in Hood County, or 2757 people. It is anticipated that the average per capita amount of water consumed per day is 90 gpd, which accounts for an overall increase in consumption of approximately 248,100 gpd (EPA 2003). This ammounts to an increase of 3 percent over current consumption. However, the projected total water usage is only 55 percent of the total water treatment capacity in Hood County.

As discussed in Subsection 2.5.2.7.1, Somervell County is supplied by a single water treatment facility run by the Somervell County Water District. The system has a maximum capacity of 1,426,000 gpd and a current utilization of 488,000 gpd. The incoming peak workforce increases the population by 1378 people, which corresponds to an increase in water usage of approximately 124,050 gpd. While this is a 25 percent increase in usage, the projected usage is only 43 percent of the total capacity of the treatment facility.

The population of the city of Cleburne increase by 788 people due to the in-migrating workers during peak construction. The city's water treatment plant has a maximum capacity of 15 million gpd and a current daily usage of 7.3 million gpd. The in-migrating population increases usage by 70,885 gpd or 1 percent. This projected usage is 49 percent of the total capacity.

The city of Fort Worth has four water treatment plants with a combined capacity of 485 million gpd. The incoming construction and operations workers increase the usage by 53,164 gpd, or 0.03 percent of the current usage. This projected usage is 34 percent of the total capacity.

The population of Stephenville increase by 394 people due to the in-migration of workers and their families. The city's currently daily usage of 2.3 million gpd is increase by 35,443 gpd, or 1.5 percent. This projected usage is 43 percent of the total capacity of the treatment facility.

Walnut Springs has a current daily usage of 6000 gpd serving 315 connections. However, maximum capacity numbers for the water treatment plant are not available. Assuming the same usage for additional connections, the approximate maximum capacity of the water treatment plant is 38,100 gpd. The incoming peak workforce increases the population by 328, which corresponds to an increase in water usage of 29,535 gpd. This represents a 492-percent increase in usage and brings the projected usage to 93 percent of the total capacity.

The increase in population due to peak construction leaves the water treatment plants of Somervell County, Cleburne, Fort Worth, and Stephenville below 50 percent of total capacity. Hood County increases to just over half at 55 percent. The city most impacted is Walnut Springs, which is estimated to increase to 93 percent of capacity. Walnut Springs relies solely on groundwater, so it is likely that additional public or private wells would be y\used to meet demand.

There are two wastewater treatment plants associated with the cities in Hood County. The Tolar Wastewater Treatment Plant has a capacity of 100,000 gpd and is currently operating at 70 percent capacity. Plans for expansion of the plant are expected to be made within the next few years. The Granbury Wastewater Treatment Plant has a maximum capacity of 2,000,000 gpd and is operating at 48 percent capacity. If the total projected water use for Hood County is processed through the plants, the usage increases to 1,278,098 gpd or 61 percent of the total capacity.The Somervell County Wastewater Treatment Plant that serves Glen Rose and the rest of Somervell County has a maximum capacity of 600,000 gpd and is operating at 53 percent capacity. During peak construction, the wastewater usage increases to 442,049 gpd or 74 percent of maximum capacity. In Cleburne, the wastewater usage increases to 6,670,885 gpd or 89 percent of maximum capacity. The wastewater treatment plant in Fort Worth is barely affected, with utilization increasing by 53,164 gpd to 65 percent of maximum capacity. Wastewater usage in Stephenville increases by 35,443 gpd, with total wastewater usage of 92,535 gpd or 77 percent of the maximum capacity. Cleburne is the only case where the projected utilization of the wasterwater treatment plants exceed 77 percent and plans are in place to expand the plants in Cleburne and Somervell County. Therefore, the wastewater treatment plants are able to accommodate the expected increase in population.

Potable water for construction is expected to be obtained from the newly-created Wheeler Branch Reservoir. The SCWD has evaluated the potential water demands for all users within the district and has indicated that 350 gpm (565 ac-ft per year) will be available from Wheeler Branch Reservoir to the CPNPP site during Units 3 and 4 construction and operation. The 565 ac-ft per year allocation is expected to be included in the 2011 Brazos Region G Water Plan that is currently being drafted. Raw water during construction is expected to be supplied from Lake Granbury and non-potable water is expected to be supplied from SCR.

Potable water from SCWD (Wheeler Branch Reservoir) will either be blended with water from Lake Granbury and stored in on-site raw water storage tanks for retreatment and construction use, or be conveyed to daily potable water users at the site. Wheeler Branch Reservoir has a capacity of 1.3 billion gal with an annual yield of approximately 651,700,000 gal (SCWD 2007). The daily water use from Wheeler Branch Reservoir is assumed to be the maximum available water supply from the SCWD to the CPNPP Site (504,000 gpd).

Non-potable water from Lake Granbury will be blended with potable water from SCWD and stored in on-site raw water storage tanks for treatment and construction use. Construction estimates include withdrawals of 470 gpm (676,800 gpd) to 1,100 gpm (1,584,000 gpd) from Lake Granbury. The demands from Lake Granbury are dependent upon specific construction needs (i.e. initial system fills and flushing, crafts demand, fire protection test/fill, and concrete batching) and will vary during construction.

Non-potable water from SCR will be used for construction sanitary restrooms, dust suppression and general clean-up. Daily consumptive use of water withdrawn from Squaw Creek Reservoir was determined by applying the maximum estimated daily use (93,000 gpd) to a 16-hour work day. The resulting daily use from Squaw Creek Reservoir is 62,000 gpd. Wastewater treatment is provided on-site. It should be noted that all wastewater treatment is performed onsite and up to 100,000 gpd of treated sanitary wastewater will be discharged to SCR through permitted outfalls; therefore, a net gain in SCR may occur. The physical impacts of onsite construction activity on water and wastewater treatment services are expected to be SMALL, with no mitigation required.

As discussed in Subsection 2.5.2.7.2, there are 68 police officers in Hood County, and 19 police officers and 40 firefighters in Somervell County. The national average ratio of full-time police officers per 1000 residents was 2.5 in 2003. The estimated population of Hood County in 2006 is 49,238 (Census 2006). The average number of officers per 1000 residents for a population that size is 1.8 (BJS 2003). Hood County had a ratio of 1.4 in 2006. Somervell County had an estimated population of 7773 in 2006 (Census 2006). The average number of officers per 1000 residents for a population that size is 2.2 (BJS 2003). Somervell County had a ratio of 2.4 in 2006. In 2014, the year of peak construction, due to population growth and the incoming workforce, the ratio in Hood County decreases to 1.3 and the ratio in Somervell County decreases to 2.0. This puts both counties below the national average for communities of their respective sizes. However, Hood County is already below the average based on the 2006 population.

In 2008, the national average number of firefighters per 1000 in population served was 1.6 (Senter 2009). As discussed in Subsection 2.5.2.7.2, there are 250 firefighters in Hood County and 40 firefighters in Somervell County. The ratio of firefighters per population served in both Hood and Somervell counties in 2006 was 5.1 and 5.2, respectively. By 2014, the influx of construction workers and continuing population growth decrease the ratio in Hood County to 4.8 and the ratio in Somervell County to 4.3. Both of these numbers are still well above the national average. The CPNPP employs its own fire brigade who responds to all on-site emergencies however; CPNPP uses local firefighters when necessary for on-site emergencies.

Increases in population in the remaining counties of the economic region are not as large. The ratio of police officers per 1000 in population served in 2006 in Stephenville is 2.2. This decreases to 1.9 by peak construction with the incoming construction workers. The average number of officers for a city that size is 2.0, so police services in Stephenville remain at average levels (BJS 2003). The ratio in Cleburne decreases from 1.9 to 1.6. The average number of officers for a city the size of Cleburne is 1.8, so police staffing falls to slightly below average (BJS 2003). Walnut Springs does not have a police department but is serviced by the Bosque County Sheriff’s Office. The city is pursuing a grant to form a police department of its own. The city has less than 1000 residents before the in-migration of workers, but has 1143 residents with the workers. The average number of police officers per 1000 residents for a city of just over 1000 residents is 2.3 (BJS 2003). If the sheriff’s office numbers are used, the ratio in Walnut Springs decreases from 22 to 16, putting it far above the national average.

The ratio of firefighters per 1000 in population served decreases from 2.7 to 2.4 in Stephenville with the incoming construction workers. Cleburne decreases from 1.8 to 1.5, which is just below the national average of 1.6. Walnut Springs decreases from 12 to 8.8, leaving it well above the national average.

As discussed in Subsection 4.4.2.1, the population increase in Fort Worth is not sufficient to affect public service levels.

Based on the pattern of in-migration, the two counties most affected by the construction workforce are Hood and Somervell counties. Local police and fire officials that were contacted in Hood and Somervell counties stated that there are already plans to expand services due to population growth in the country. The construction plans for CPNPP Units 3 and 4 merely hasten the intended expansions of staffing and infrastructure. Historically, the vicinity was able to accommodate the public service needs of the 8694 construction workers for CPNPP Units 1 and 2 in the 1980s. The impact due to the 5751 in-migrating workers and families should be proportionally less. Therefore, the impacts of construction activity on local police and firefighter departments are expected to be SMALL.

Hood County is home to one hospital, Lake Granbury Medical Center, located in Granbury. The hospital contains 59 beds, with 36 doctors and 30 courtesy doctors (Lake Granbury Medical Center 2007). The hospital has plans for a $15 million expansion to begin in 2008 that doubles the current inpatient capacity and provides an additional operating room and support areas. The medical center also constructed a new primary care facility, Fall Creek Medical Plaza, that supports six physicians. Somervell County also has one hospital, Glen Rose Medical Center. Located in Glen Rose, the medical center has 16 beds with 80 staff members, including staff associated with the attached nursing home. Glen Rose Medical Center also has expansion plans beginning in 2008, with eight emergency room beds to be added. The CPNPP employs its own on-site emergency first-aid and medical services. The combined daily load at Lake Granbury Medical Center and Glen Rose Medical Center is 23 beds. With expansions complete, the medical centers have a combined capacity of 142 beds, well above the current demand. The construction workforce only increases the local population in Hood and Somervell counties by 5 and 16 percent, respectively. Thus, the medical facilities are more than adequate to accommodate the demands of the incoming population and the impacts of construction activity on local medical services are expected to be SMALL, and require no mitigation.

Social services such as Medicaid and welfare are funded through the federal and state governments. The construction boom due to CPNPP is not anticipated to have an impact on these social services.

Traffic counts for roads within the vicinity of the CPNPP site are discussed in Subsection 2.5.2.2.3. Effects of construction on transportation are discussed in Subsection 4.4.1.3. Effects of construction on education are discussed Subsection 4.4.2.5.

4.4.2.4 Housing

Neither Hood County nor Somervell County has a comprehensive land-use plan. The city of Glen Rose is currently accepting proposals from consultants to develop a comprehensive plan. The city of Granbury has a comprehensive plan published in 2001, and in 2006 requested proposals to update the plan. Land-use planning and zoning laws within site and vicinity are described in Subsection 2.2.1. Land-use effects from construction of the CPNPP are described in Subsection 4.1.1.

Regional housing availability is described in Subsection 2.5.2.6. As discussed in Subsection 4.4.2.1, it is expected that the in-migrating workers settle in the six counties of the economic region based on the worker settlement pattern of the operations workers for CPNPP Units 1 and 2. During peak construction, 3467 construction workers and 124 operations workers in-migrate, for a total of 3591 workers.

Because the construction of CPNPP is not a permanent event, during the peak phase of construction, it is probable that not all construction workers move into the region and need housing. As discussed in Subsection 2.5.2.6, using the most recent U.S. Census and American Community Survey data, there are a total of 11,759 housing units for sale and 38,122 housing unites for rent in the economic region. Property listings in Granbury and Glen Rose for September 2007 indicate 659 and 50 available housing units, respectively, including single family houses, townhomes, multi-family houses, mobile homes and rentals (NAR 2007).

For this analysis, a conservative assumption is made suggesting 3467 construction workers and 124 operation workers need housing during the peak construction phase, thus one housing unit per worker is required for a total of 3591 units.

The population in Hood County in 1970 was 6368, while the population in Somervell County was 2793. The 2006 estimated populations of 49,238 and 7773 for the two counties represent population increases of 673 percent and 178 percent, respectively. With the continued expansion of the Dallas-Fort Worth metropolitan area and the presence of lakefront property, population growth in Hood County is anticipated to remain rapid. A large number of housing developments are currently under development in Hood County, with several more in the planning stages. Population increase is not as prevalent in Somervell County with little housing development currently underway. Somervell County offers no apartments and housing prices are generally higher than in Hood County.

The construction workers for CPNPP Units 3 and 4 are expected to make use of the temporary housing in the area, including hotels, motels, and RV parks. As discussed in Subsection 2.5.2.6, there are numerous hotel and motels in the area: Granbury has 746 rooms, with 88 additional rooms projected or complete; Glen Rose has 471 rooms; Stephenville has 363 rooms; and Cleburne has 260 rooms. There are competing demands for the temporary housing in the vicinity from recreational transients as well as workers involved in the Barnett Shale mining. Additionally, outage workers for CPNPP Units 1 and 2 periodically increase the demand for housing, with 800 – 1200 workers required for a period of up to 24 days every 18 months. An outage for CPNPP Unit 1 is expected to coincide with peak construction, increasing demand on temporary housing.Hotel rooms are generally reserved on a first-come, first-serve basis, with all but one hotel offering long-term rentals. It is likely that the number of construction workers during peak construction makes it difficult for recreational transients to find hotel rooms in the area, which may displace some of the transients to other housing in the region, such as cabins, bed and breakfasts, RV parks, and lodges.

As discussed in Subsection 2.5.2.6, there are 11 RV parks located in Hood and Somervell counties. The RV parks have a combined total of 619 spots, with possible expansion at two parks for a total of 114 additional spots. Almost all of the RV parks are frequented by CPNPP Units 1 and 2 outage workers, so it is expected that construction workers also find lodging at these locations. The construction workers are expected to displace some recreational transients at these locations as well. However, numerous RV parks exist in other cities in the economic region, including Cleburne, Stephenville, Joshua, and Alvarado. These cities are located approximately 30 minutes from the CPNPP site, so it is expected that some of the construction workers would commute from these locations.

Due to the amount of temporary and permanent housing in the region, it is anticipated that the construction workers are able to find sufficient housing. Due to population increase, it is also likely that additional hotels and motels are constructed in the region before or during the construction time period. Due to the competition with recreational transients, the impacts of construction on housing in the region are expected to be SMALL to MODERATE. However, temporary housing is a market-driven industry that adjusts with new facilities to compensate for demand.

4.4.2.5 Education

A detailed description of the CPNPP regional public education system is described in Subsection 2.5.2.8.

At peak construction, it is estimated that 3010 workers, 25 percent with their families, in-migrate into the region, resulting in an estimated total of 5268 people. According to the 2000 census, Hood County’s percent of school age children is 18 percent while Somervell County’s percent is 22 percent. Based on the CPNPP Units 1 and 2 settlement patterns discussed in Subsection 5.8.2.1, it is assumed that 42 percent of the in-migrating construction workforce settles in Hood County and 21 percent in Somervell County. Using the county percentages, it is estimated that of the construction workforce approximately 491 people in Hood County and 303 people in Somervell County are school-aged. The total number of students for the 2007 – 2008 school year, not including private schools, is 6882 in Granbury ISD and 1657 in Glen Rose ISD. Therefore, the influx of population would result in a 7.1-percent change in student population in Hood County and a 18-percent change in Somervell County.

As discussed in Subsection 2.5.2.8.2, Glen Rose ISD has a maximum capacity of 2862 students. Enrollment for the 2007 – 2008 school year is 1657 students. Officials with Glen Rose ISD have indicated that the school system is capable of handling the influx of students generated by the anticipated construction workforce.

Granbury ISD has a September 2007 enrollment of 6882 students. The district has a capacity of 8556 students. The district has seen an enrollment growth rate of less than 2 percent over the last 4 years. Impact to the district from the in-migrating construction workforce would depend on the grade level of the students. Granbury ISD is developing a long range plan for the district, with a final report due sometime in 2008.

The additional students due to construction affect the amount owed as Chapter 41 school districts. The Chapter 41 recapture policy is explained in Subsection 2.5.2.8. Each additional student raises the weighted average, allowing the school district to retain more wealth.

Lesser numbers of the workforce settle in other counties of the economic region. According to the 2000 Census, the percentage of school age children in Johnson County is 21 percent, Tarrant County is 20 percent, Erath County is 18 percent, and Bosque County is 19 percent (Census 2000). Thus the in-migrating workforce increases enrollment in Cleburne ISD by 168 students (2.5 percent), Fort Worth ISD by 119 students (0.1 percent), Stephenville ISD and Three Way ISD by 71 students (2.0 percent), and Walnut Springs ISD by 61 students (30 percent). This increase is most apparent in Walnut Springs ISD due to the small student-body size. There is no district. However, during construction of CPNPP Units 1 and 2, the district accomodated an influx of approximately 140 students. Local officials stated that the district would be able to handle the additional students and would make any necessary expansions.

Enrollment during peak construction is below the maximum capacities of the districts in Hood and Somervell counties. The increases to the other districts expected to be affected in the economic region are proportionally small with the exception of Walnut Springs ISD. As that district has accomodated an increase of approximately 140 students in the past, the increase of 61 students is not expected to exceed the capability of the district. Because the influx of students due to the construction workforce are split between several districts, the impacts of construction on the education systems of the region are expected to be SMALL and no mitigation is required.

4.4.2.6 Recreation

Recreational opportunities in the region include local, state, and special events. Local tourism and recreation is described further in Subsection 2.5.2.5.

The nearest transient attraction, not including the CPNPP Visitor Center and SCR, is Dinosaur Valley State Park, located 3.3 mi southwest of the center point. While SCR is open to the public via controlled access, no new visual impacts are anticipated due to the proximity to CPNPP Unit 1 and Unit 2, which has been in operation since 1990 and 1993, respectively. The reactor domes for CPNPP Units 1 and 2 are visible from the Dinosaur Valley State Park; therefore, the construction of CPNPP Units 3 and 4 is anticipated to have a small visual impact. The Texas Amphitheater, on a hill overlooking SCR, is the second closest transient attraction, located 3.7 mi southeast of the center point. The amphitheater hosts outdoor events; therefore, the construction may result in a slight visual and noise impact. Other identified outdoor attractions in the vicinity are greater than 5 mi away and thus are unlikely to be impacted by construction at CPNPP.

Because of the distance of area attractions from the site, impacts from construction on recreation are SMALL and require no mitigation.

4.4.3 ENVIRONMENTAL JUSTICE IMPACTS

Executive Order 12898 directs federal executive agencies to consider environmental justice under the National Environmental Policy Act (NEPA 1969). This Executive Order ensures that minority and/or low-income populations do not bear a disproportionate share of adverse health or environmental consequences of a proposed project, such as the CPNPP.

Environmental justice impacts at alternative sites are discussed in Subsection 9.3.4.3.3. Subsection 2.5.4 describes the evaluation process used to identify minority and low-income populations living within the region that meet the conditions associated with the NRC guidance. Tables 2.5-24, 2.5-25, and 2.5-26, and Figures 2.5-10, 2.5-11, 2.5-12, 2.5-13, 2.5-14, 2.5-15, 2.5-16, 2.5-17, 2.5-18, and 2.5-19 identify census blocks, block groups, and relative distances and spatial distributions of minorities and low-income populations around the CPNPP.

Figure 2.5-11 illustrates the distribution of all minority populations that were identified in Subsection 2.5.4. Locally, there are no minority populations identified adjacent to the site (Figure 2.5-11). However, there are two blocks with aggregate minority plus Hispanic populations located adjacent to the site as shown in Figure 2.5-18. The closest residences in the blocks are located 0.9 mi southwest of the CPNPP Units 3 and 4 center point. The distance from the on-site construction is expected to minimize the impacts of dust and noise on the residences (Subsections 4.4.1.5 and 4.4.1.6). No expansions or improvements are planned for FM 56 as a result of the construction. The anticipated traffic volumes are less than historic levels, so the aggregate minority plus Hispanic blocks are not disproportionately affected by their proximity to the site and FM 56. The nearest minority populations to the site are in the cities of Glen Rose and Granbury. Because the effects of construction occur primarily to the site and adjacent properties, it is anticipated that there are no disproportionate impacts on minority populations.

The identified low-income populations are associated with urban areas, with the exception of an identified census block located outside the city of Dublin. There are no low-income populations in the vicinity of the CPNPP. The nearest low-income population to the site is located southwest near the city of Dublin just over 32 mi away. Because of their distance from the site and geographic location, it is anticipated that any impacts due to plant construction are minimal and proportionate to the majority of the population.

4.4.3.1 Potential Environmental Impacts

For the purposes of this environmental justice assessment, environmental impacts under consideration due to plant construction include potential impacts due to land use, water, and ecology. Potential impacts due to land use are discussed in detail in Section 4.1. Impacts due to water are described in Section 4.2. Ecological impacts are described in Section 4.3.

As outlined in Subsection 4.4.1.1, CPNPP construction remains within the site boundary. Therefore most of the impacts on the population are on the properties adjacent to the site.

As discussed in Section 4.1, all of the potential land-use impacts, which are confined to the site are SMALL. Because no minority and low-income populations occur on the site, the potential for disproportionately high impacts on minority and low-income populations is SMALL. No additional land must be procured beyond the current site, and no relocations to local off-site roads as a result of construction of a new facility are expected.

As described in Sections 4.2 and 4.3, all of the potential water-related and ecological effects are SMALL. Moreover, water-related and ecological impacts are confined to the site and its immediate vicinity where no minority or low-income populations occur. Therefore, the potential for disproportionate impacts on minority and low-income populations is SMALL.

Based on input from these sections, and the minimal construction outside the CPNPP site boundary, physical impacts are expected to be SMALL. Thus, disproportionate impacts to minority and low-income populations are SMALL.

4.4.3.2 Potential Socioeconomic Impacts

The socioeconomic effects with the greatest potential to have an impact of minorities and low-income populations are transportation, housing, and education. The remainder of the socioeconomic effects, which include public safety, social services, public services, economy, noise, and recreational resources, are SMALL or beneficial.

The impacts of plant construction on transportation are expected to be SMALL and are mainly centered on the roads closest to the plant: FM 56. Because no minority or low-income populations are located along those roads near the plant, there are no disproportionate impacts to minority and low-income populations.

The impacts of plant construction on the housing market in the economic region are expected to be SMALL to MODERATE due to the amount of temporary and permanent housing available. Based on the distribution pattern of minorities and low-income populations, the construction related housing impact on minority populations is not disproportionate. However, competition for rental and temporary housing and market-driven rate increases could impact low-income populations. The nearest low-income population that meets the LIC-203 criteria is located in the town of Dublin in Erath County. The majority of the in-migrating construction workforce to Erath County are expected to reside in Stephenville rather than Dublin (see Subsection 4.4.2.4). Based on these distribution patterns, any housing related impact on the low-income population residing in Dublin are expected to be minimal. The only other identified low-income population located within the economic region are in the Ft. Worth area. Due to the availability of housing in Tarrant County, as described in Subsection 2.5.2.6, the effects of availability rising housing cost are anticipated to be negligible.

As shown in Table 2.5-1, the population within 16 km (10 mi) in 2007 is 32,451 people. If all of the in-migrating people that are associated with construction move into that radius (3763 people) there is a population increase of 11.6 percent. In Table 2.5-2, the next radius is 40 km (25 mi) resulting in a population increase of 4.4 percent. The number of available houses is proportional to the population. The affect on the housing market of adding population numbers to the area decreases as the distance from the site increases. Therefore, the effects are reduced at the distances that the low-income populations start to appear.

The impacts on the local education system are expected to be SMALL to MODERATE. Because these impacts affect every school in the two-county area, there are no disproportionate impacts on minority or low-income populations.

Because the remainder of the impacts are small or beneficial, and because of the distribution of minorities and low-income populations among the majority populations in the region, disproportionate socioeconomic impacts in these categories on minority and low-income populations are SMALL.

Several positive socioeconomic impacts, principally applicable to the counties in the region, would be realized by the construction of Units 3 and 4 at the CPNPP. These are described in Subsection 4.4.2, and include increased employment opportunities, as well as possible income increases, both directly and indirectly related to plant construction.

Minority and low-income populations are distributed among the majority population and are not disproportionately impacted due to any benefits.

4.4.3.3 Transmission Corridors

Land use for transmission lines or off-site areas used for the construction of CPNPP Units 3 and 4 are discussed in Subsection 4.1.2. Further, discussion of transmission systems is discussed in Subsection 9.4.3. The transmission lines consist of five single and double 345-kV circuits that are owned, operated, and maintained by Oncor. Of these five lines, three single-circuit lines are located on existing ROW and use existing tower structures. Two double circuit expansions, Whitney and DeCordova, require new towers on new or expand transmission line ROW. Land use along the Whitney ROW consists of primarily grassland with some deciduous and evergreen forest and only 20 percent being designated as developed land. Land use along the DeCordova ROW consists mainly of grassland, with only 13 percent being designated as developed land as shown in Table 2.2-4.

The impacts of land use within the new transmission corridors are expected to be SMALL and are mainly centered on the new or expanded transmission line ROW closest to the Whitney line. Because the closest minority to this line is approximately one mile and because there are no low-income populations near the Whitney or DeCordova lines, there are no disproportionate impacts to minority and low-income populations.

4.4.3.4 Conclusion

Based upon the environmental justice analysis, impacts on minority and low-income populations within the vicinity and region are not disproportionate and thus are expected to be SMALL with no mitigation required.

4.4.4 REFERENCES

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TABLE 4.4-1
PERCENT OF TOTAL WORKFORCE BY CRAFT FOR CONSTRUCTION OF CPNPP UNITS 3 AND 4

Laborers	Percent of Total Work Force for US-APWR Construction[a]
Asbestos Workers	2.7
Boilermakers	0.5
Carpenters	14.4
Cement Masons	1.3
Electricians	10.6
Ironworker	19.2
Laborers	16.4
Millwrights	4.3
Operating Engineers	7.7
Painters	0.9
Pipefitters	12.8
Roofers	0.3
Sheet Metal Workers	2.0
Steamfitters	4.3
Teamsters	2.9

a) The total man-hours were converted to man-years by assuming a 50-hr work week and 52 weeks per year. The total man-years were used to derive the percentages.

TABLE 4.4-2
TOTAL NUMBER OF ON-SITE WORKFORCE PER YEAR FOR CONSTRUCTION OF CPNPP UNITS 3 AND 4[(1)]

Year	Construction	Operation	Total Workers
2008	0	22	22
2009	0	60	60
2010	119	76	195
2011	621	92	713
2012	886	168	1054
2013	2423	213	2636
2014	4953	248	5201
2015	3739	378	4117
2016	598	457	1055
2017	0	494	494
2018	0	464	464
2019	0	412	412

(1) For construction and operation milestones, see Table 1.1-1.

TABLE 4.4-3
CRAFT LABOR AVAILABILITY 2004 - 2014

Craft	Amounts for CPNPP Units 3 and 4	2004 North Central WDA	2004 Tarrant WDA	2004 Texas	2014 North Central WDA	2014 Tarrant WDA	2014 Texas
Boilermakers	15	47	76	1,620	59	94	1,893
Carpenters	520	2,926	3,445	49,818	3,896	4,206	60,378
Cement Masons	31	1,196	1,325	18,382	1,646	1,715	22,932
Electricians	380	2,728	3,587	44,795	3,580	4,227	53,720
Structural Iron and Steel Workers	715	375	502	7,081	517	640	8,622
Construction Laborers	635	6,570	7,457	105,247	8,418	9,050	123,516
Millwrights	175	138	182	2,692	185	219	3,246
Operating Engineers	309	2,017	1,733	29,036	2,718	2,142	35,959
Painters	27	1,633	1,891	28,902	2,065	2,275	34,405
Pipefitters/Steamfitters	660	1,695	2,187	28,659	2,268	2,640	35,002
Roofers	4	667	976	10,962	876	1,258	13,292
Sheet Metal Workers	72	748	1,076	11,797	978	1,276	14,365

(TWC 2008a) and (TWC 2008b)

TABLE 4.4-4 (Sheet 1 of 2)
ATTENUATED NOISE LEVELS (DBA) EXPECTED FROM CONSTRUCTION EQUIPMENT

Type of Noise Generating Equipment	Distance From Source (ft)					
	50[a]	100	400	2000[b] Closest Point to fence line (near Location 1)	2000[b] Nearest Residence (near Location 1)	6500[b] Nearest Church (Location 25)
Heavy Trucks	84	78	66	52	52	<46
Dump Trucks	84	78	66	52	52	<46
Concrete Mixer	85	79	67	53	53	<47
Jack Hammer	85	79	67	53	53	<47
Scraper	85	79	67	53	53	<47
Dozer	85	79	67	53	53	<47
Generator-25kVA	70	63	52	38	38	<32
Crane	85	79	67	53	53	<47
Loader	80	74	62	49	49	<43
Grader	85	79	67	53	53	<47
Excavator	85	79	67	53	53	<47
Pile Driver	95	89	77	63	63	<57

TABLE 4.4-4 (Sheet 2 of 2)
ATTENUATED NOISE LEVELS (DBA) EXPECTED FROM CONSTRUCTION EQUIPMENT

Type of Noise Generating Equipment	Distance From Source (ft)					
	50[a]	100	400	2000[b] Closest Point to fence line (near Location 1)	2000[b] Nearest Residence (near Location 1)	6500[b] Nearest Church (Location 25)
Concrete Batch Plant	83	77	65	51	51	<45

Noise attenuation calculation. Secondary noise level (SPL_2,dBA) = Initial noise level ($SPL_{1,}$dBA) - 20 log ($d^{'}/d^2$) where d^1 is the original distance from the source and d^2 is the measured distance from the source.

a Maximum noise levels (L_{max} dBA) at 50 feet, (US DOT 2009)

b Measurements were calculated from the approximate central location of the proposed new units major construction and the nearest receptors (Figure 2.5-20). The closest point to the fence line (location 1), back yard of residence (near location 23), and the nearest church (location 25) were measured from the approximate location of the nearest concrete batch plant and near new unit construction area. The noise levels at the nearest church should be attenuated to below background (less than existing ambient) levels at this distance.

4.5 RADIATION EXPOSURE TO CONSTRUCTION WORKERS

This section evaluates the potential radiological dose impacts to construction workers at the CPNPP resulting from the operation of CPNPP Units 1 and 2. Because the CPNPP Units 3 and 4 construction period occurs while CPNPP Units 1 and 2 are operating, construction workers at CPNPP Units 3 and 4 would be exposed to direct radiation and gaseous radioactive effluents from CPNPP Units 1 and 2. Doses to CPNPP Unit 4 construction workers from operation of CPNPP Unit 3 are not evaluated because the CPNPP Unit 4 fuel load would occur before CPNPP Unit 3 begins commercial operation. Gaseous effluent releases from CPNPP Unit 3 during fuel loading and low power testing, less than 5 percent power, are not expected to be significant and are bounded by the conservatisms in the following dose estimate. During CPNPP Unit 3 testing, the overall work force as well as outdoor construction activities on CPNPP Unit 4 would be reduced.

4.5.1 SITE LAYOUT

The CPNPP Units 3 and 4 power block areas are shown on Figure 2.1-1. As shown, the additional units would be located northwest of the protected area for the existing units. Construction activity for CPNPP Units 3 and 4 would be outside the protected area for CPNPP Units 1 and 2 but inside the restricted area boundary.

4.5.2 RADIATION SOURCES

Workers constructing CPNPP Units 3 and 4 could be exposed to direct radiation and to gaseous radioactive effluents emanating from the routine operation of CPNPP Units 1 and 2 as described in the following paragraphs.

4.5.2.1 Direct Radiation

The refueling water storage tanks (RWST) are the principal contained sources that could contribute to direct radiation exposure at the construction site. This source is not significant at CPNPP because a 2-ft 6-in thick concrete wall is used instead of a thin steel shell wall for the RWST. CPNPP Units 1 and 2 do not have an independent spent fuel storage installation (ISFSI); therefore, this source of direct radiation is not considered. In general, the dose rate at the ISFSI protected area fence would be below five mrem/hr. The radiation intensity from the ISFSI decreases with distance from the source, varying as the inverse square of the distance. For a point source, the following relation expresses the inverse square spreading effect:

$$\phi = \frac{S}{4\pi R^2}$$

Where ϕ is the intensity at a surface of a sphere of radius R, and S is the source strength. The energy twice as far from the source is spread over four times the area; therefore, it has one-fourth the intensity. Any point source that spreads its influence equally in all directions without limits to its range would obey the inverse square law. The distance from the CPNPP Unit 3 and 4 construction area to any potential ISFSI site is well over 1000 ft. For conservatism, a distance of 1000 ft is assumed. Neglecting attenuation in the air and applying the inverse square relation, a five mrem/hr dose rate within the confines of the ISFSI (at an assumed distance of one ft from the source) is reduced to 5.0E-06 mrem/hr at 1000 ft from the ISFSI facility. Considering an exposure period of 2500 hr/yr, the annual dose to a construction worker from direct radiation emanating from the ISFSI is 1.25E-02 mrem/yr.

4.5.2.2 Gaseous Effluents

Some radioactive gaseous effluents are released on a batch basis to the environment. Release pathways in this category include intentional discharges from the containment purge exhaust and the waste gas decay tanks via the plant vent stacks. Radioactive gaseous effluents are also released continuously to the environment. Potentially radioactive gases are continuously discharged from the fuel building, safeguards building, and auxiliary building ventilation exhaust systems, and the condenser off-gas system via the plant vent stacks.

The annual releases for 2006 have been reported as 148 Ci of fission and activation gases, 4.23E-04 Ci of iodines, 0.00 Ci of particulates with half-lives greater than eight days, and 47 Ci of tritium (ARERR 2007). The annual releases for 2006 are higher than normal for the existing units (ARERR 2007) due to the type of fuel used (i.e., 18-month fuel), core life, power output, and number of core cycles.

4.5.2.3 Liquid Effluents

Effluents from the liquid waste disposal system introduce small amounts of radioactivity into the SCR and the low volume waste (LVW) pond. The annual liquid radioactivity releases for 2006 have been reported as 5.9E-03 Ci of fission and activation products, 1522 Ci of tritium, and 0.54 Ci of dissolved and entrained gases (ARERR 2007). The annual releases for 2006 are typical for the existing units; however, the tritium production is dependent on fuel type, power production, and core power history.

4.5.3 MEASURED AND CALCULATED DOSE RATES

4.5.3.1 Direct Radiation

The CPNPP Units 1 and 2 have a general area monitoring (GAM) program that monitors various points inside the protected area. The protected area fence Thermoluminescent Dosimeter (TLD) readings for 2006 are given in Table 4.5-1. The limiting cumulative dose rate is 0.001 mrem/hr. This dose rate bounds the CPNPP Units 3 and 4 construction worker direct radiation dose rate from CPNPP Units 1 and 2 because this location is closer to CPNPP Units 1 and 2 than to the CPNPP Units 3 and 4 construction area.

4.5.3.2 Gaseous Effluents

The annual Radioactive Effluent Release Report for 2006 (ARERR 2007) provides continuous and batch mode releases for CPNPP Units 1 and 2. For 2006, the calculated noble gas air dose due to gamma radiation was 7.21E-03 mrad/yr/unit, while the calculated noble gas air dose due to beta radiation was 1.76E-02 mrad/yr/unit. The total combined 2006 gaseous effluent releases are given in Table 4.5-2. The 2006 releases are conservative when compared to historic average gaseous effluent release data. (ARERR 2007)

The CPNPP Unit 3 construction area is approximately 1900 ft (579 m) NW of the closest corner of the CPNPP Unit 2 turbine building. This distance is conservative relative to any actual gaseous effluent release point for either CPNPP Unit 1 or Unit 2. Use of the distance to the CPNPP Unit 3 construction area is also conservative because the CPNPP Unit 4 construction area is farther away. To ensure that the limiting dose at the construction area is captured, atmospheric dispersion factors were also calculated for the WNW and NNW directions at a distance of 1900 ft. The XOQDOQ computer code was used with the 2001 – 2006 CPNPP meteorological data to determine the atmospheric dispersion and deposition from this assumed release location to the CPNPP Unit 3 construction area. The atmospheric dispersion and deposition factors are given in Table 4.5-3.

The GASPAR computer code was then used, with the calculated atmospheric dispersion factors, to determine the CPNPP Unit 3 construction worker dose due to gaseous effluent releases from CPNPP Units 1 and 2. The gaseous effluent releases from CPNPP Units 1 and 2 were conservatively modeled as ground level releases because the release height is not more than 2 times the height of adjacent buildings. The release elevation of the plant vent stack is approximately 58 m above plant grade. The assumed area for calculation of building wake effects was 3193 m^2. This represents the cross-sectional area of the CPNPP Unit 1 containment building. This is conservative because the gaseous effluent releases are from both operating units. The building height used was 260 ft (79m) above grade.

4.5.3.3 Liquid Effluents

The Annual Radioactive Effluent Release Report for 2006 (ARERR 2007) reports a total body dose of 0.103 mrem and a critical organ dose of 0.103 mrem to the maximally exposed member of the public due to the release of liquid effluents from the existing units, calculated in accordance with the existing units' ODCM.

4.5.4 CONSTRUCTION WORKER DOSES

Construction worker doses were conservatively estimated using the following information:

- The estimated maximum dose rate for each pathway.
- An exposure time of 2500 hr/yr (50 hr/week * 50 week/yr).
- A peak loading of 4300 construction workers per year.

The estimated maximum annual dose for each pathway as well as the total dose is discussed below.

4.5.4.1 Direct Radiation

Using the protected area fence cumulative dose rate of 0.001 mrem/hr from Subsection 4.5.3.1, the annual construction worker dose due to direct radiation is 2.5 mrem based on a construction worker exposure of 2500 hr/yr. This is the dose at the CPNPP Units 1 and 2 protected area fence. Doses to the CPNPP Units 3 and 4 construction workers would be reduced due to the distance to the construction area.

4.5.4.2 Gaseous Effluents

The annual gaseous effluent doses to the maximally exposed member of the public are based on continuous occupancy. The construction worker doses are given in Table 4.5-4. These doses have been adjusted for an exposure time of 2500 hr/yr, the estimated individual worker doses due to gaseous effluent releases from CPNPP Units 1 and 2 are 4.05E-03 for the total body and 4.20E-03 mrem for the critical organ. Applying a weighting factor of 0.03 to the critical organ dose, as discussed in RG 1.183, page 1.183-9, and adding to the total body dose, a total effective dose equivalent (TEDE) of 4.18E-03 mrem is estimated.

4.5.4.3 Liquid Effluents

The annual liquid effluent doses to the maximally exposed member of the public are based on continuous occupancy and are adjusted for an exposure time of 2500 hr/yr. Although the liquid effluent dose rates to which the workers would be exposed are not expected to be as high as the dose to the maximally exposed member of the public, the doses calculated for the public are used. The resulting doses are 2.9E-02 mrem for the whole body and 2.9E-02 mrem for the critical organ. Applying a weighting factor of 0.03 to the organ dose and adding to the whole body dose, a TEDE of 3.0E-02 mrem is estimated.

4.5.4.4 Total Doses

The annual doses from all three pathways are summarized in Table 4.5-4 and compared to the public dose criteria of 10 CFR 20.1301 and 40 CFR 190 in Table 4.5-5 and Table 4.5-6, respectively. Because the calculated doses meet the public dose criteria of 10 CFR 20.1301 and 40 CFR 190, the workers would not need to be classified as radiation workers. Table 4.5-7 shows that the doses also meet the design objectives of 10 CFR 50, Appendix I, for direct radiation, and gaseous and liquid effluents. The maximum annual collective dose to the construction work force of 4300 workers is estimated to be 10.75 person-rem.

The calculated doses are based on available dose rate measurements and calculations. It is possible that these dose rates would increase in the future as site conditions change. The site would be continually monitored during the construction period, and appropriate actions would be taken as necessary to ensure that the construction workers are protected from radiation.

The annual estimated construction worker doses attributable to the operation of CPNPP Units 1 and 2 for the proposed construction areas for CPNPP Units 3 and 4 are below 10 CFR 20 and 10 CFR 50, Appendix I, limits. Therefore, in accordance with 10 CFR 20.1301 criteria, monitoring of individual construction workers is not required.

4.5.5 REFERENCES

(ARERR 2007) Comanche Peak Steam Electric Station Units 1 and 2 Radioactive Effluent Release Report, January 1, 2006 - December 31, 2006, ML071230073.

TABLE 4.5-1
PROTECTED AREA FENCE TLD MEASUREMENTS

	Exposure Rate in mr/hr			Cummulative Exposure Rate
	Jan-Mar	Mar-Aug	Aug-Dec	
Protected Area 810' N. Floppy Fence	0.001	0.001	0.001	0.001
Protected Area 810' RCA Fence N.	0.001	0.001	0.002	0.001
Protected Area 810' RCA Fence NE.	0.001	0.001	0.001	0.001
Protected Area 810' RCA Fence SE.	0.001	0.001	0.001	0.001
Protected Area 810' RCA Fence S.	0.001	0.001	0.002	0.001
Protected Area 810' RCA Fence SW	0.001	0.001	0.001	0.001
Protected Area 810' RCA Fence	0.001	0.001	0.001	0.001

TABLE 4.5-2
2006 CPNPP UNITS 1 AND 2 GASEOUS EFFLUENTS

Isotope	Total Release (Ci)
Ar-41	8.86E-01
Kr-85	3.34E+00
Kr-85M	2.46E-01
Kr-87	0.00E+00
Kr-88	1.45E-01
I-131	2.34E-04
I-132	4.17E-05
I-133	1.47E-04
Xe-131M	7.31E-01
Xe-133	1.37E+02
Xe-133M	9.56E-01
Xe-135	4.57E+00
Xe-135M	2.23E-02
Xe-138	3.78E-02
H-3	4.74E+01

TABLE 4.5-3
ATMOSPHERIC DISPERSION AND DEPOSITION

		Atmospheric Dispersion Factor (sec/m^3)			
Distance	Direction	X/Q	X/Q decayed	X/Q decayed depleted	D/Q
579 m	WNW	2.3E-06	2.3E-06	2.1E-06	1.7E-08
579 m	NW	4.7E-06	4.7E-06	4.4E-06	4.0E-08
579 m	NNW	5.9E-06	5.9E-06	5.5E-06	5.8E-08

TABLE 4.5-4
ANNUAL CONSTRUCTION WORKER DOSE

	Annual Dose (mrem)		
	Whole Body	Critical Organ	TEDE
Direct Radiation	2.5	N/A	2.5
Gaseous Effluents	4.05E-03	4.20E-03 (thyroid)	4.18E-03
Liquid Effluents	2.9E-02	2.9E-02	3.0E-02
Total	2.5	3.32E-02	2.5

TABLE 4.5-5
CONSTRUCTION WORKER DOSE
COMPARISON TO 10 CFR 20.1301 CRITERIA

Type of Dose	Annual Dose Limits[a]	Estimated TEDE Dose[b]
Annual dose (mrem)	100	2.5
Unrestricted area dose rate (mrem/hr)	2	0.001

a) 10 CFR 20.1301 criteria.

b) Dose due to direct radiation and liquid and gaseous effluent releases.

Note: Divide mrem by 100 to get mSv.

TABLE 4.5-6
COMPARISON OF CONSTRUCTION WORKER DOSE
TO 40 CFR 190 CRITERIA

Type of Dose	Annual Dose Limits[(a)]	Estimated TEDE Dose[(b)]
Total body dose	25 mrem	2.5 mrem
Thyroid doses	75 mrem	3.32E-02 mrem
Other organ doses	25 mrem	7.84E-03 mrem (skin)

a) 10 CFR 20 requires that the dose to an individual also meet 40 CFR 190 limits.

b) The estimated whole body dose conservatively includes background radiation whereas the dose limit applies to exposures from plant operation only.

Note: Divide mrem by 100 to get mSv.

TABLE 4.5-7
COMPARISON OF CONSTRUCTION WORKER DOSE
TO 10 CFR 50 APPENDIX I CRITERIA

Type of Dose	Annual Dose Limits[a]	Evaluated Dose mrem
Total body dose from liquid effluents	3	2.9E-02
Organ dose from liquid effluents	10	2.9E-02
Total body dose from gaseous effluents	5	4.05E-03
Organ dose from radioactive iodine and radioactive particulates in gaseous effluents	15	4.20E-03 (thyroid)

a) 10 CFR 50, Appendix I, criteria.

Notes:

1. Exposure period of 2500 hr/yr is assumed.

2. Divide mrem by 100 to get mSv.

4.6 MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

A summary of adverse impacts is presented in Table 4.6-1. The table compares environmental disturbances versus environmental receptors, or resources. The top horizontal axis on the impact matrix represents the principal environmental disturbances that could result from construction activities. The left vertical axis depicts the environmental receptors or resources that could potentially be affected by those disturbances. The table also summarizes measures and controls that have been identified for minimizing or mitigating construction impacts.

The significance indicators provided in Table 4.6-1 are designated using the following descriptors: SMALL (S), MODERATE (M), or LARGE (L). The significance indicators are defined in Section 4.0.

The assignments of significance levels (S, M, L) in Table 4.6-1 are based on the assumption that for each impact, corresponding specific mitigation measures and controls, or equivalents, are implemented. A blank cell in the elements column “Potential Environmental Disturbances” denotes “no impact” of that type on the environmental resource.

Each attribute in the column “Impact Description or Activity” is assigned a number. Similarly, each attribute in the column “Specific Measures and Controls” is assigned a number in parenthesis that corresponds to the number in the column “Impact Description or Activity. ”

The measures and controls described in Sections 4.1 through 4.5 and in Table 4.6-1 are considered reasonable from a practical, engineering, and economic view. They are based on statutes and regulatory requirements, or they are accepted practices within the construction industry. Therefore, these controls and measures are not expected to present an unreasonable or undue hardship on the applicant. In addition, preparation of specific control procedures is planned, which are designed to provide the necessary guidance for implementing the control program elements, including monitoring, which are identified in Table 4.6-1.

Based on a review of the construction impacts described in Chapter 4, applicable measures and controls for reducing these impacts at the CPNPP Units 3 and 4 location is supported by the following activities:

- Completion of archaeological surveys to identify areas of concern and to limit the potential impact during construction is described in this COL application (Subsections 2.5.3 and 4.1.3).
- Identifying construction activities and utilization of appropriate measures to limit the impact of construction on adjacent water bodies (Subsections 4.2.1 and 4.2.2).
- Completion of ecological surveys to identify areas of potential impacts from construction activities (Subsections 2.4.1, 2.4.2, 4.3.1 and 4.3.2).
- Conduct planning and engineering studies to evaluate the appropriate location to construct infrastructure facilities; i.e., parking lots, storage facilities, office buildings, roads, etc., so as to reduce construction impacts.

- Geologic borings, soil tests, and groundwater well data are used in combination with the planning and engineering studies to develop a stormwater pollution prevention plan.
- Control dust emissions from construction activities by spraying water on unpaved roads and other disturbed areas, thus limiting potential visual and safety impacts.
- Materials Safety Data Sheets (MSDS) are required for use with applicable hazardous materials at the CPNPP site. Construction employees are trained in the appropriate use of hazardous materials. Hazardous materials are used in accordance with applicable federal, state, and local laws and regulations.
- Hazardous wastes are treated, stored, and disposed of in accordance with the Resource Conservation and Recovery Act (RCRA), and any other applicable federal, state, and local laws and regulations. Construction employees are trained in the appropriate handling and disposal of hazardous wastes.
- Safety and environmental personnel are to oversee and inspect construction activities to help limit potential impacts.
- Construction activities are performed in accordance with applicable local, state, and federal ordinances, laws, and regulations intended to prevent or minimize adverse environmental impacts of construction activities on air, water, and land, and on workers and the public.
- Construction activities comply with applicable permits and licenses.
- Construction activities are performed in compliance with applicable corporate safety and construction procedures.
- Pertinent construction permits and environmental requirements are included in construction contracts.
- Tax revenues provide improvements to infrastructure and community services thus limiting the impacts by temporary construction demands.

4.6.1 REFERENCES

None

TABLE 4.6-1 (Sheet 1 of 9)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

	Potential Environmental Disturbances and Significance Levels															
ENVIRONMENTAL RESOURCES (Section Reference)	Noise	Erosion	Air and Dust Emissions	Traffic	Chemicals and Petroleum Products	Surfacewater Disturbances	Groundwater Disturbances	Land Disturbances	Water Use Consumption	Terrestrial Disturbances	Aquatic Disturbances	Socioeconomic Changes	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
4.1 Land-Use Impacts																
4.1.1 The Site and Vicinity		S	S		S										1. Construction of new buildings and impervious surfaces. 2. Ground-disturbing activities, including grading and re-contouring. 3. Removal of existing vegetation. 4. Use of chemicals and petroleum. 5. Stockpiling of soils on-site.	(1) Land has already been dedicated as the site for CPNPP Units 1 and 2, and much of the site has been previously disturbed. No additional land is needed to complete construction of the new plants. (1 and 2) Limit ground disturbances to the smallest amount of area necessary to construct and maintain the plants. (1 and 2) Ground disturbing activities are to be performed in accordance with regulatory and permit requirements; use adequate BMPs erosion control measures to minimize impacts. (3) Limit vegetation removal to the area within the CPNPP site designated for construction activities. (4) Minimize potential spills of chemicals and petroleum materials through training, spill prevention plans, and rigorous compliance with applicable regulations and procedures. (5) Restrict soil stockpiling and reuse to designated areas on the CPNPP site.

TABLE 4.6-1 (Sheet 2 of 9)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

	Potential Environmental Disturbances and Significance Levels															
ENVIRONMENTAL RESOURCES (Section Reference)	Noise	Erosion	Air and Dust Emissions	Traffic	Chemicals and Petroleum Products	Surfacewater Disturbances	Groundwater Disturbances	Land Disturbances	Water Use Consumption	Terrestrial Disturbances	Aquatic Disturbances	Socioeconomic Changes	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
4.1.2 Transmission Corridors and Off-site Areas		S	S		S										1. Construction or modification of transmission line corridor.	(1) Site new corridor(s) to avoid impact on critical or sensitive habitats/species as much as possible. (1) Limit vegetation removal and construction activities to corridor(s). (1) Restrict sites regarding access to corridor(s) for construction equipment. (1) Minimize potential spills of hazardous wastes/ materials through training and rigorous compliance with applicable regulations. (1) Minimize potential impacts through avoidance, compliance with permitting requirements, and BMPs.
4.1.3 Historic Properties														S	1. Erosion and ground-disturbing activities including grading and re-contouring, and construction of new transmission lines that could affect cultural resources.	(1) Consult with SHPO if a cultural resource is discovered. (1) Follow established procedures to halt work if a potential unanticipated historic, cultural, or paleontological resource is discovered.
4.2 Water-Related Impacts																

TABLE 4.6-1 (Sheet 3 of 9)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

ENVIRONMENTAL RESOURCES (Section Reference)	Potential Environmental Disturbances and Significance Levels: Noise	Erosion	Air and Dust Emissions	Traffic	Chemicals and Petroleum Products	Surfacewater Disturbances	Groundwater Disturbances	Land Disturbances	Water Use Consumption	Terrestrial Disturbances	Aquatic Disturbances	Socioeconomic Changes	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
4.2.1 Hydrologic Alterations		S			S	S	S	S	S	S	S				1. Construction or modification of water intake structures could result in minor hydrologic changes. 2. Clearing of previously undisturbed areas are expected to have minor effects on hydrology. 3. Excavation dewatering activities. 4. Dredging for construction of water intake and discharge structures on Lake Granbury. 5. Eroded materials reaching wetlands and other surfacewaters.	(1) Adhere to applicable regulations and permits. (2) Minimize sizes of cleared areas and employ BMPs to control erosion. (3) Limit extent of dewatering to only that necessary to proceed with construction. (4) Comply with TCEQ and USACE permit conditions using BMPs during construction. (5) A formal SWP3 is expected to define specific control measures during construction using BMPs appropriate to the specific activity.

TABLE 4.6-1 (Sheet 4 of 9)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

	Potential Environmental Disturbances and Significance Levels															
ENVIRONMENTAL RESOURCES (Section Reference)	Noise	Erosion	Air and Dust Emissions	Traffic	Chemicals and Petroleum Products	Surfacewater Disturbances	Groundwater Disturbances	Land Disturbances	Water Use Consumption	Terrestrial Disturbances	Aquatic Disturbances	Socioeconomic Changes	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
4.2.2 Water-Use Impacts		S	S						S						1. Water used in dust suppression, general cleanup, the concrete batch plant, and watering vegetation would have a SMALL effect on water usage. 2. Increased worker population would result in a SMALL increase in water use. 3. Water used in pipeline cleaning and hydrostatic testing would potentially impact receiving waters.	(1 and 2) No measures or controls are necessary because impacts are expected to be too SMALL to warrant consideration of any mitigation measures. (3) TPDES permit requirements are expected to minimize discharge impacts to receiving waters.

TABLE 4.6-1 (Sheet 5 of 9)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

	Potential Environmental Disturbances and Significance Levels															
ENVIRONMENTAL RESOURCES (Section Reference)	Noise	Erosion	Air and Dust Emissions	Traffic	Chemicals and Petroleum Products	Surfacewater Disturbances	Groundwater Disturbances	Land Disturbances	Water Use Consumption	Terrestrial Disturbances	Aquatic Disturbances	Socioeconomic Changes	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
4.3 Ecological Impacts (i.e., impacts on the physical environment)																
4.3.1 Terrestrial Ecosystems	S	S		S	S			S		S					1. Clearing and grading and habitat loss include animals, such as birds and mammals, displaced from the construction site, and less mobile animals killed. 2. Wildlife startled or frightened away by construction noises. 3. Potential animal impacts from vehicles and bird collisions with manmade structures, cranes, buildings, during construction. 4. Release of chemical and petroleum products or wastes.	(1) Limit clearing to the smallest amount of area necessary to construct the plant and transmission line ROW(s). (1) Use established (SWP3) procedures for minimizing erosion or sediment deposition on terrestrial habitat. (3) Impact is very SMALL. Confine vehicles to roadways and authorized stream crossings; no reasonable mitigation measures have been identified for bird collisions. (4) Use best practices as outlined in a site-specific SPCC Plan to maintain equipment and prevent spills and leaks.

TABLE 4.6-1 (Sheet 6 of 9)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

	Potential Environmental Disturbances and Significance Levels															
ENVIRONMENTAL RESOURCES (Section Reference)	Noise	Erosion	Air and Dust Emissions	Traffic	Chemicals and Petroleum Products	Surfacewater Disturbances	Groundwater Disturbances	Land Disturbances	Water Use Consumption	Terrestrial Disturbances	Aquatic Disturbances	Socioeconomic Changes	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
4.3.2 Aquatic Ecosystems	S	S			S	S					S			S	1. Potential impacts to surfacewater from contaminated stormwater and spills. 2. Erosion and runoff into nearby water bodies. 3. Potential impacts to surfacewater from increased sediment load during construction. 4. Temporarily degraded aquatic habitat due to construction near water body crossings by the transmission system. 5. Turbidity and sediment deposition from construction of new intake and discharge facilities on Lake Granbury.	(1) Develop and implement a construction stormwater pollution prevention plan. (1) Develop and implement a site-specific spill prevention control and countermeasure plan for construction activities. (2,3,4 and 5) Implement erosion and sediment control plans that incorporate recognized BMPs. (2, 3, and 4) Install appropriate barriers and use BMPs during construction. (5) Limit construction area to minimum required to complete construction activity.

TABLE 4.6-1 (Sheet 7 of 9)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

	Potential Environmental Disturbances and Significance Levels															
ENVIRONMENTAL RESOURCES (Section Reference)	Noise	Erosion	Air and Dust Emissions	Traffic	Chemicals and Petroleum Products	Surfacewater Disturbances	Groundwater Disturbances	Land Disturbances	Water Use Consumption	Terrestrial Disturbances	Aquatic Disturbances	Socioeconomic Changes	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
4.4 Socioeconomic Impacts (i.e., impacts on the human environment)																
4.4.1 Physical Impacts	S		S											S	1. Potential temporary and limited noise impacts to workers. 2. Potential for worker accidents. 3. Increased air and dust emissions from construction equipment. 4. Increased debris to existing off-site landfills.	(1) Make public announcements or give prior notification of atypically loud construction activities. (1, 2, and 3) Train and appropriately protect employees and construction workers to reduce the risk of potential exposure to noise, dust, and exhaust emissions. (2) Provide on-site services for emergency first aid, and conduct regular health and safety monitoring. (2) Provide appropriate job training to construction workers. (3) Use dust control measures such as watering, stabilizing disturbed areas, covering trucks. (4) Establish procedures and perform audits to ensure that all waste is disposed of according to applicable regulations such as the Resource Conservation and Recovery Act (RCRA).

TABLE 4.6-1 (Sheet 8 of 9)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

ENVIRONMENTAL RESOURCES (Section Reference)	Potential Environmental Disturbances and Significance Levels														Impact Description or Activity	Specific Measures and Controls
	Noise	Erosion	Air and Dust Emissions	Traffic	Chemicals and Petroleum Products	Surfacewater Disturbances	Groundwater Disturbances	Land Disturbances	Water Use Consumption	Terrestrial Disturbances	Aquatic Disturbances	Socioeconomic Changes	Radiation Exposure	Other (site-specific)		
4.4.2 Social and Economic Impacts				S				S				S			1. Potential impacts to existing traffic in the vicinity of CPNPP due to increased traffic. 2. Potential short-term housing shortage. 3. Potential for increased housing construction impacts. 4. Potential short-term ability of schools to accommodate influx of students without additional facilities and teachers. 5. Potential for increased traffic accidents with increased construction traffic.	(1) Stagger shifts, encourage car pooling, and time deliveries to avoid shift change or commute times. (1) Erect signs alerting drivers of construction and potential for increased construction traffic. (2) Mitigate housing shortage through new construction in anticipation of arrival of construction workforce. (3) The temporary and short term nature of this demand is expected to be met through the market response in terms of motel/hotel/RV parks construction and rehabilitation of existing facilities. (5) Use procedures and employee training program to reduce potential for traffic accidents.
4.4.3 Environmental Justice Impacts															1. None identified.	(1) No mitigation measures required.

4.5 Radiation Exposure to Construction Workers

TABLE 4.6-1 (Sheet 9 of 9)
SUMMARY OF MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

	Potential Environmental Disturbances and Significance Levels															
ENVIRONMENTAL RESOURCES (Section Reference)	Noise	Erosion	Air and Dust Emissions	Traffic	Chemicals and Petroleum Products	Surfacewater Disturbances	Groundwater Disturbances	Land Disturbances	Water Use Consumption	Terrestrial Disturbances	Aquatic Disturbances	Socioeconomic Changes	Radiation Exposure	Other (site-specific)	Impact Description or Activity	Specific Measures and Controls
4.5.1 Worker Impacts													S		1. Actions to protect construction workers while the first unit is operating and the second is being built.	(1) Take measures that could include monitoring workers, providing radiation worker training, and developing work plans that minimize worker radiation exposure. (1) Ensure compliance with all federal and state regulatory requirements pertaining to the radiation protection program.

4.7 CUMULATIVE IMPACTS RELATED TO CONSTRUCTION ACTIVITIES

This section summarizes the potential cumulative environmental impacts associated with construction activities for CPNPP Units 3 and 4 at the Luminant CPNPP site. Cumulative impact is defined by the NRC as:

> "...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

The preceding definition appears in the regulations of the Council on Environmental Quality (CEQ) for implementing the NEPA, 40 CFR 1508.7. NRC regulation 10 CFR 51.14(b) states that 40 CFR 1508.7 would be utilized by the NRC in implementing NEPA regulations.

This section includes the identification and tabulation of potential adverse cumulative impacts associated with construction of the proposed units. The following are steps utilized to identify the potential impacts:

a. Identification of geographical areas that were considered in evaluating cumulative impacts. The CEQ guidance emphasizes the use of natural ecological or sociocultural boundaries (CEQ 1997) are possible geographical areas that could be used to determine the appropriate geographical area for a cumulative impact analysis. A 50-mi radius from the center point between CPNPP Units 3 and 4 was chosen as the geographical area for cumulative analysis (Figure 4.7-1).

b. Identification of past, present, and reasonably foreseeable federal, non-federal, and private actions that could have meaningful cumulative impacts with the proposed action.

c. Determination of cumulative impacts through assessment of the aggregate effects from these projects and the effects expected from construction of CPNPP Units 3 and 4.

Two federal projects have been identified in the geographical area of the proposed project site (Subsection 4.7.2). Subsection 4.7.3 and Table 4.7-1 provide a summary of potential cumulative impacts assuming that construction activities for the two identified federal projects coincide with construction of CPNPP Units 3 and 4.

4.7.1 IDENTIFICATION OF THE GEOGRAPHIC AREA TO BE CONSIDERED IN EVALUATING CUMULATIVE IMPACTS

No adverse cumulative impacts were noted in the geographical area of the proposed project site. Smaller areas of analysis within this geographical area are tied to specific aspects of the existing environment, and these areas are identified in Table 4.7-1.

4.7.2 IDENTIFIED ACTIONS THAT MAY HAVE POTENTIAL FOR CUMULATIVE IMPACTS IN ADDITION TO THE PROPOSED ACTION

Agency reviews were performed for all probable federal agency actions within the geographical area of the proposed project site. Two projects were identified (Figure 4.7-1) pursuant to NEPA and are presented in Section 2.8. In 2006, a USACE Environmental Assessment (EA) was prepared prior to the development of Ham Creek Park (HCP) into a class A campground at Whitney Lake (USACE 2006). Ham Creek is a public park located about seven mi west of Rio Vista on the Brazos River. The park closed about 20 years ago, but Johnson County and the USACE plan to renovate and re-open it. Congress secured $900,000 in federal money for the project in 2006, and with Senate approval, plans to secure an additional $1.8 million. The proposed plan includes construction of roads, a boat ramp with parking, a gate house, group pavilions, day use sites, recreational and primitive camping sites, hiking, an equestrian center, and an amphitheater.

The USACE EA for HCP development states “There will be no significant adverse impacts to human and natural environment associated with proper implementation of the proposed action. No significant adverse environmental impacts are anticipated for soil, waters of the United States, water quality, fish and wildlife, aquatic vegetation, noise and general aesthetics, culture resources, hazardous, toxic and radioactive wastes, air quality, recreation, or socioeconomics within the subject property” (USACE 2006).

The second project identified was the Wheeler Branch Reservoir (WBR) currently being constructed by the Somervell County Water District (SCWD). As discussed in Section 2.8, the project has been issued a USACE Section 404 permit (USACE 2005). The reservoir, when completed, would provide potable water for Somervell County residences and would also be utilized for the construction of CPNPP Units 3 and 4. A Mitigation Plan for this project was prepared by Freese & Nicholas, Inc. (F&N 2005) for the construction of WBR. This document was used by USACE for basis to approve the 404 permit.

Based on the conclusions of the documents referenced above there would be no adverse impacts of the identified projects associated with the construction of CPNPP Units 3 and 4.

Impacts from past federal projects potentially effecting environmental conditions during the construction of CPNPP Units 1 and 2 were also evaluated. The only large federal projects in addition to CPNPP Units 1 and 2 within the geographical area of the proposed project site include the impoundment of Lake Palo Pinto by the construction of Palo Pinto Creek Dam (completed 1965) and the impoundment of Lake Granbury by the construction of the De Cordova Dam (completed 1969). Several other water reservoirs are within the geographical area (Figure 4.7-1); however, these water reservoirs are located within different watersheds from the proposed project’s watershed, and these water reservoirs would not be impacted by the construction of CPNPP Units 3 and 4.

4.7.3 CUMULATIVE IMPACTS

A summary of potential cumulative impacts related to construction activities for CPNPP Units 3 and 4 is presented in Subsection 4.3.1 and Table 4.7-1. This table is based on the analysis in Table 2-2 of the CEQ publication titled Considering Cumulative Effects Under the National

Environmental Policy Act from the Council on Environmental Quality (CEQ 1997). Table 4.7-1 compares environmental disturbances versus environmental receptors or resources and lists where these areas of concern are addressed. Significance indicators for the cumulative impacts are designated using the following descriptors: SMALL (S), MODERATE (M), or LARGE (L). The significance indicators are defined in Section 4.0. The measures and controls for limiting adverse impacts during construction are described in Sections 4.1, 4.2, 4.3, 4.4 and 4.5 and presented in Table 4.6-1.

SMALL impacts from construction of CPNPP Units 3 and 4 and their supporting structures are expected during the construction time period; however, these impacts are considered temporary and not cumulative in nature (Table 4.6-1).

As stated in Subsection 4.7.1, no adverse cumulative impacts were noted in the geographical area.

Based on the USACE EA prepared for the proposed HCP development, this project is not considered a major federal project. The construction activities of the proposed HCP project that would commence during the construction of CPNPP Units 3 and 4 have a cumulative impact that would be anticipated as SMALL, or nonexistent because of the physical distance between the projects (approximately 18 mi).

The construction of the WBR project is likely to be complete by the time major construction activities from CPNPP Units 3 and 4 commence. Some site preparation activities for the proposed project may overlap with the WBR construction. Any cumulative impacts between the two projects are expected to be SMALL or nonexistent because of the physical distance between the two project sites that are located in separate watersheds, and the CPNPP Units 3 and 4 geographical location (approximately 2 mi).

There are no other identified private construction projects proposed within the geographical area other than the construction of the CPNPP Units 3 and 4. If additional projects should be proposed in the future, construction activities would be evaluated, and, where appropriate, actions would be considered to mitigate any cumulative impacts identified.

4.7.4 REFERENCES

(CEQ 1997) Council on Environmental Quality. Considering Cumulative Effects Under the National Environmental Policy Act. January 1997.

(F&N 2005) Paluxy River Diversion Project. Somervell County, Texas. Somervell County Water District. Mitigation Plan. USACE Project No. 200100522. March 2005

(USACE 2005) Department of the Army Permit Evaluation and Decision Document, Somervell County Water District. Application No. 200100522. April 2005.

(USACE 2006) U.S. Army Corps of Engineers, Ft. Worth District, Environmental Assessment, Ham Creek Park Development Whitney Lake. Johnson County, Texas. http://www.swf.usace.army.mil/pubdata/notices/HamCreek/Ham_Creek_Final_EA_March_2006_reduced.pdf. Accessed February 2006.

TABLE 4.7-1 (Sheet 1 of 10)
POTENTIAL CUMULATIVE IMPACTS FROM CONSTRUCTION ACTIVITIES

Resources	Areas for Analysis	Projects in Geographical Area	Potential Impact	Cumulative Impact Level	Impact Description and Mitigation (if necessary)	ER Section Impact Addressed for CPNPP
Air Quality	Metropolitan area, airshed, or global atmosphere	WBR and HCP redeveloped	Air pollution	S	WBR project is expected to be completed prior to starting major construction activities for CPNPP Units 3 and 4. Some site grading activities may coincide with final WBR construction activities. A Mitigation Plan (F&N 2005) has been completed for this project and USACE has issued a 404 Permit (USACE 2005) HCP redevelopment project has not been funded to date, so construction activities may or may not coincide with those of CPNPP Units 3 and 4. The USACE EA (USACE 2006) completed for HCP states that there would be no adverse impact to the air quality in the vicinity of the subject property; therefore, there would be no cumulative impacts to WBR and CPNPP Units 3 and 4. No mitigation is required. Based on the physical distance between these two projects and the proposed CPNPP project, the potential cumulative impact from air emissions during construction activities is considered SMALL to nonexistent; therefore, no migration is required.	4.4.1.6

TABLE 4.7-1 (Sheet 2 of 10)
POTENTIAL CUMULATIVE IMPACTS FROM CONSTRUCTION ACTIVITIES

Resources	Areas for Analysis	Projects in Geographical Area	Potential Impact	Cumulative Impact Level	Impact Description and Mitigation (if necessary)	ER Section Impact Addressed for CPNPP
Water Quality	Stream, watershed, river basin, estuary, aquifer, or parts thereof	WBR and HCP	Water pollution	S	WBR is located in a different watershed; therefore, potential water quality impacts from construction activities at WBR and CPNPP Units 3 and 4 are considered to be SMALL or nonexistent, and no mitigation is required. HCP is located in the Brazos River Basin watershed approximately 40 river miles downstream of CPNPP. CPNPP construction plans include the implementation of a best management practices which should limit any potential water quality impact to SCR and Lake Granbury. The potential of cumulative impacts is SMALL, and no mitigation is required. The EA completed for HCP and the 404 Permit for WBR states that there would be no long term adverse impact to water quality in the vicinity of the subject property; therefore, there would be no cumulative impacts to WBR and CPNPP Units 3 and 4. No mitigation is required. No long term water pollution issues related to CPNPP Unit 3 and 4 construction activities are foreseen and any cumulative impact would be SMALL. A LARGE beneficial cumulative impact from the construction of WBR would be that all four units at CPNPP would not require the use of groundwater during plant operations.	4.2

TABLE 4.7-1 (Sheet 3 of 10)
POTENTIAL CUMULATIVE IMPACTS FROM CONSTRUCTION ACTIVITIES

Resources	Areas for Analysis	Projects in Geographical Area	Potential Impact	Cumulative Impact Level	Impact Description and Mitigation (if necessary)	ER Section Impact Addressed for CPNPP
Vegetative Resources	Watershed, forest, range, or ecosystem	WBR and HCP	Land disturbance, erosion, air, and water pollution	S	The USACE EA and the 404 Permit for WBR completed for HCP states that there would be no adverse impact to vegetation to the subject site; therefore, there would be no cumulative impacts to WBR and CPNPP Units 3 and 4. No mitigation is required. To minimize potential impacts during construction clearing activities are performed in compliance with federal and state regulations, and permit requirements at all three sites. No long term land disturbance or water pollution issues related to construction activities from all three sites is foreseen, and any cumulative impact would be SMALL.	4.2 and 4.3.1.1

TABLE 4.7-1 (Sheet 4 of 10)
POTENTIAL CUMULATIVE IMPACTS FROM CONSTRUCTION ACTIVITIES

Resources	Areas for Analysis	Projects in Geographical Area	Potential Impact	Cumulative Impact Level	Impact Description and Mitigation (if necessary)	ER Section Impact Addressed for CPNPP
Resident wildlife	Species habitat or ecosystem	WBR and HCP	Land disturbance, erosion, air, noise, and water pollution	S	The EA completed for HCP and the 404 Permit for WBR states that there would be no adverse impact to vegetation to the subject site; therefore, there would be no cumulative impacts to WBR and CPNPP Units 3 and 4. No mitigation is required. A direct impact on wildlife in the construction area at each location could occur during the construction period. This impact would affect only organisms that cannot readily flee the construction areas. The direct mortality of wildlife in the limited areas of construction is not expected to be great enough to cause detectable population effects. No commercially valuable, essential, critical, or bio-indicator species that potentially occupy habitats have been identified at or near CPNPP. The only important terrestrial species potentially occupying the site are a small number of rare species and a larger number of recreationally valuable species that are common in northern Texas. No long term air, noise, or water pollution issues related to construction activities are foreseen and any cumulative impact would be SMALL.	2.4, 4.3.1, and 4.3.1.2

TABLE 4.7-1 (Sheet 5 of 10)
POTENTIAL CUMULATIVE IMPACTS FROM CONSTRUCTION ACTIVITIES

Resources	Areas for Analysis	Projects in Geographical Area	Potential Impact	Cumulative Impact Level	Impact Description and Mitigation (if necessary)	ER Section Impact Addressed for CPNPP
Migratory wildlife	Breeding grounds, migration route, wintering areas, or total range of affected population units	WBR and HCP	Land disturbance, air, noise, and water pollution	S	The USACE EA completed for HCP and the 404 Permit for WBR states that there will be no adverse impact to wildlife habitat and vegetation at the subject property; therefore, there would be no cumulative impacts to WBR and CPNPP Units 3 and 4. No mitigation is required. Visual inspections to date have not identified any valuable, essential, critical, or bio-indicator species that potentially occupy habitats that have been identified at or near CPNPP. No long term air, noise, or water pollution issues related to construction activities are foreseen and any cumulative impact would be SMALL.	4.2 and 4.3

TABLE 4.7-1 (Sheet 6 of 10)
POTENTIAL CUMULATIVE IMPACTS FROM CONSTRUCTION ACTIVITIES

Resources	Areas for Analysis	Projects in Geographical Area	Potential Impact	Cumulative Impact Level	Impact Description and Mitigation (if necessary)	ER Section Impact Addressed for CPNPP
Fishery resources	Stream, river basin, estuary, or parts thereof; spawning area and migration route	WBR and HCP	water pollution	S	The EA completed for HCP and the 404 Permit for WBR states that there would be no adverse impact to aquatic vegetation at the subject property; therefore, there would be no cumulative impacts to WBR and CPNPP Units 3 and 4. No mitigation is required. Construction and transmission line maintenance near water bodies has the potential to adversely affect aquatic environmental quality. Effects of erosion on areas of disturbed vegetative cover, as well as toxicity caused by unintentional chemical spills may occur. To minimize potential impacts to the surrounding aquatic communities, compliance with BMPs provided by in the site-specific SWPPP and spill prevention guidance would be required. This compliance would minimize the risk of surface water contamination by construction activities. There are no commercial fisheries on SCR or Lake Granbury. No long term water pollution issues related to construction activities are foreseen and any cumulative impact would be SMALL.	4.2 and 4.3.2

TABLE 4.7-1 (Sheet 7 of 10)
POTENTIAL CUMULATIVE IMPACTS FROM CONSTRUCTION ACTIVITIES

Resources	Areas for Analysis	Projects in Geographical Area	Potential Impact	Cumulative Impact Level	Impact Description and Mitigation (if necessary)	ER Section Impact Addressed for CPNPP
Historic resources	Neighborhood, rural community, city, state, tribal territory, known or possible historic district	WBR and HCP	Land disturbance	S	The USACE EA completed for HCP and the 404 Permit for WBR states that there would be no adverse impact to cultural resources at the subject property; therefore, there would be no cumulative impacts to WBR and CPNPP Units 3 and 4. No mitigation is required. Several cultural resource studies were completed prior to construction of CPNPP Units 1 and 2. In addition, studies were also conducted as part of the COLA for CPNPP Units 3 and 4 to assess the potential impact of off-site water pipeline installation. No historically or archaeologically sensitive sites were noted within the proposed construction zones. The cumulative impacts of on-site and off-site construction at the CPNPP upon historic sites or prehistoric and historical archaeological sites within a 10-mi radius of the property are SMALL. No mitigation is warranted.	4.1.3

TABLE 4.7-1 (Sheet 8 of 10)
POTENTIAL CUMULATIVE IMPACTS FROM CONSTRUCTION ACTIVITIES

Resources	Areas for Analysis	Projects in Geographical Area	Potential Impact	Cumulative Impact Level	Impact Description and Mitigation (if necessary)	ER Section Impact Addressed for CPNPP
Sociocultural resources	Neighborhood, community, distribution of low-income or minority population, or culturally valued landscape	WBR and HCP	Land disturbance, erosion, air, noise, visual and water pollution social services, environmental justice	S	The USACE EA completed for HCP states and the 404 Permit for WBR that there would be no adverse impact to cultural resources at the subject property; therefore, there would be no cumulative impacts to WBR and CPNPP Units 3 and 4. No mitigation is required. Based on input from sections in Chapter 4, and the minimal construction outside the CPNPP site boundary, physical impacts are expected to be SMALL. Thus, disproportionate impacts to minority and low-income populations are SMALL. Minority and low-income populations are distributed among the majority population and are not disproportionately impacted due to any benefits.	4.1, 4.2, 4.3 and 4.4.3
Land use	Community, metropolitan area, county, state, or region	WBR and HCP	Land disturbance	M	Land for construction activities for CPNPP Units 3 and 4 and pipeline ROWs is owned or leased; e.g. by CPNPP. Land disturbances from off-site construction activities are expected to be MODERATE but temporary. Due to the distances between the sites, the likelihood of any cumulative impacts is minimal. Each site must maintain a SWPPP that has BMPs to ensure that erosion controls are maintained and also provide emergency procedures in case of a spill. No additional mitigation measures are warranted.	4.1

TABLE 4.7-1 (Sheet 9 of 10)
POTENTIAL CUMULATIVE IMPACTS FROM CONSTRUCTION ACTIVITIES

Resources	Areas for Analysis	Projects in Geographical Area	Potential Impact	Cumulative Impact Level	Impact Description and Mitigation (if necessary)	ER Section Impact Addressed for CPNPP
Coastal zone	Coastal region or watershed	N/A	None – CPNPP is not located in a coastal area	N/A	N/A – Both identified projects and CPNPP are over 200 mi from the nearest coastal region or watershed.	N/A
Recreation	River, lake, geographic area, or land management unit	WBR and HCP	Land disturbance, air, noise, and water pollution	S	The USACE EA completed for HCP and the 404 Permit for WBR states that there would be no adverse impact to recreation activities at the subject property; therefore, there would be no cumulative impacts to WBR and CPNPP Units 3 and 4. No mitigation is required. Because of the distance of area attractions from the site, cumulative impacts from construction on recreation are SMALL and require no mitigation.	4.1 and 4.4.2.6

TABLE 4.7-1 (Sheet 10 of 10)
POTENTIAL CUMULATIVE IMPACTS FROM CONSTRUCTION ACTIVITIES

Resources	Areas for Analysis	Projects in Geographical Area	Potential Impact	Cumulative Impact Level	Impact Description and Mitigation (if necessary)	ER Section Impact Addressed for CPNPP
Socioeconomics	Community, metropolitan area, county, state, or country	WBR and HCP	Land disturbance, air, noise, visual pollution, social services, environmental justice	S/M	The USACE EA completed for HCP states that there would be no adverse impact to demand on socioeconomic resources at the subject property; therefore, there would be no cumulative impacts to WBR and CPNPP Units 3 and 4. No mitigation is required. There are several SMALL and MODERATE impacts expected during the construction of CPNPP Units 3 and 4; however, none of these impacts are foreseen to be cumulative in nature. No additional migration is warranted. The only LARGE potential cumulative impact is the increase in sales tax revenue from purchases made by the facilities and construction workers. This revenue would be considered a beneficial impact.	4.4

4.8 NONRADIOLOGICAL HEALTH IMPACTS - CONSTRUCTION

This is a supplemental ER section. It is not covered by a NUREG-1555 ESRP. This section is provided to assist the reviewer in understanding the potential nonradiological public and occupational health impacts from work activities associated with the construction of CPNPP Units 3 and 4.

4.8.1 PUBLIC HEALTH

Members of the public can potentially be put at risk by construction of CPNPP Units 3 and 4. Nonradiological air emissions and dust can transport off-site through the atmosphere to where people are living. Noise can also propagate off-site. The increase in traffic from commuting construction workers and deliveries can result in additional air emissions and traffic accidents.

Subsection 4.4.1 addresses the impacts to the public from air emissions, noise, and traffic resulting from construction activities and concludes that the impacts would be SMALL with some MODERATE but temporary noise impacts during operation of heavy equipment or large bulk deliveries to CPNPP, and pipeline construction.

4.8.2 OCCUPATIONAL HEALTH

Construction of CPNPP Units 3 and 4 would involve risk to workers from accidents or occupational illnesses. These risks could result from physical accidents such as slips, falls, electrical shock and burns, exposure to toxic or oxygen-replacing gases, and other hazards. The construction contractor and subcontractors would be required to adhere to Occupational Safety and Health Administration standards, practices, and procedures.

The Bureau of Labor Statistics (BLS) maintains records of a statistic known as total recordable cases (TRCs), which are a measure of work-related injuries or illnesses that include death, days away from work, restricted work activity, medical treatment beyond first aid, and other criteria. The 2005 nationwide TRC rate published by the BLS for utility system construction is 5.6 per 100 workers or 5.6 percent (BLS 2006a). The same statistic for Texas is 3.9 per 100 workers or 3.9 percent (BLS 2006b). Luminant has calculated the TRC incidence for the proposed units as the national TRC rate times the number of workers. Using the estimated yearly employment numbers (Table 4.4-2) and the national and Texas TRC rates, Luminant estimated the annual average TRCs over the 108 months of preconstruction and construction activities (2009 through 2018) for Units 3 and 4 and the peak number of TRCs for a 12-month period with peak employment (month’s 73 through 84 following preconstruction activities).

The number of TRCs per year during the construction of CPNPP Units 3 and 4 can be estimated as the number of workers multiplied by the TRC rate then divided by 100. The estimated TRC incidences would be:

	TRC Incidence Based on U.S. Rate	TRC Incidence Based on Texas Rate
Average Annual (2018 workers)	113	78
Peak 12-month period (4503 workers)	252	176

The BLS data for fatal occupational injuries (BLS 2006c) and average employment (BLS 2006a) were used to calculate the nationwide annual rate of fatal occupational injuries. Luminant requires contractors to develop and implement safety procedures with the intent of preventing injuries, occupational illnesses, and deaths. Even with effective safety procedures, construction work carries the risk of injury, illness, and death. Based on statistical analysis, Luminant does not anticipate the construction of CPNPP Units 3 and 4 to result in more potential construction fatalities than for other similarly-sized power plant or large construction projects.

4.8.3 REFERENCES

(BLS 2006a) Table 1. Incidence rates of nonfatal occupational injuries and illnesses by industry and case types, 2005. BLS 2006. http://www.bls.gov/iif/oshwc/osh/os/ostb1619.pdf. Accessed February 15, 2008.

(BLS 2006b) Table 6. Incidence rates of nonfatal occupational injuries and illnesses by industry and case types, 2005. Texas, BLS 2006. http://www.bls.gov/iif/ oshwc/osh/os/pr056tx.pdf. Accessed February 15, 2008.

(BLS 2006c) Table A-1. Fatal occupational injuries and event or exposure. All United States, 2005. BLS 2006. http://www.bls.gov/iif/oshwc/cfoi/cftb0205.pdf. Accessed February 15, 2008.

4.9 SEPARATION OF CONSTRUCTION AND PRECONSTRUCTION IMPACTS

In the context of this section, and for discussion of separation of construction and preconstruction environmental impacts, the term “construction” has two decidedly different meanings. When printed in italics hereafter, the term “*construction*” refers to the specific term that is defined in 10 CFR 50.10:

> the analysis, design, manufacture, fabrication, quality assurance, placement, erection, installation, modification, inspection, or testing of a facility or activity which is subject to the regulations in this part and consulting services related to the facility or activity that are safety related.

When italics are not used, the term “construction” refers to the more commonly used general term that includes all activities necessary to build the two-unit nuclear plant, including the associated supporting structures and facilities.

In addition to the cumulative impacts attributable to preconstruction and construction of the entire CPNPP site summarized in Table 4.7-1, a breakdown of estimated *construction* and preconstruction environmental impacts is provided in Table 4.9-1 for the purpose of assessing impacts attributable specifically to the *construction* of safety- related structures, systems, or components (SSCs) as defined in 10 CFR 50.2 “Definitions”. The remaining CPNPP construction activities can be considered to be either preconstruction or other than *construction* under the definition in 10 CFR 50.2.

Table 4.9-1 provides estimates of the percentages of impacts attributable to *construction* and to preconstruction, as well as a summary of the basis for the estimates. The estimated *construction*-related impacts presented in Table 4.9-1 were based on two factors: the area associated with the *construction* of safety-related SSCs and the labor hours associated with the *construction* of safety-related SSCs. Information related to these two factors is provided as follows.

Construction Area

The CPNPP site consists of approximately 7950 ac excluding off-site facilities (pipeline corridors, transmission line corridors, rail corridors and intake structure). The total estimated area that will be developed for CPNPP Units 3 and 4 is estimated to be approximately 675 ac excluding off-site facilities. Of these developed areas, approximately 193 ac are expected to be developed for safety-related SSCs. The area that is expected to be developed for the *construction* of safety-related SSCs therefore represents approximately 29 percent of the total area to be developed (excluding off-site facilities).

Labor Hours

Based on preliminary *construction* estimates for all phases of development of CPNPP Units 3 and 4 the estimated labor hours associated with the *construction* of safety-related SSCs is approximately 98 percent of the total labor hours associated with the development of the entire CPNPP Units 3 and 4 site.

TABLE 4.9-1 (Sheet 1 of 5)
SUMMARY OF CONSTRUCTION-AND PRECONSTRUCTION-RELATED IMPACTS

Section Reference	Potential Impacts and Significance[a]	Estimated Impacts (%) Preconstruction	Estimated Impacts (%) *Construction*[b]	Basis of Estimate
ER Section 4.1 Land-Use Impacts				
ER Subsection 4.1.1 The Site and Vicinity	S – Erosion S – Air and Dust Emissions S – Chemicals and Petroleum Products	71	29	Estimates are based on the area of land use that would be dedicated to safety-related structures, systems, or components (SSCs) and the assumption that the construction of SSCs would occur on no more than approximately 193 acres (ac) of the project area being developed (that is, 675 ac, excluding off-site electric transmission lines) (28.6%, restated as 29%).
ER Subsection 4.1.2 Transmission Corridors and Off-Site Areas	S – Erosion S – Air and Dust Emissions S – Chemicals and Petroleum Products	100	0	Neither transmission corridors nor any other off-site areas associated with construction of the CPNPP are included in the definition of construction of SSCs.
ER Subsection 4.1.3 Historic Properties	S – Other (site-specific)	100	0	The impact on historic properties would apply only to preconstruction activities, because they would be identified prior to land clearing, grading, installation of drainage systems, erosion controls, and other environmental mitigation measures, and construction of temporary roads and laydown areas.

TABLE 4.9-1 (Sheet 2 of 5)
SUMMARY OF CONSTRUCTION-AND PRECONSTRUCTION-RELATED IMPACTS

Section Reference	Potential Impacts and Significance[(a)]	Estimated Impacts (%)		Basis of Estimate
		Preconstruction	*Construction*[(b)]	
ER Subsection 4.2 Water-Related Impacts				
ER Subsection 4.2.1 Hydrologic Alterations	S – Erosion S – Chemicals and Petroleum Products S – Surfacewater Disturbances S – Groundwater Disturbances S – Land Disturbances S – Water Use Consumption S – Terrestrial Disturbances S – Aquatic Disturbances	71	29	Estimates are based on the area of land use that would be dedicated to safety-related structures, systems, or components (SSCs) and the assumption that the construction of SSCs would occur on no more than approximately 193 acres (ac) of the project area being developed (that is, 675 ac, excluding off-site electric transmission lines) (28.6%, restated as 29%).

TABLE 4.9-1 (Sheet 3 of 5)
SUMMARY OF CONSTRUCTION-AND PRECONSTRUCTION-RELATED IMPACTS

Section Reference	Potential Impacts and Significance[a]	Estimated Impacts (%)		Basis of Estimate
		Preconstruction	*Construction*[b]	
ER Subsection 4.2.2 Water-Use Impacts	S – Surface Water S – Air and Dust Emissions S – Water Use Consumption	71	29	Estimates are based on the area of land use that would be dedicated to safety-related structures, systems, or components (SSCs) and the assumption that the construction of SSCs would occur on no more than approximately 193 acres (ac) of the project area being developed (that is, 675 ac, excluding off-site electric transmission lines) (28.6%, restated as 29%).
ER Subsection 4.3 Ecological Impacts (i.e., impacts on the physical environment)				
ER Subsection 4.3.1 Terrestrial Ecosystems	S – Noise S – Erosion S – Traffic S – Chemicals and Petroleum Products S – Land Disturbances S – Terrestrial Disturbances	100	0	Ecological impacts would occur during preconstruction activities, and mobile wildlife species are expected to vacate the site until construction is complete. Impacts to native plants would occur during land clearing and preparation.

TABLE 4.9-1 (Sheet 4 of 5)
SUMMARY OF CONSTRUCTION-AND PRECONSTRUCTION-RELATED IMPACTS

Section Reference	Potential Impacts and Significance[a]	Estimated Impacts (%)		Basis of Estimate
		Preconstruction	*Construction*[b]	
ER Subsection 4.3.2 Aquatic Ecosystems	S – Noise S – Erosion S – Traffic S – Chemicals and Petroleum Products S –Surfacewater Disturbances S –Aquatic Disturbances S – Other (site-specific)	100	0	The impact on aquatic ecosystems would apply only to preconstruction activities, because they would be identified prior to land clearing, grading, installation of drainage systems, erosion controls, and other environmental mitigation measures, and construction of temporary roads and laydown areas.
ER Subsection 4.4 Socioeconomic Impacts (i.e., impacts on the human environment)				
ER Subsection 4.4.1 Physical Impacts	S – Noise S – Air and Dust Emissions S – Other (site-specific)	2	98	Most perceptible noise impacts at off-site locations would occur during the most intense operations in the power block area and would include pile driving for SSCs. Air emissions would occur in the vicinity of the SSCs (power block area) during construction. Estimates are based on the percent of labor hours dedicated to safety-related SSCs (98 %) and the percent of land dedicated to SSCs (29 %).

TABLE 4.9-1 (Sheet 5 of 5)
SUMMARY OF CONSTRUCTION-AND PRECONSTRUCTION-RELATED IMPACTS

Section Reference	Potential Impacts and Significance[(a)]	Estimated Impacts (%)		Basis of Estimate
		Preconstruction	*Construction*[(b)]	
ER Subsection 4.4.2 Social and Economic Impacts	S – Traffic S – Land Disturbances S – Socioeconomic Changes	2	98	Estimates are based on the percent of total project labor hours that would be dedicated to the construction of safety-related SSCs, all of which would be in the power block areas of the CPNPP (approximately 98%).
ER Subsection 4.4.3 Environmental Justice Impacts	None identified	2	98	Estimates are based on the percent of total project labor hours that would be dedicated to the construction of safety-related SSCs, all of which would be in the power block areas of the CPNPP (approximately 98%).
ER Subsection 4.5 Radiation Exposure to Construction Workers				
ER Subsection 4.5.1 Worker Impacts	S – Radiation Exposure	51	49	Estimates are based on 50% of the workforce remaining during completion of the SSCs for CPNPP Unit 4 (half of 98 %).

Notes

(a) The assigned potential impact significance levels of SMALL (S), MODERATE (M), or LARGE (L) are based on the assumption that mitigation measures and controls would be implemented.

(b) "*Construction*," as defined in 10 CFR 50.2 refers to the construction of safety-related SSCs for a facility.